

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

Sustainable Supply Chain Management for Cocoa in Ghana

By **KNUST**

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A Thesis submitted to the Department of Information Systems and Decision Sciences,
College of Social Sciences
in partial fulfilment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

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DECLARATION

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

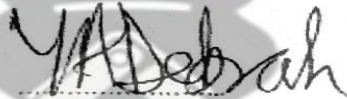
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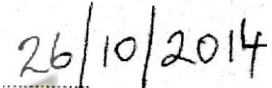
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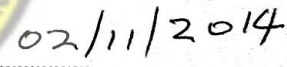
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DEDICATION

I dedicate this work to my Lord and Saviour Jesus Christ.

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It is often said, and truly so, that no thesis is the work of the author only. This study is no exception. Many people have, directly and indirectly, contributed to the realization of its successful completion. Most importantly, I am very thankful to God, by whose grace I have been able to complete this work successfully. To Him do I pledge allegiance and offer the tribute of praise from the core of my heart. I wish to also express my sincerest gratitude to Prof. Yaw A. Debrah and Dr. Gilbert Aryee; my first and second supervisors respectively, for their enormous counseling and guidance, constructive comments, useful suggestions, excellent pieces of advice and unlimited help which made it possible for me to complete this work. Your immense contribution will never be in vain. God richly bless you. I need to also mention that I am highly indebted to Prof. W. O. Ellis, the Vice Chancellor of this great institution, for granting me the opportunity of enrolling on this programme. I know he will be greatly rewarded. I cannot forget Prof. Afrane and Prof. J. M. Frimpong, Provost of CASS and Dean of KSB respectively, for their support and commitment towards ensuring the realization of the mission of the Vice Chancellor's initiative. To my Head of Department, Dr. Jonathan Annan, who graciously recommended me for the Doctoral Programme from which this thesis emanated, I am very grateful. Together with other staff members of the Department and Faculty, may God richly bless you for your diverse assistance. Many thanks also go to all the respondents; farmers, PCs, LBCs and CMC officials who willingly supplied the needed data to complete this thesis successfully. To my family, may God richly bless you for the genuineness of love and immense support. You have all been very instrumental in bringing me to this far and experience in life. I am also thankful to all those who helped in any way to make this research work a success.



ABSTRACT

Among development priorities, the Government of Ghana is very committed to securing the sustainability of the cocoa supply chain due to its important role in Ghana's economy. Yet, Ghana must confront serious challenges regarding the maintenance of future sustainability of the cocoa value chain. This study assesses the management of sustainability in the cocoa chain in Ghana. Among other things, the study sought to: map the flow process of cocoa in the domestic chain in Ghana; identify the risks within each stage that impact on goals of sustainability; establish the relationship that exists between engagement in sustainable practices and the performance of players in the chain and to find out whether supply chain improvement programmes play any moderating role in the linkage between sustainable practices and the performance of players in the chain. To this end, a mixed method approach was employed to collect both qualitative and quantitative data. Results of the quantitative method indicate differences in sustainability practices among key players. Specifically, it is observed that farmers are highly involved in economic initiatives than environmental and social and for the Cocoa Marketing Companies (CMC) efforts are invested in internal operations specifically those that border on social and economic sustainability. The qualitative results also reveal that the cocoa chain is exposed to enormous risks. These risks revolve around the following: farm level risks which include stock-out, spoilage, environmental, pest infestations, shrinkage, theft and loss of cocoa land; Purchasing Clerks (PCs') risks include weight loss of cocoa beans, theft, unpaid credit, environmental and pest infestations; License Buying Companies (LBCs') risks include poor quality supply, stock-out, contractual, technical, commercial, reputational, employee turnover, performance, environmental, shrinkage, spoilage, theft, pest infestations, smuggling, robbery/theft, short-landed, outsourcing, accident and spoilage; and the CMC risks include shortages, add-mixture, spoilage, health, over-supply, theft/robbery and smuggling of cocoa. This study contributes to the literature on Sustainable Supply Chain Management (SSCM) by demonstrating that SSCM relates positively with the competitive performance of actors and that Supply Chain Management (SCM) Investments moderate the linkage between SSCM and the performance of actors. Furthermore, by adopting a system-wide analysis that reveals the inherent risks in the chain and with emphasis on the Supply Chain (SC) phases for which existing literature is limited, this study makes a significant contribution to the field/discipline.

CONTENTS

TITLE	PAGE
Title page.....	i
Declaration.....	ii
Dedication.....	iii
Acknowledgement.....	iv
Abstract.....	v
Contents.....	vi
List of tables.....	xi
List of figures.....	xii
List of abbreviations/acronyms	xiii
CHAPTER ONE - INTRODUCTION	
1.0 Background of the Study.....	1
1.1 Statement of the Problem.....	6
1.2 Research Objectives.....	10
1.3 Research Questions.	11
1.4 Justification of the Study	12
1.5 Research Methodology.....	13
1.6 Scope of the Study.....	14
1.7 Limitations of the Study.....	14
1.8 Organisation of the Study.....	15
CHAPTER TWO - LITERATURE REVIEW	
2.0 Introduction.....	17
2.1 Supply Chain.....	17
2.2 Supply Chain Management.....	20
2.3 Sustainable Supply Chain Management.....	22
2.4 Dimensions of a Sustainable Supply Chain.....	26
2.4.1Economic Dimension of Sustainability.....	26
2.4.2Social Dimension of Sustainability.....	28
2.4.3Environmental Dimension of Sustainability.....	29
2.5 The Economic Value of a Sustainable Supply Chain	30
2.6 Sustainability and the Cocoa Chain	31
2.6.1 The Economic Dimension of a Sustainable Cocoa Chain	33
2.6.2 The Environmental Dimension of a Sustainable Cocoa Chain	33
2.6.3 The Social Dimension of a Sustainable Cocoa Chain	33
2.7 Empirical Review	34
2.8 Conclusion	57
CHAPTER THREE – THEORETICAL FRAMEWORK	
3.0 Introduction	58
3.1 Sustainable Supply Chain Management: An Operational Definition	58
3.1.1 Economic Dimension.....	60
3.1.2 Social Dimension	61

3.1.3 Environmental Dimension	62
3.2 Theoretical Framework and Hypotheses Building	62
3.2.1 The Link between Social and Environmental Dimensions	63
3.2.2 The Link between Social and Economic Dimensions	65
3.2.3 The Link between Environmental and Economic Dimensions	67
3.2.4 A Three-Fold or a Single-Fold?	68
3.3 Competitive Advantage: A Means to an End	71
3.3.1 Production Efficiency	72
3.3.2 Innovation Capacity	73
3.3.3 Company Reputation	75
3.3.4 Operational Performance	76
3.3.5 Strategic Capabilities	77
3.3.6 Resource Pool	78
3.3.7 Market Share	79
3.4 The Moderating Effect of SCM Improvement Programmes	80
3.4.1 Transparency	80
3.4.2 Risk Management	82
3.4.3 Supplier Development and Vendor Rating	83
3.4.4 Supply Chain Collaboration	85

CHAPTER FOUR – METHODOLOGY

4.0 Introduction	87
4.1 Research Philosophy	87
4.2 Research Approach	88
4.3 Research Purpose	89
4.4 Type of Investigation	90
4.5 Extent of Researcher Interference	91
4.6 Unit of Analysis	91
4.7 Study Setting	91
4.8 Time Horizon	92
4.9 Study Population	92
4.10 Sample Size and Sampling Techniques	93
4.10.1 Sampling: Qualitative	93
4.10.2 Sampling: Quantitative Study	95
4.11 Types and Sources of Data	96
4.12 Methods of Data Collection	96
4.12.1 Interview and Focus Group Discussion Methods	96
4.12.2 Questionnaire Method	98
4.12.1.1 Measures	98
4.12.2 Pre-Testing of Questionnaires	98
4.12.3 Final Administration Procedure	100
4.13 Data Analysis: Qualitative	100
4.14 Data Analysis: Quantitative	102
4.15 Validity and Reliability	108
4.15.1 Reliability of Results	104

4.15.2 Factor and Parallel Analysis	105
4.15.3 Principal Component Analysis for Environmental Dimension	109
4.15.4 Principal Component Analysis for Economic Dimension	107
4.15.5 Principal Component Analysis for Social Dimension	113
4.15.5 Principal Component Analysis for Moderators	117
4.15. Principal Component Analysis for Competitive Advantage	120
4.18 Research Ethics	124

CHAPTER FIVE – PROFILE OF COCOA CHAIN IN GHAN

5.0 Introduction	126
5.1 The Global Cocoa Chain	126
5.1.1 Cocoa as a World Economic Good	126
5.1.2 Cocoa as a Network	128
5.2 Overview of Ghana’s Domestic Cocoa Chain	131
5.3 A Description of the Ghana Cocoa Supply Chain	134

CHAPTER SIX – QUANTITATIVE DATA ANALYSIS

6.0 Introduction	139
6.1 Descriptive Analysis	139
6.1.1 Aspects of Social Dimension	140
6.1.2 Aspects of Environmental Dimension	143
6.1.3 Aspects of Economic Dimension	145
6.1.4 Pattern of Sustainability Practices among Actors	147
6.1.5 The Effectiveness of the Measures of Sustainability	150
6.2 Correlation Analysis	157
6.2.1 Diagnostic Tests	158
6.2.2 Correlation Matrix	159
6.2.3 Relationship between Moderators, Sustainability & Competitive Advantage.....	165
6.3 Regression Analysis	169
6.3.1 The Generalized Linear Regression	170
6.3.2 GLR of Sustainability, Moderators and Competitive Advantage	170
6.3.3 Moderating Effects	178
6.4 Hypotheses Testing	182
6.4.1Hypotheses on Cross Effects	183
6.4.2Hypotheses on Relationship Competitive Advantage	184
6.4.3Hypothesis on Associated Impact	189
6.4.4Hypothesis on Best Dimensions	190
6.4.5Hypotheses on Moderating Effects	192

CHAPTER SEVEN - QUANTITATIVE DATA DISCUSSION

7.0 Introduction	196
7.1 Supply Chain Phases Emphasized by Players	196
7.1.1 Key Aspects of the Social Dimension	197
7.1.2 Key Aspects of the Environmental Dimension	200
7.1.3 Key Aspects of the Economic Dimension	201

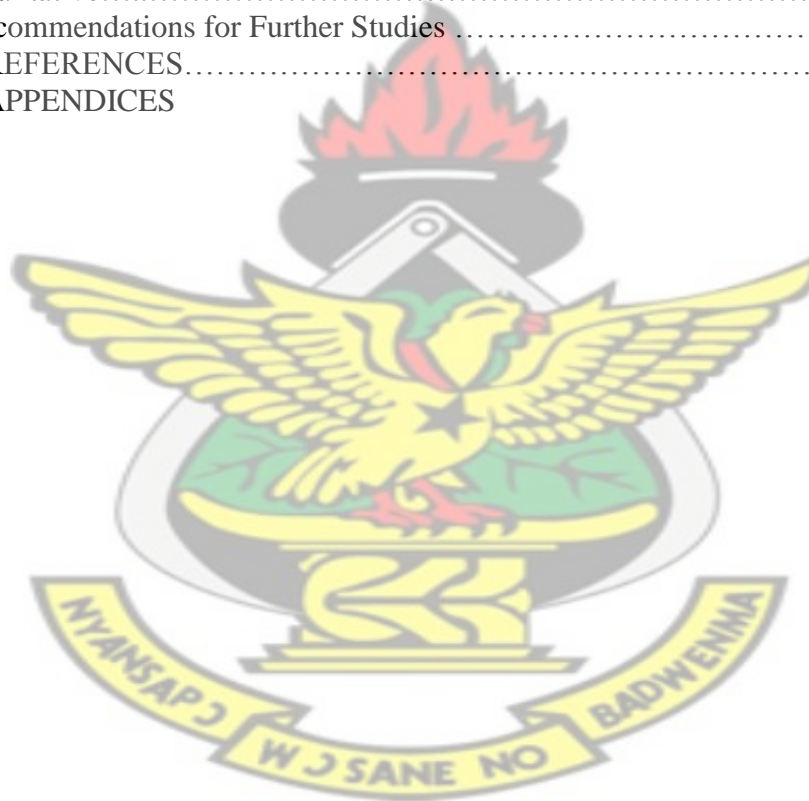
7.1.4 Pattern of Sustainability Practices among Actors	203
7.2 Relationship among Sustainability Dimensions	204
7.3 The Tripod and Single Strand Effect	207
7.4 Sustainable Supply Chain Management Initiatives and Performance	209
7.4.1 Production efficiency	210
7.4.2 Innovation Capacity	211
7.4.3 Company Reputation	212
7.4.4 Operational Performance	213
7.4.5 Strategic Capability	215
7.4.6 Resource Pool	216
7.4.7 Market Share	217
7.4.7 Hypothesis on Associated Impact	218
7.5 Role Of Supply Chain Improvement Programmes	219
7.5.1 Transparency	220
7.5.2 Risk Management	221
7.5.3 Supplier Development	222
7.5.4 Collaboration	223
7.6 Conclusion	225

CHAPTER EIGHT – QUALITATIVE DATA ANALYSIS AND DISCUSSION

8.0 Introduction	226
8.1 The Flow Process of Cocoa in Ghana	226
8.2 Risks in the Cocoa Chain	229
8.2.1 Farm Level Risks	230
8.2.1.1 Purchasing Risks	230
8.2.1.2 Internal Operations Risks	233
8.2.1.3 Warehousing Risks	237
8.2.1.4 Transportation Risks	239
8.2.2 PC Level Risks	240
8.2.2.1 Purchasing Risks	240
8.2.2.2 Internal Operations Risks	243
8.2.2.3 Warehousing Risks	244
8.2.2.4 Transportation Risks	244
8.2.3 LBC Level Risks	244
8.2.3.1 Purchasing Risks	244
8.2.3.2 Internal Operations Risks	254
8.2.3.3 Warehousing Risks	264
8.2.3.4 Out-Bound Transportation Risks	259
8.2.4 CMC (COCOBOD) Level Risks	261
8.2.4.1 Purchasing/Insourcing Risks	262
8.2.4.3 Warehousing Risks	261
8.2.4.4 Out-Bound Transportation Risks	266
8.3 Discussion	268
8.4 Conclusion	272

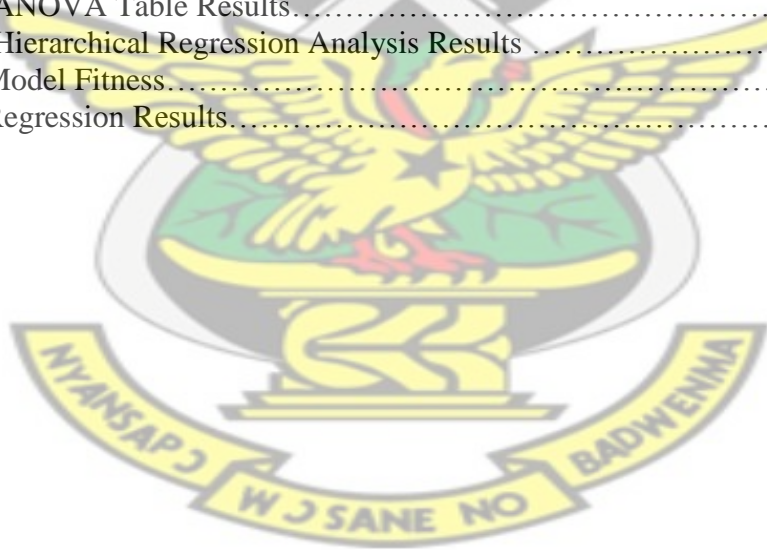
CHAPTER NINE - SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

9.0 Introduction	273
9.1 Summary of Findings	273
9.1.1 The Flow Process of Cocoa in the Domestic Cocoa Chain in Ghana.....	273
9.1.2 Types of Risks within the Cocoa Chain	276
9.1.3 Patterns of Sustainability among Actors	277
9.1.4 Relationship among Sustainability Dimensions.....	279
9.1.5 Sustainable Supply Chain Management Initiatives and Performance	279
9.1.6 The Tripod and Single Strand Effect	280
9.1.7 Role of Supply Chain Improvement Programmes	281
9.2 Conclusions	286
9.3 Recommendations	286
9.3.1 Quantitative	283
9.3.2 Qualitative.....	289
9.3.3 Recommendations for Further Studies	293
REFERENCES.....	295
APPENDICES	



LIST OF TABLES

TABLES	PAGES
Table 4.1 Sample Size and Distribution	95
Table 4.2 Sample Size and Distribution	95
Table 4.3: Cronbach's Reliability Tests	104
Table 4.4: Factor Analysis (PCA) For Environmental Dimension	106
Table 4.5: Comparison of eigenvalues using Horn's Parallel analysis: Env. Dimen.....	108
Table 4.6: Factor Analysis and Cronbach Alpha for Economic Dimension	110
Table 4.7: Comparison of Eigenvalues Using Horn's Parallel Analysis: Economic.....	112
Table 4.8: Factor Analysis and Cronbach Alpha for Social Dimension.....	114
Table 4.9: Comparison of Eigenvalues Using Horn's Parallel Analysis: Social.....	116
Table 4.10: Factor Analysis and Cronbach Alpha for Moderators.....	118
Table 4.11: Comparison of eigenvalues using horn's parallel analysis: moderators.....	119
Table 4.12: Factor Analysis for Competitive Advantage	121
Table 4.13: Comparison of Eigenvalues Using Horn's Parallel Analysis: Comp. Adv...124	124
Table 5.1 Key Members in Ghana Cocoa Production and Export.....	135
Table 6.1: Pattern of Sustainability Practices among Actors.....	148
Table 6.2: Correlation between Sustainability Dimensions & Variants of Comp. Adv...160	160
Table 6.3: Correlation Analysis b/n Moderators, Sustainability & Overall Comp. Adv.168	168
Table 6.4: Diagnostics Tests.....	171
Table 6.5: Model Summary.....	172
Table 6.6: ANOVA Table Results.....	172
Table 6.7: Hierarchical Regression Analysis Results	176
Table 6.8 Model Fitness.....	179
Table 6.9 Regression Results.....	180



LIST OF FIGURES

FIGURES	PAGE
Fig. 3.1: Theoretical Framework.....	63
Fig. 5.1: World Cocoa Production (2007-2012)	127
Fig. 5.2: A Simplified World Cocoa Chain.....	131
Fig. 5.3: Annual Trends of Cocoa Production.....	133
Fig. 6.1: Key Aspect of Social Dimension emphasised by Practitioners.....	141
Fig. 6.2: Key Aspects of Environmental Dimension emphasised by Practitioners.....	144
Fig. 6.3: Key Aspects of Economic Dimension emphasised by Practitioners.....	146
Fig. 6.4: Competitive Advantage against Sustainability Practice.....	152
Fig. 6.5: Sustainability Practices and Competitive Advantage.....	155
Fig. 6.6: Scatter Plots of Moderators and Sustainability Variables.....	158
Fig. 8.1 The Flow Process of Cocoa in Ghana's Domestic Cocoa Chain.....	229



LIST OF ABBREVIATIONS/ACRONYMS

3BL	Triple Bottom Line
ADM	Archer Daniels Midland
ANP	Analytic Network Process
BPC	British Potato Council
CER	Company Environmental Report
CMC	Cocoa Marketing Company
CO₂	Carbon Dioxide
COCOBOD	Ghana Cocoa Board
CSCMP	Council of Supply Chain Management Professionals
CSR	Corporate Social Responsibility
DEA	Data Envelopment Analysis
DJGI	Dow Jones Global Index
EPA	Environmental Protection Agency
EPE	Environmental Performance Evaluation
GDP	Gross Domestic Product
IMSS	International Manufacturing Strategy Survey
ISO	International Organisation for Standards
kg/ha	Kilograms Per Hectare
LBC	License Buying Company
NAICS	North American Industrial Classification System
NGO	Non-Governmental Organisation
PBC	Product Buying Company
PC	Purchasing Clerk
PCA	Principal Component Analysis
PEQ	Productivity, Efficiency and Quality
ROA	Return on
ROI	Return on Investment
SC	Supply Chain
SCM	Supply Chain Management
SSC	Sustainable Supply Chain
SSCM	Sustainable Supply Chain Management
UK	United Kingdom
UN	United Nations
US	United State
USA	United States of America
USD	US Dollar
WCED	World Commission on Environment and Development
WCF	World Cocoa Foundation

CHAPTER ONE

INTRODUCTION

1.0 BACKGROUND OF THE STUDY

“There is increasing debate at international, national and local levels about the consequences of development which fails to reconcile the often conflicting objectives of economic growth, social progress, protection of the environment and prudent use of natural resources” (Vasileiou, and Morris, 2006). The impetus for this interest finds expression in the concept of sustainable development which attempts to determine how the needs of the present human generation can be met without compromising the ability of future generations to meet their needs (WCED, 1987). The concept of sustainability thus seeks to create a balance between the three key components of development which define the quality of human life in the broadest sense, namely: economic, social and environmental objectives (OECD, 1997; DETR, 1999).

The interest in sustainability competence has become a huge buzzword, both in today’s business world and within the broader facets of society to an extent that now it is difficult, for example, to walk by a news stand without seeing at least one magazine cover featuring alternative sources of energy, energy efficiency, green supply chain and climate change issues (Carter and Easton, 2011). Hence, producers that operate in an international context are now being challenged to incorporate economic, environmental and social aspects into their strategies, policies, culture and decision-making (Blengini, and Shields, 2010). Today, these issues have become even more relevant to managers primarily because their stake-holders, including

customers, regulatory bodies, non-governmental organizations and their own employees are increasingly demanding organizations to address and manage the environmental and social issues which are impacted by their operations (Carter and Easton, 2011). To this end, Porter and Kramer (2006) maintain that sustainability is “an inescapable priority for business leaders in every country” and so competency in sustainability provides a differential advantage if this competency is comparatively unique in the firm’s market place ((Mentzer et al., 1989).

Competency in sustainability is becoming increasingly important in most supply chains, especially in those that function in very fierce competitive markets (Flint and Golobic, 2009). According to Carter and Easton (2011), supply chain managers are particularly in an advantageous position to effect positively or negatively, environmental and social performance through their chain activities such as supplier selection and development, modal and carrier selection, vehicle routing and scheduling, location decisions, and packaging choices. Winter and Knemeyer (2013) argue that the relationship that exists between sustainability and supply chain management extends to both the operational drivers of profitability and their relationship to people and the environment. Hence, many firms now depend extensively on competencies that are obtained through their supply chains for sustainable gains (Markley and Davis, 2007).

In the context of food, sustainable growth is proving to be a key concern for all players in the food supply chain. In recent times for example, the sustainability of food production for human consumption has been questioned, particularly relating to the degradation of natural resources, environmental pollution, potential health and

safety risks associated with intensive farming (Vasileiou, and Morris, 2006). Additionally, the overall decline and increased volatility of farm profitability have adversely affected not only employment in rural areas but also the livelihoods in rural communities. (Plowden, 1996; Skinner et al., 1997; Pretty, 1998; MAFF, 2000; Pannell and Glen, 2000; PCFFF, 2002). For these reasons and more, the sustainability of agricultural supply chains is of prime interest to governments and policy makers and most participants in the food supply chain especially beyond the farm gate, motivated by a mix of market and regulatory drivers, have sought to assess and improve the sustainability of the food supply chain (e.g. M&S, 1999; Sainsbury, 2004; Unilever, 2004; MAFF, 1999; Defra, 2001).

The UK Government, for example has adopted broad measures of agricultural sustainability that extend beyond traditional performance indicators (MAFF, 2000). In response to the growing concerns surrounding child labour in the cocoa supply chain, the U.S. House of Representatives developed a Cocoa Protocol; a voluntary initiative primarily aimed at developing voluntary, industry-wide standards of certification by 2005. This protocol was endorsed by major cocoa companies that included Hershey, Mars, Nestlé and Archer Daniels Midland as indicative of their commitment to eliminate child labour associated with cocoa farming by 2005 (Griek, 2010).. This also was to certify that the cocoa they purchased from farmers was free from child labour (Griek, 2010). In some countries, environmental protection has become a key compliance requirement for farm income support (LEAF, 1997; Defra, 2003).

The Government of Ghana, for instance, has identified agriculture and cocoa in particular, as having the potential to make an important contribution to economic growth and to assist in meeting its goals for poverty reduction (Assuming-Brempong

et al., 2008). Accordingly, the Government of Ghana, among its development priorities, is committed to securing the sustainability of the cocoa supply chain due to its unique position in Ghana's economy. Indeed, cocoa has consistently been the largest foreign exchange earner for Ghana (Bank of Ghana, 2008; Amoah, 2008). It has long played a crucial role in Ghana's economic development not only in the vast foreign earnings it creates but it also remains an important source of rural employment and the country's most important agricultural export crop (Teal and Vigneri, 2004; Teal et al., 2006; Cappalle, 2009). Until the advent of oil production in 2011, cocoa cultivation accounted for almost 4.0% of total GDP from 1995-2000 (NDPC, 2010) and employs over 700,000 households along its value chain. With these contributions in perspective, the impact of a sustainable cocoa chain on economic development cannot be overstretched and empirical evidence shows a strong positive correlation between cocoa revenue and economic growth (see Armah, 2009).

Unfortunately, a careful study of the cocoa value chain illustrates that as the product moves downstream, from semi processed products to finished products, Ghana's market share in total tradable cocoa diminishes. Despite the economic advantages which the country stands to gain from exporting value added cocoa products, statistics show that the country has rather solidified its position of exporting quality raw cocoa beans as a competitive strategy; necessitated by the premium status the country enjoys on the world market. Ford (2002) maintains that due to the strict conditions under which a semi- processed product can be transported, it is unclear whether local value addition is profitable for Ghana. Notwithstanding the high premium status to ensure optimum acquisition of potential economic gains and to take advantage of niche

markets, the production of the cash crop needs not only be increased but its quality must be exceptionally maintained. This will require the continual improvement in the relationship and interactions that exist among actors in Ghana's cocoa supply chain (Williams, 2009). Although the Ghana Cocoa Board (COCOBOD) has been generally effective in maintaining strict quality standards, the conundrum that boggles policymakers and researchers is whether current production patterns are sustainable. In other words, will Ghana be able to spar with rising international competition and future demand increases in its cocoa beans?

Gockowski (2007) submits that Ghana yields are particularly low compared to its leading competitors; Cote d'Ivoire and Indonesia, in that cocoa production in Ghana is not only labour-intensive, but on smallholdings. More so, most cocoa farmers find it difficult adapting to best practices (Edwin and Masters, 2005; Gockowski and Sonwa, 2007; Opoku et al., 2009). For instance, improper fermentation and drying of cocoa beans by farmers caused the purple colouration of cocoa beans in the industry in 2005; a condition which greatly affected the reputation of Ghana for quality cocoa beans. Ruf (2001) also indicates that farmers typically find it easier to expand their farms than to replant old and disease cocoa trees owing to the huge costs involved in replanting. The consequence is the low ratio of hybrid trees as compared to traditional trees in cocoa farms; thus, the lower cocoa yield of more than 60% below the estimated potential.

Indeed, all these challenges threaten the sustainability of the cocoa chain. Hence, an analysis into the supply chain of cocoa becomes more imperative. How do we ensure a sustainable supply chain for cocoa so that the status that the country has perspired to

attain can still be maintained, knowing well that any negligence will not only affect cocoa earnings, but economic development and the incomes of close to one million Ghanaians who depend on the cash crop for their livelihood?

1.1 STATEMENT OF THE PROBLEM

The motivation for undertaking this research lies mainly in the value that cocoa cultivation brings to any country. Ostensibly, the significance of a booming cocoa industry to economic growth and development globally and especially countries along the equatorial regions where cocoa is produced has been clearly spelt out in literature (Cappalle, 2009). The Government of Ghana, for instance, has identified agriculture and cocoa in particular, as having the potential to make an important contribution to economic growth, and to Ghana meeting its goals for poverty reduction (Assuming-Brempong et al., 2008). The interest in cocoa has therefore transcended from being a national issue to a global issue; in that it remains an important driver of socio-economic development. For example, about 30% of the total population in Ghana depends on cocoa for living. Any potential threat to the industry, intuitively, will hold serious repercussions for most Ghanaians and the economy as a whole.

Yet, in spite of its significant value to the economy, Ghana must confront serious challenges regarding the maintenance of future sustainability of the cocoa value chain. Sustainability challenges have been earmarked under three critically interrelated dimensions. First, on the economic side, productivity is well below expected (about 400 kg/ha as against a potential of 1000kg/ha) with an ageing farmer population. The youth have virtually shown little or no interest in cocoa; pursuing endeavours in

mining and other commercial ventures. This is taking place in the wake of a fast expanding chocolate value chain. A probable dwindle in economic gains will not be far-fetched given a possible decline in output. One of the questions that this study will ultimately help to address is; how do we expand production and increase productivity to sustain farmer income and export growth whilst maintaining quality? Once the country has created a niche in the international market for quality; the need for quality cannot also be tangential with any drive for production growth. Even though Ghana enjoys a quality premium on its cocoa exports; evidence points to the fact that this premium may erode over time. Advancements in technological processing has made it possible to compensate for quality variations by substituting different origins and users, hence there is a lesser dependence on traditional parameters (Kolavalli and Vigneri, n.d.). Ford (2001) suggests that the premium that Ghana enjoys on quality attributes may erode over time.

This raises the question; in what respect can Ghana entrench its reputation for quality in the face of growing competitiveness and social challenges? Similarly, the question arises; how do we ensure that in spite of growing technical progress, Ghana's cocoa beans will still remain the buyers' choice? These quality issues and concerns bring to bear the need for a strong interaction between players so that quality is maintained right down from the farm gate to the final consumer. However, evidence shows that the actors within the chain, sometimes compromise on quality because of unmet interests or earnings below an expected level; and yet, "a sustainable cocoa chain requires that each person investing time or money into the supply chain would be able to earn a decent income for themselves and their family, work in good conditions, and

in a manner which does not harm the environment” (Oxfam International Research Report, 2008).

The second dimension which is therefore a question of social sustainability also does revolve around some environmental concerns. Research has shown that most cocoa production occurs under bad conditions such as child trafficking and serious forms of child labour, the labour intensive nature of production and harvest, poor health and safety measures, the low incomes of cocoa farmers, lack of access to credit, uncertain property rights, etc. (Oxfam International Research Report, 2008). These factors may potentially affect the quality and output of cocoa that Ghana exports. For instance, increased awareness at the international front that cocoa production takes place amidst the worst forms of child labour has resulted in rapid demand for organic chocolate (Assuming-Brempong et al., 2008). Similarly, low farmer income has forced many cocoa farmers to sell off farm lands to mining companies and investors and smuggling of cocoa to neighboring countries. These attempts do not only guarantee an ever decreasing cultivable cocoa lands but suggest that cocoa production will not be the preference of future generation (Assuming-Brempong et al., 2008).

The third dimension revolves around the question on environmental sustainability. The forest cultivation methods and the use of pesticides and fertilizers with their spillover effect on public health and the environment is of prime concern to stakeholders. Poor farm practices affect the quality of beans, yet most cocoa farmers find it difficult adapting to best practices (Edwin and Masters, 2005; Gockowski and Sonwa, 2007; Opoku et al., 2009). For instance, improper fermentation and drying of cocoa beans by farmers caused the purple colouration of cocoa beans in the industry

in 2005; a condition which greatly affected the reputation of Ghana for quality cocoa beans. Ruf (2001) also indicates that farmers typically find it easier to expand their farms than to replant old and disease cocoa trees owing to the huge costs involved in replanting. The consequence is the low ratio of hybrid trees as compared to traditional trees in cocoa farms; thus, the lower cocoa yield of more than 60% below the estimated potential. Indeed, these challenges are an indication that the collaboration between the actors of the cocoa supply chain is weak; and yet a sustainable supply chain cannot suffice without a strong collaboration among players.

The threats that gawp starkly over this viable industry have thus endorsed the motivation for undertaking this study; to assess how the supply chain of cocoa can be managed for its sustainability. Obviously, varied studies have been undertaken concerning sustainable cocoa value chain in Ghana, all contributing significantly to understanding the drivers of a sustainable cocoa chain (Abenyega and Gockowski, 2003; Vigneri, 2007; Ton et al., 2008; Anthonio and Aikins, 2009; Pinnamang-Tutu and Armah, 2011). However, these studies do not devote ample attention to the entire cocoa supply chain; illustrating its processes, stages and peculiar barriers and opportunities. “To be consistent with its underlying principle, any assessment of sustainability must apply to the supply chain as a whole, rather than any one part of it. Otherwise, for example, the benefits of improvements in the environmental performance of farming systems (where most of the focus in the food supply chain has been to date) could be lost if subsequent processing or distribution stages result in increased waste or environmental risk” (Vasileiou, and Morris, 2006).

This study therefore contributes to this growing research by conducting not only a thorough investigation on the stages within the supply chain, but also analyses the role that the various actors play and the peculiar threats within the stages that impact on sustainability issues that have been discussed above. The primary focus is on how these actors manage their supply chain phases; purchasing, internal operations, warehousing and out-bound transportation towards a sustainable value chain, particularly relating to economic, social and environmental interests. To steer policymaking, a thorough analysis is merited on the conditions of the variables that are responsible for the success or failure of the cocoa value chain, and how these conditions can be optimised for maximum benefit to stakeholders.

1.2 RESEARCH OBJECTIVES

In the context of increased interest in the sustainability of food supply chains, this study mainly seeks to understand the degree to which actors within the cocoa chain in Ghana are functioning in terms of initiatives to reach sustainability. Specifically, the study seeks to:

- i. Map the flow process of cocoa in the domestic chain of cocoa in Ghana;
- ii. Identify the risks within each stage that impact on goals of sustainability;
- iii. Find out the phases of the supply chain that are mostly emphasized by the chain players in the implementation of sustainable initiatives and if there exist any observed variations among them;
- iv. Find out if there exists, any cross effect among the three major dimensions of sustainability in the cocoa chain;

- v. Establish the relationship that exists between engagement in sustainable supply chain management initiatives and the performance of players in the chain;
- vi. Examine if focusing on one strand of sustainability will result in same improvement in sustainable outcome as focusing on all strands of sustainability;
- vii. Ascertain whether supply chain improvement programmes play any moderating role in the linkage between sustainable practices and the performance of players in the chain.

1.3 RESEARCH QUESTIONS

To drive home the prime object of the study, the research hinges on finding answers to the following pertinent questions:

- i. What is the flow process of cocoa in the domestic chain of cocoa in Ghana?
- ii. What peculiar risks surface at each stage and how do these impinge on the sustainability and the policy of maximum benefit retention within the network?
- iii. Are there any variations among actors in the implementation of sustainability initiatives?
- iv. Is there any cross effect among the three major dimensions of sustainability as they relate to the cocoa value chain?

- v. Does the engagement in sustainable initiatives impact differently on the performance of actors in the supply chain of cocoa?
- vi. Does focusing on one strand of sustainability result in same improvement in sustainable outcome as focusing on all strands of sustainability?
- vii. Do supply chain improvement programmes play any moderating role in the linkage between sustainable practices and performance of the players in the cocoa chain?

1.4 JUSTIFICATION OF THE STUDY

Cocoa is Ghana's dominant cash crop and single most important export product. Cocoa production in Ghana is the major economic activity for over 700,000 households, with around 6.3 million Ghanaians depending on cocoa for their living (Gockowski et al., 2011). Sustainable cocoa production and trade is thus in the interest of all value chain stakeholders; from farmers to consumers as well as the Government. However, its supply chain is largely undeveloped. This research therefore seeks to look out for how the key actors in the cocoa supply chain can be properly connected as well as how to improve the flow process for the best interest of the players along the network, the nation and the world at large. This is as a result of the fact that with the recent and rapid evolution of quality programmes, firms are undoubtedly at different stages in their progression of programmes to implement so as to increase their bottom line. While some farmers are undoubtedly on the right path, others may be using supply chain systems which are not consistent with the industry's quality initiative standards. With increased competition both domestic and worldwide, firms must be aware of every aspect within their businesses and be looking for ways

to improve them. This study will therefore be valuable to farmers and all the other actors in the cocoa chain and would thus allow them to compare their performance and development with other players in the cocoa beans industry as a whole.

In addition, it would provide progressive organizations with the opportunity to achieve a competitive advantage over rival firms with respect to the proper management of the supply chain by implementing best practices not being used by other firms in the industry. The results of this study, as it is expected, would equally provide interesting implications for international marketing, globalization and development policy. With the fast expansion of globalization, developing countries like Ghana are attracting foreign companies from all over the world. Therefore, international companies need to understand how the supply chains function here, and to understand what impacts their participation will bring to the society. In the area of development policy, Ghana needs to understand the impacts of these extremely important chains and how to regulate them for its sustainability.

1.5 RESEARCH METHODOLOGY

Primary data was mainly employed for answering the research questions, obtained through personal interviews and administration of questionnaires. The sample frame consisted of the major players within the domestic chain of cocoa in Ghana; farmers, Purchasing Clerks, Licensed Buying Companies and the COCOBOD. The study executed to perform a thorough content, descriptive and statistical analysis of the subject using a two-part strategy to solve the research questions; a qualitative-based strategy for analysing qualitative data and a quantitative-based strategy involving the empirical analysis of quantitative primary data. Synthesis of information from these

two sources is believed to provide a holistic approach and hence guarantees better results (Pinnamang-Tutu and Armah, 2011).

1.6 SCOPE OF THE STUDY

Ideally, “any assessment of sustainability must apply to the supply chain as a whole, rather than any one part of it. Otherwise, for example, the benefits of improvements in the environmental performance of farming systems could be lost if subsequent processing or distribution stages result in increased waste or environmental risk” (Vasileiou, and Morris, 2006). However, due to the extensive nature of the value chain, this research concentrated mainly on the domestic value chain; from the farm gates to the domestic brokers of raw cocoa beans. Indeed, cocoa is traded through a local and international supply chain, and is marketed as a variety of products at different stages in the network (Cappalle, 2009).

1.7 LIMITATIONS OF THE STUDY

Almost every field research encounters some challenges, this study was no exception. The research design was constrained by limited access to objective verifiable quantitative data, in part due to commercial confidentiality on the part of some players. Apart from the challenge of bearing huge financial costs and limited time frame for the completion of the study, the researcher had to interpret the questions in the survey instrument to some respondents due to their lack of proficiency in reading which limited wider data coverage. Additionally, there were some cases of data loss in the responses and some questionnaires were never returned. As a result, data collected had to be checked and re-tested through all other means possible to improve

on its validity and reliability. Notwithstanding, the statistical results of these tests were very good, rendering such errors negligible.

1.8 ORGANISATION OF THE STUDY

The study is organised into nine major chapters. Chapter one gives an introduction to the study which provides a background to the study, the problem statement, research objectives and questions, justification of the study, overview of the methodology of the study, scope, limitations and organization of the study. Chapter two reviews related literature in the subject area in two major parts; the first part covers the definition of concepts of the major components of the study and the second part reviews empirical studies related to the study. Chapter three presents the theoretical framework of the study, which discusses the interrelationships among the variables that are deemed to be integral to the dynamics of the study. The major features of the framework include clear explanations of the study variables, a discussion on the relationships that are theorized to exist among the variables and developed hypotheses raised to test these relationships. Chapter four presents the methodology employed for the conduct of the study. It examines six basic aspects of research design; purpose of the study, the type of investigation, the extent of researcher interference, the study setting, the unit of analysis and the time horizon of the study. It further discusses other issues as regards the study population and sampling design, methods of data collection and analysis, validity and reliability tests and how ethical issues were addressed throughout the process.

Chapter five presents a profile of the domestic cocoa chain in Ghana with a brief highlight on the global cocoa chain. Chapter six presents the quantitative analysis of

the study in three major sections. The first section highlights the descriptive analysis of the data and the second section gives a correlation analysis between observed variables in order to establish the direction of relationships. The final part gives the regression analysis of the data in two parts; the first part utilises generalised linear models specified in hierarchical form to check the impact of sustainability on competitive advantage and the second part specifies the moderating effects of the independent variables on the dependent variables. In the seventh chapter, discussion of the results from the quantitative data analysis is presented while the eighth chapter presents the analysis and discussion of the qualitative data. Chapter nine, which is the final chapter, presents a summary of the findings from both the quantitative and qualitative analyses, conclusions drawn from the findings and appropriate recommendations toward a sustainable supply chain for cocoa in Ghana.



CHAPTER TWO

LITERATURE REVIEW

2.0 INTRODUCTION

This chapter reviews related literature in the subject area in two major parts. The first part covers the definitions of concepts of the major components of the study which include supply chain, supply chain management, sustainable supply chain management, dimensions of sustainable supply chain, sustainable cocoa chain, among others. The second part reviews empirical studies that are related to the field under investigation.

2.1 SUPPLY CHAIN

There is no single accepted definition of supply chain. A number of scholars have defined supply chain from many different perspectives. Also known in literature as value chain or demand chain, the supply chain is the entire network of enterprises or facilities that are involved in the functions of procurement of materials, transformation of materials to intermediate and finished products and distribution of finished products or services to an end customer (Huňka *et al*, 2011; Lee and Billington, 1993; Frazelle, 2002). According to Waters (2003), “often, organizational barriers between these facilities exist, and information flows can be restricted such that complete centralized control of material flows in a supply chain may not be feasible or desirable. Consequently, most companies use decentralized control in managing the different facilities at a supply chain”.

The supply chain consists of four processes: *plan, source, make* and *deliver* (Roussel 2005). This implies that the scope of the supply chain primarily deals with all interactions right from the supplier's supplier to the customer's customer (Roussel 2005). Thus a supply chain consists of a network of organizations linked together by physical, informational and financial flows designed to satisfy end-customer requirements (Roussel 2005). Supply Chain is just a group of participating companies who are interconnected by one another, whose activities add value to a stream of transformed inputs from their source of origin to the end products for satisfying the needs of end-consumers (Lu 2011).

In their definition of Supply Chain, Mentzer *et al* (2001) identify three degrees of supply chain complexity: *a direct supply chain*, *an extended supply chain* and *an ultimate supply chain*. A direct supply chain according to them, consists of a company, a supplier and a customer who are involved in the upstream and/or downstream flows of products, services, finances, and/or information while an extended supply chain consists of suppliers and customers of the focal organisation, all involved in the flows of products, services, finances, and/or information from the point-of-origin to the point-of-consumption. In the case of an ultimate supply chain, it comprises all the participants who interact directly or indirectly in the flows of products, services, finances and information from the very initial supplier to the ultimate customer.

In His definition, Ayers (2000) likens the supply chain to a Life Cycle processes that support physical, information, financial and knowledge flows for moving products

and services from suppliers to end-users. Slack *et al.* (2010) also use the analogy of the pipeline to describe supply chains;

‘Just as liquids flow through a pipeline, so physical goods (and services, but the metaphor is more difficult to imagine) flow down a supply chain. Long pipelines will, of course, contain more liquid than short ones. So, the time taken for liquid to flow all the way through a long pipeline will be longer than if the pipeline were shorter. Stocks of inventory held in the supply chain can be thought of as analogous to storage tanks. On the journey through the supply chain pipeline, products are processed by different operations in the chain and also stored at different points’.

In almost all the above definitions, the concept of supply chain is illustrated to move beyond the traditional viewpoint of supply chains as merely existing as organisations forwarding customer requests. This viewpoint tends to limit the role of supply chain. Rather, a supply chain moves beyond physical distribution which essentially includes the role of knowledge inputs into supply chain processes (Ayers, 2000). The primary purpose for the existence of every supply chain is to satisfy customer needs in an efficient manner, while in the process generating profits for actors. Firms in a supply chain therefore coordinate and share the benefits through market mechanisms, contracts and partnership arrangements, which lead to the increasing efficiency of all partners (Xia & Tang, 2011). This justifies the need for strategic management to ensure that gains are enhanced and value upgraded or maintained at every stage of the chain.

2.2 SUPPLY CHAIN MANAGEMENT (SCM)

Supply Chain Management (SCM) emerged in the 1980s as a new integrative philosophy to manage the total flow of goods from suppliers to the ultimate user. The essence of this approach was the management of a chain of supply as though it was a single entity, with the primary objective of fixing the suboptimal deployment of inventory and capacity (Huňka *et al.* 2011). SCM as defined by the Council of Supply Chain Management Professionals (CSCMP) encompasses “the planning and management of all activities involved in sourcing and procurement, conversion and all logistics management activities”. Most other definitions of SCM emphasize the integration of the linkages that exist between supply chain partners. For example, according to Slack *et al.* (2010), SCM is the management of the interconnections that exist between organizations that relate to each other through upstream and downstream linkages between the processes that produce value to the ultimate consumer in the form of products and services. It is an integrating function with the sole responsibility for linking major business functions and processes within and across organizations into a cohesive and high-performing business model which includes all of the logistics management activities as well as manufacturing operations (Vitasek, 2010).

Thus, SCM is the process through which a buyer works with their suppliers to ensure that products and services are procured in ways that meet the buyer's specifications (Sctwartz *et al.*, 2008). These authors add that, SCM initially focused on quality aspects, and later was broadened to include environmental issues in order to improve eco-efficiency and reduce waste, as part of the implementation of lean production systems. Accordingly, SCM is a holistic approach to managing across company

boundaries (Sctwartz *et al.*, 2008). Most supply chain managers share one common and central objective; to satisfy the end-customer. All stages in a chain must eventually include consideration of the final customer, no matter how far an individual operation is from the end-customer (Sctwartz *et al.*, 2008). When a customer decides to make a purchase, he or she triggers action back along the whole chain. All the businesses in the supply chain pass on portions of that end-customer's money to each other, each retaining a margin for the value it has added. Each operation in the chain aims at satisfying its own customer, but also making sure that eventually the end-customer is also satisfied (Slack *et al.*, 2010).

Importantly, SCM also includes coordination and collaboration with chain partners such as suppliers, intermediaries, third-parties and end consumers, who interact directly or indirectly towards ensuring a seamless flow of products, funds and related information right from the point-of-origin to the point-of-consumption. Thus in essence, SCM integrates supply and demand management within and across organisations (Vitasek, 2010). According to Ayers (2000), SCM is a discipline worthy of a distinct identity which puts it on a level with disciplines like finance, marketing, among others. According to him, the definition of SCM reflects the idea that it extends to both the supply chain formulation and its subsequent operation and maintenance.

The objective of managing the supply chain is to be efficient and cost-effective across the entire system; total system wide costs, from transportation and distribution to inventories of raw materials, work in process and finished goods. To the consumer, evaluating the chain of supply of a product brings more advantage in terms of better

availability, less stock-outs, fresher produce with a longer shelf-life and potential cost savings (Wilson, 2005). For the producer, such an activity results in strategic advantages in the form of improved market intelligence, assured volumes, quality information for planning, less obsolescence, accurate investment and increased revenue generation through increased quality, enhanced reputation, gaining competitive advantages by proactively shaping future legislation and being more attractive overall to customers, employees and suppliers (Votano *et al.*, 2004 and Wilson, 2005).

2.3 SUSTAINABLE SUPPLY CHAIN MANAGEMENT (SSCM)

SSCM has been variously defined in literature yet it increasingly denotes the management of environmental, social and economic impacts throughout the lifecycles of goods and services (Carter & Rogers, 2008; Sisco, Chorn, & Pruzan-Jorgensen, 2010; Carter & Easton, 2011; Ho & Choi, 2012). Sisco *et al.* (2010) specifically states that “the objective of supply chain sustainability is to create, protect and grow long-term environmental, social and economic value for all stakeholders involved in bringing products and services to the market”. This implies that without building a sustainability consciousness, the lifespan of a product value chain is threatened. Thus, strategic management aimed at ensuring that the firm is fully exploiting opportunities and managing risks in an evolving market is more proficient, if it is not aligned to the goals of sustainability.

SSCM is a critical subject matter affecting an organization’s supply chain or logistics network in terms of environmental, risk and waste costs. Sustainability in the supply chain is increasingly seen among high-level executives as essential to delivering long-

term profitability (Mefford, 2011; Kaufmann and Carter, 2010) and has replaced monetary cost, value and speed as the dominant topic of discussion among purchasing and supply professionals. The best companies view sustainability not only as a chance to contribute to social goals, but also as a powerful source of competitive advantage and a matter of corporate survival (Yang *et al.*, 2010 cited in Ho and Choi, 2012). SSCM is therefore the integration and co-ordination of economic, environmental and social practices throughout the supply chain to improve firms' economic, environmental and social performance along the supply chain (Ho and Choi, 2012). An interminable monitoring of the supply chain network of the goods is therefore critical, since the supply chain illustrates all the different phases by which resources are exploited to deliver the customer's request. Questions of product design, manufacturing by-products, by-products produced during product use, product life extension, product end-of-life and recovery processes at end-of-life are central issues of sustainable supply chain (Jayaraman *et al.*, 2007). In the nutshell, pursuing sustainability as a corporate culture creates the leverage to cut down on costs, design new products, avoid long term ills and improve competitive edge; a sustainable supply chain is necessary to make a firm sustainable (Callieri *et al.*, 2007).

Indeed, the concept of SSCM can be broken down into three main pillars; environment, social and economic dimensions. Literature indicates that these dimensions are interdependent with strong and numerous complexities. The interrelationship between the environment, social and economic aspects of sustainability is commonly represented by one of two models. The first model commonly referred to as the *three-nested-dependencies model* features three concentric spheres. Here, economic and social dimensions are portrayed as dependent

on environmental performance (McKenzie, 2004); illustrating the idea that human society is a wholly-owned subsidiary of the environment with the environment determining how human economic activity is set within the society. Hence, the quality of life determines the degree of economic progress (Willard, 2010). This means that the degree to which firms are socially responsible can greatly affect the economic gains derived from networks. For instance, the firm that institutes good social incentives and working conditions for its workers can expect increased productivity and better financial performance. However, critics of this model raise concern that during the recent recession, the economic downturn rather had a significant impact on people's quality of life. This implies that the economic performance is so vital to the growth and progress of a company that supply chain experts who insist on the subservience of economic standards to social goals are sometimes accused of being naive about how the "real world" works (Willard, 2010).

The second model known as the *overlapping or the triple bottom line model* shows the intersection of economic, environment and social factors. In the overlapping model, if anyone pillar is weak, then the system as a whole is unsustainable. Rather than suggesting that firms identify and engage in social and environmental activities which will hopefully help, or at least not harm economic performance, the triple bottom line "explicitly directs managers to identify those activities which improve economic performance and dictate the avoidance of social and environmental activities which fall outside of this intersection" (Carter & Easton, 2011). Carter and Rogers (2008) conceptualize this theory to develop an approach that anticipates a win-win situation, reconciling unlimited aspirations and a finite resource base. Carter and Rogers (2008) refer to this concept as Sustainable Supply Chain Management

(SSCM) which they define as a “strategic, transparent integration and achievement of an organization’s social, environmental and economic goals in the systemic coordination of key inter-organizational business processes for improving the long-term economic performance of the individual company and its supply chains”. Hence, from the overlapping model, one can conclude that there are activities pursued under each pillar which are not necessarily optimal or falls outside the domain of achieving even slight sustainability. In that way, such an activity does not pass for ensuring the overall progress of the entire supply chain. They can at best achieve internal harmony.

A sustainable supply chain is consequently achieved when there are social and environmental supply chain activities that lie at the intersection with the economic bottom line. Critical areas of collaboration and performance exist in the overlap between two pillars but to achieve an optimal goal, all actions and decisions must overlap all three dimensions. In point of fact, supply chain experts and practitioners have argued that for the supply chain to remain sustainable, it must simultaneously satisfy all dimensions. The reason is that at every stage in the life-cycle of specific products, there are social and environmental impacts or externalities on the environment and on people (Sisco et al., 2010) regardless of the economic gains agents derive.

According to Carter and Rogers (2008) cited in (Carter & Easton, 2011), examples of the activities that fall within the triple bottom line include cost savings owing to reduced packaging waste and more effective design for reuse and disassembly; lower health and safety costs, as well as reduced turnover and recruitment costs due to safer warehousing and transport and improved working conditions; reduced labour costs in

the form of higher levels of motivation and productivity and less absenteeism resulting from improved working conditions; lower costs, shorter lead-times, improved product quality and lower disposal costs resulting from the implementation of ISO 14000 standards and the use of design for disassembly and reuse and an enhanced organizational reputation, which can make a firm more attractive to both customers and suppliers. Simply put, supply chains are critical links that connect an organization's inputs to its outputs. However, the increasing environmental costs of these networks and growing consumer pressure for greener products have led many organizations to look at supply chain sustainability as a new measure of profitable logistics management. This shift is reflected by an understanding that sustainable supply chains frequently mean profitable supply chains (Kaufmann and Carter, 2008).

2.4 DIMENSIONS OF A SUSTAINABLE SUPPLY CHAIN

Most sustainability literature reveal three primary dimensions of supply chain sustainability; economic, social and environment (Kaufmann and Carter, 2008; Sloan, 2010; Miemczyk, 2012; Winter and Knemeyer, 2013; Mann, *et al.*, 2010; Closs, *et al.*, 2010).

2.4.1 Economic Dimension of Sustainability

The economic dimension includes all profits earned by the members of the chain as well as the economic benefits realized by the host nations, regions and communities of those members (Sloan, 2010). It relates to the efficient use of resources, the competitiveness and the viability of the sector as well as its contributions to the viability of communities. Efficient production structures, appropriate technologies as well as the diversification of income sources for agents are important elements of this

dimension (European Commission, 2001). According to Votano, *et al.* (2004b), economically, sustainability means providing economic welfare with the future in mind. Harris (2000) states that an economically sustainable system must be able to produce goods and services on a continual basis; to maintain manageable levels of government and external debt and to avoid extreme sectorial imbalances which damage agricultural or industrial production. As a pillar, economic sustainability entails more than internal profits of the companies or agents involved in the network. Sloan (2010) distinguishes four main categories of economic dimension of sustainability as:

- **Economic Performance:** order fill lead time, product defect rate, transportation cost per unit, productivity and market value;
- **Financial Health:** profitability ratio, cost of goods sold and return on working capital;
- **Market and Structure:** degree of vertical integration, depth of supplier pool, breadth of customer base and market share;
- **Institutions or Systems:** regulatory compliance, standards certification and quality management system in use.

Mahler (2007) cited in (Ho and Choi, 2012) confers that all activities that seek to promote profits, create jobs, attract customers, reduce costs, anticipate and manage long-term risks whilst fostering long-term competitiveness encapsulates economic sustainability. Economic sustainability is therefore used to identify various strategies that make it possible to use available resources to their best advantage. The idea is to promote the use of those resources in a way that is both efficient and responsible and likely to provide long-term benefits. In the case of a business operation, it calls for

using resources so that the business continues to function over a number of years, while consistently returning a profit.

2.4.2 Social Dimension of Sustainability

Improving sustainability with respect to the social dimension involves developing and maintaining business practices that are fair and favourable to the labour, communities, and regions touched by the supply chain (Sloan, 2010). Social well-being encompasses improving labour standards and conditions, enhancing communities and creating and delivering socially responsible products and services (Mahler, 2007). Torjman (2000) states social sustainability to include such key issues as poverty reduction, social investment and the building of safe and caring communities. To this, Sloan (2010) expresses three categories of social dimension of sustainability:

- **Work place/Internal Conditions:** wages, employee contracts, healthcare, opportunities for career development, number of accidents and/or deaths per person-hour of work
- **Community/External Conditions:** product liability and healthcare benefits
- **Institutions/Systems:** supplier evaluation including social factors, hours of safety training per employee, regulatory compliance, health and safety management system in use.

To Schneider (2007), every decent social activity should not only aim at productivity but must also provide job security, respect for labour rights and workers' well-being particularly with information, consultation, social dialogue, union freedom, workers' health, collective bargaining and participation. It should also offer adequate incomes and must focus on social protection. Hence, social sustainability encompasses human

rights, labour rights and corporate governance. A socially sustainable network is equitable, diverse, connected and democratic; with the aim of providing a good quality of life for members.

2.4.3 Environmental Dimension of Sustainability

Environmental sustainability involves making decisions and taking actions that are in the interests of protecting the natural world, with particular emphasis on preserving the capability of the environment to support human life (Miemczyk et. al., 2012). Environmental sustainability forces businesses to look beyond making short term gains and look at their long term impact on the natural world. It is therefore the maintenance of the factors and practices that contribute to the quality of the environment on a long-term basis. Environmental sustainability considers the physical inputs used in production (Kaufmann and Carter, 2010), emphasizing environmental life-support systems without which neither production nor humanity could exist. These life support systems include atmosphere, water, food, soil, minerals, materials and energy resources; all of which need to be healthy; their environmental service capacity needs to be maintained (Goodland, 1995; Sloan, 2010).

Environmental sustainability is vital because the source capacities that support global life are large but finite. Overuse of a capacity impairs its provision of life support services; sustainability therefore requires that they are maintained rather than run down. It is important to strike a balance between the needs of a growing and changing population and the ability of natural resources to support this growth; sustainable environmental practices are needed in order to support smart growth. Hence, environmental sustainability is especially relevant for sustainability because it is the

environment that provides humankind with the needed resources for its economic capital as a means to make ends meet. Therefore, for human beings to perpetually meet their needs, it will require that nature does not get depleted than it can regenerate.

2.5 THE ECONOMIC VALUE OF A SUSTAINABLE SUPPLY CHAIN

There are empirical evidence that support the argument that sustainable supply chain efforts result in economic benefits to firms that engage in sustainable corporate behaviours (Mefford, 2011; Kaufmann and Carter, 2010). Economic benefits shown in literature range from increased sales, decreased costs, reduced financial risk (Mefford, 201; New Zealand Business Council for Sustainable Development, 2003; Kaufmann and Carter, 2010) and increased profits/returns to the firm's shareholders (Mefford, 2011; New Zealand Business Council for Sustainable Development, 2003). A research done by Kaufmann and Carter (2010) on sustainable management in emerging economy context reveals several economic benefits of sustainable supplier management to include supplier operational performance, supplier strategic capabilities, company reputation and supplier management skills.

According to Mefford, (2011), there is diverse economic justification for sustainable corporate behaviour. The most common and obvious element is that of higher sales as consumers respond favorably to firms they perceive to be ethical (Mefford, 2011). However, modern production theory suggests that engaging in sustainable corporate behaviour may potentially accrue to such firms, some productivity and cost benefits for competitive gains (Mefford, 2011; Kaufmann and Carter, 2010). Not only that, sustainable behaviour may also impact positively on employee behaviour that result

into productivity gains for increased profitability. The argument here is that employees generally value supportive and pleasant working conditions, as well as high safety standards which help improve their satisfaction and retention (Mefford, 2011; Kaufmann and Carter, 2010). The resulting benefit is that employees increasingly develop a pride in working for leaders in the field of sustainability (Mefford, 2011; Kaufmann and Carter, 2010). Other studies have also shown that, pursuing sustainable practices can result in a significant reduction in financial risk (UN Global Compact, 2010; New Zealand Business Council for Sustainable Development, 2003). While each factor in itself brings benefits to sustainable firms, Mefford (2011) argues that there are also some synergies among these factors that overall can result in higher revenues, lower costs and reduced financial risk to such firms.

2.6 SUSTAINABILITY AND THE COCOA CHAIN

Applying the concept of sustainability to the cocoa chain, researchers in the field claim that the chain's performance should be measured by its impact on ecological and social systems as well as profit (Shrivastava, 1994; Starik and Rands, 1995; McDonough and Braungart, 2000; Kleindorfer et al., 2005; Sharma and Henriques, 2005). This perspective is known as the triple-bottom-line thinking (3BL), which integrates three key elements; profit, people and the planet into the culture, strategy, and operations of companies (Elkington, 1999). The cocoa supply chain garners a significant amount of attention particularly because the survival of a large number of people in most nations is greatly affected by cocoa production, as well as plant and animal species. As a result, members of the cocoa chain are forced to address consumer concerns about the cocoa system's impact on people and the planet. As

Griek and Hougee (2010) puts it, “a sustainable cocoa supply chain would involve the use of environmentally-friendly practices and provide those involved in the cultivation, harvesting and processing of cocoa a liveable income and safe working conditions”.

2.6.1 The Economic Dimension of a Sustainable Cocoa Chain

Relating to the economic side of a sustainable cocoa chain, it is expedient that the income of cocoa farmers or the return in cocoa downstream processing is increased. To achieve such increases would require a significant increase in productivity, efficiency and quality (PEQ) in either cocoa bean production or cocoa downstream processing through the adoption of best agricultural/processing practices respectively (Azhar and Lee, 2006). In achieving effective adoption of the best practices for attainment of high PEQ, technology delivery and technology development play the respective significant role (Azhar and Lee, 2006). Another vital factor of concern in economic sustainability in a cocoa chain is the prices of cocoa beans or cocoa products. The price of cocoa beans or cocoa products play a key role in determining the eventual income of cocoa farmers and the return of investment in cocoa downstream processing (Azhar and Lee, 2006). It has a strong impact on the social capital of the chain. According to the International Labor Rights Forum as cited in Griek and Hougee (2010), low commodity prices of cocoa usually send farmers in search of cheap labour and as a result, they use child labour in the cultivation of cocoa. It thus becomes appropriate that international cooperation and national initiative worked towards achieving a more balanced growth in world supply and demand of cocoa so that reasonable remunerative prices could be attained.

Furthermore, price support mechanism could be instituted as the option in price risk management (Azhar and Lee, 2006).

2.6.2 The Environmental Dimension of a Sustainable Cocoa Chain

Lee (2006) maintains that in order to meet the requirement for environmental sustainability of the cocoa chain, environmentally friendly practices should be adopted in cocoa growing or processing. According to Lee (2006), there is sufficient scientific evidence to show that appropriate adoption of available best technologies such as the use of disease resistant planting materials, fertilizer programming and integrated pest management approach and recommended agronomic practices coupled with accountable management could result into the low use of pesticides and chemical fertilizers in crop management which has a potential consequence of high productivity in cocoa production. He continues to argue that such practices will not only minimize negative impact to the environment but could potentially enhance soil fertility, hence, meeting the requirement of environmental sustainability. Thus, improving the quality of cocoa and reaping of higher economic returns hinges on good agricultural practices by planting high yielding, disease resistant cocoa plantlets, as well as responsible cocoa farming towards more responsible environmental stewardship and removing the footprints of cocoa operations at all tiers of the cocoa chain.

2.6.3 The Social Dimension of a Sustainable Cocoa Chain

Social sustainability in the cocoa chain requires that cocoa production and processing practices are carried out in a socially acceptable way including efforts taken to increase the income of cocoa farmers or return in the investment in cocoa downstream processing. This implies that meeting economic sustainability could lead to

improvement in social standing and sustainability in the cocoa sector. Unfortunately, cocoa cultivation is reported in literature as being operated under high levels of poverty. According to Griek and Hougee (2010), the Tropical Commodity Coalition estimates that an average cocoa farming family which comprises about six or seven members earns between USD 2,000 and USD 3,000 annually, which amounts to only USD 300 to USD 500 per capita. Indeed, this threatens the future sustainability of cocoa as this creates a high level of farmers' vulnerability to price fluctuations in the internal market. Additionally, lower incomes and prices for cocoa farmers do not only put at risk the sustainability of cocoa growing, but compels farmers to seek for cheap labour who are all children. Studies show that over 283, 000 children in Cote d'Ivoire, Cameroon, Ghana and Nigeria, all younger than 13 years with some not older than 5 years, work under hazardous conditions. Children are often forced to work for long hours using dangerous equipment, exposed to pesticides and subjected to physical abuse (Griek et al., 2010). Therefore, for cocoa players to reap greater profitability on a persistent basis, efforts must be directed to developing the human/social capital of players.

2.7 EMPIRICAL REVIEW ON SSCM

This section reviews the empirical studies on sustainable supply chain. The review focuses on various sectors in order to grasp the main concepts and findings that are eminent and vital for this study. Foremost, Hamprecht *et al.* (2005) illustrate the significance of the triple bottom line measure of sustainability to organizations while focusing on food supply chains. They suggest that controlling the tripod indicator of sustainability: economic, environment and social performance of supply chain is key to achieving sustainable agricultural supplies. Using Swiss Nestle Company Limited

as the case study, the authors selected and monitored the raw material flow from the factory gate back to agricultural production whilst controlling the traceability in the supply chain. At the end of the survey, they concluded that the effective control of sustainable supply chain practices does not create new skills; rather it ensures improvement in business capabilities. They observed in addition the significance of horizontal alliances in the creation of the Sustainable Agriculture Initiative in the food industry. They concluded that alliances as well as quality management skills and a commitment to achieving change could prove vital in creating sustainable supply chains.

Vasileiou and Morris (2006) conducted a survey to examine the performance of supply chain networks using sustainability criteria of economic, social and environmental performance while exploring best practice measures of enhancing sustainability within an industry using growers, merchants and retailers of British fresh potatoes industry as a case study. The key task was to detect and explain the perceptions of key participants on the issue of sustainability; how perceptions change over time, the drivers of sustainability as well as the extent to which these drivers had changed over time and the degree to which there was perceived synergy or conflict amongst these drivers. Information was drawn using repeated exploratory semi-structured interviews and postal survey in order to test the research hypothesis. Information was collected on: the scalability and nature of the potato enterprise; respondent perception on the relevance of sustainability criteria decision making in terms of environmental pollution, business uncertainty, and profitability; the impact on external agents such as market and regulatory organizations on decision making; and the relative importance of factors which acted as constraints on performance such

as labour supply, availability of natural resources and business uncertainty. Again, information on the organizational practices towards sustainability was also collected. At the first stage of the research, questionnaires were sent by post, with the assistance of the British Potato Council (BPC), to a sample of 1,000 registered potato growers who each grew more than 10 ha of potatoes annually out of which 240 were completed and returned. Again, 28 potato merchants who accounted for the majority of the trade were also sampled of which 17 questionnaires were completed, representing 60%. In addition 8 retailers were sampled but only 4 responded favourably to the questionnaires.

On the second stage of data collection, a similar second questionnaire was sent to the 17 merchants who had replied to the initial enquiry, 10 of whom responded, but only 7 of these were able or willing to answer the question bothering on the trade-off between economic, social and environmental factors. All of the responding retailers answered the second questionnaire. However, at the second stage only opinions of 80 growers were sampled of which 20 responded. At the end of the survey, it was revealed that upgrading the skills of workers delivered financial and environmental benefits, and more so, reducing environmental risks provides financial benefit. Again the paper revealed that economic factors such as profitability, market requirements, food quality and climate were important drivers of sustainability. There was a consequent observed changes and synergy among factors of sustainability, however, economic and environmental factors showed increased synergy as well as a strong relationship between social and environmental factors. They conclude that economic factors associated with staying in business and maintaining competitive advantage are critical to actors; yet their pursuit cannot be isolated from social and environmental

issues. This according to the authors gives importance to social and environmental factors both as influences on decision making and as indicators of business performance.

Markley and Davis (2007) also explored how sustainable supply chain could accrue future competitive advantage for the business organization in a bid to underscore the most workable sustainable practices. The authors raised a number of propositions in their study based on accounting theory, management strategy, green logistics and supply chain literatures. Hypotheses that were raised in the research include:

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- The logo of KNUST (Kwame Nnamdi University, Nsukka) is a large, semi-transparent watermark in the background of the list. It features a central shield with a yellow eagle with spread wings, a green base, and a red flame-like shape at the top. The shield is flanked by two yellow banners. The top banner contains the text 'KNUST' in large, bold, black letters. The bottom banner contains the text 'KNUST' in large, bold, black letters. The entire logo is set against a light blue background.
- i. The presence of a sustainable supply chain is positively related to environmental outcomes (ratings) in a firm.
 - ii. The presence of a sustainable supply chain is positively related to ethical outcomes (ratings) in a firm.
 - iii. The presence of a sustainable supply chain is positively related to positive stakeholder ratings for a firm.
 - iv. The presence of a sustainable supply chain is positively related to the profitability of a firm.
 - v. Ratings on customer, employee and social satisfaction are positively related to profitability for a firm.

The paper also underlined the notion that sustainability has a triple bottom line approach but with slightly modified outlook; financial outcomes (competitive advantage), environmental outcomes (which were measured by both EPA ratings and Innovest in terms of pollution control and recycling efforts) and social/ethical outcomes (indicated by Ethical ratings, CSR ratings, Customer Satisfaction and

Employee Satisfaction). Competitive advantage was measured using Tobin's q, ROA, ROI and net sales. These specific measures, according to the authors have been typified in numerous studies as accurate financial measures. In addition, sustainability was also measured by using ratings from the Global 100 Most Sustainable Corporations and Corporate Knights Magazine sustainability ratings of organizations. Ethical rating was measured using scores from the New Economics Foundation and Cooperative Bank's ratings in addition to results of Global Scan. Data was consequently obtained from both Compustat and the financial statements and reports published by the firms. At the end of the study, the authors recommended that as sources of competitive advantage for a firm become scarcer, potential new areas of advantage must be explored and this can be harnessed by focusing on social/ethical and environmental issues and not just the traditional financial measures of performance.

Carter and Rogers (2008) utilized a conceptual theory building to form a framework and propositions that illustrate the triple bottom line theory of sustainable supply chain management (SSCM) and open up the conceptualization of sustainability to consider vital aspects conjectured to be rudiments that supports the execution of SSCM practices in an organization, including risk management, transparency, strategy, and culture. The authors demonstrate the premise that social, economic and environmental measures of sustainability entwine to achieve long-term economic benefits. They then present a framework of SSCM and develop research propositions based on resource dependence theory, transaction cost economics, population ecology and the resource-based view of the firm. The data collection to support this methodology occurred through a rigorous review of extensive sustainability literature

using ABI/Inform and EBSCO. Data was collected on 35 supply chain managers and executives from 28 Fortune-1000 sized companies in the USA and Germany. The authors concluded by discussing managerial implications and future research directions, including the further development and testing of the framework's propositions. They observed that though the term sustainability is rife among managers, yet there are apparent atypical views on the conceptualization of sustainability among supply chain personnel.

Awaysheh and Klassen (2010) on the other hand presented an extensive analysis on dynamics of only one pillar of sustainability by exploring the integration of social issues in the management of supply chains from an operations management perspective. Their work sought to further develop a set of scales to measure multiple dimensions of supplier socially responsible practices. They also examined surrogate significant aspects of supply chain structure which can influence social performance of businesses including transparency, dependency and distance for the adoption of these socially responsible practices. Three industries were selected for the survey; food (North American Industrial Classification System (NAICS code 311), chemicals (NAICS 325) and transportation equipment (NAICS 336) on the basis of nature of competition, external social outlook and pressure and the nature of supply chain network.

Data was collected through the use of questionnaires administered to senior officials. A total of 1,209 surveys were distributed (574, 300, and 335 plants in the food, chemicals and transportation industries, respectively). However 307 completed surveys were received, yielding an effective response rate of 25%. A series of linear

models was used to examine the relationship between the structure of the supply chain and the use of the four supplier socially responsible practices. At the end of the survey, results showed improved transparency, as reflected in greater product visibility by the end-consumer was related to increased use of supplier human rights, which in turn can help to protect a firm's brands. Organizational distance, as measured by the total length of the supply chain (number of tiers in the supply chain), was related to increased use of multiple supplier socially responsible practices. Finally, firms upstream in the supply chain reported increased use of supplier codes of conduct than those downstream. Hence, the paper drawing a number of justifications for the adoption of supplier socially responsible practices as it results in the discovery of new opportunities for brand coverage and minimising stakeholder dissatisfaction, as well as mitigating the negative outcomes of unexpected events or relations.

Ross *et al.* (2012) attempted to examine logistics infrastructure, trade differences and environmental and social equity factors for a set of 89 countries. Data were obtained from the World Bank and International Monetary Fund databases. Data Envelopment Analysis (DEA) was used to compute country-level efficiencies and ANOVA was used to do regional comparisons to draw macro level linkages between supply chain logistics, environmental sustainability and development. The country efficiency levels were computed using input-oriented approach while assuming for both constant returns and variable returns to scale. Variables were selected based on input dimensions; duration of shipping clearance, workers remittances, overhead logistics costs and CO2 emissions. The output dimensions included social and environmental equity factors as well as logistics overhead costs. At the end of the research, the paper

observed that 56 countries were scale-efficient and at their most productive scale sizes.

European countries of France, Austria, Belgium, Bulgaria, Hungary, Portugal, the UK, Italy and Spain showed increasing returns (average scale efficiency of 0.788), implying that any improvement in development/investment in the input variables could lead to larger than proportional improvements in trade balance due to increasing returns to scale. 33 of the 89 countries were not operating at their most productive scale. The global supply chain analysis of the supply chain revealed that firms are now concentrating on specialization and flexibility in order to gain advantages in emerging economies, as well as looking to minimize production costs. These costs may be associated with the coordination of different firms and institutions to reduce unforeseen circumstances regarding conflicting interests that can arise from the supply chain. It was also concluded that sustainability practices (environmental, social and supply chain logistics cost/time) also impact on import and export activity whilst the effective coordination between agents in the supply chain required the conscious development of infrastructures in order to enable the supply of integrated chains encompassing a multitude of customers-suppliers.

Kaufmann and Carter (2010) present an empirical study that addresses how environmental and social sustainability drives long-term profitability across diverse industries (automotive, chemicals and pharmaceuticals, consumer goods, electronics, mechanical engineering and trade), firm size and emerging economies (China, Brazil, Hungary, India and Czech Republic). The main objectives were to establish the significant benefit derived from sustainable management and what the most effective

sustainable measures are. The paper assesses firms' sustainable practices under two broad categories; internal operations and supplier management. Focusing on six aspects of sustainable management; resource efficiency, end-of-pipe filtering, production input factors (environment aspects), working conditions, safety standards and community development (social aspects), the authors measure firms' performance in sustainability in terms of their internal operations. Based on this, the authors hypothesise that financially successful firms perform significantly more in sustainable efforts than less successful firms and then firms who engage strongly in environmental and social practices accrue a variety of competitive advantages, namely: production efficiency, innovation capacity, company reputation, attractiveness for employees and support by community.

In terms of supplier management, the authors assessed firms' sustainability performance under three key aspects; supplier selection, supplier monitoring and supplier development. They raise a hypothesis that a strong correlation exists between sustainable supplier management and competitive advantage, competitive advantage measured as supplier operational performance, supplier strategic capabilities, supplier management skills and company reputation. The study revealed significant variations in sustainable efforts in internal operations across the sampled industries. Specifically automotive, mechanical, engineering and electronics industries concentrated more on practices that improve working conditions and safety standards but less on community development whilst chemicals/pharmaceutical and consumer goods industries concentrated more on efforts that improve working conditions and safety. Consumer goods industries also placed much emphasis on environmental aspects. Under supplier management, variations in sustainable practices were equally observed across the

industries. In automotive and mechanical engineering industries, supplier development was of primary importance, whilst environmental selection criteria were of primary importance to the electronics industry. For consumer goods and trade industries, higher emphasis lies in selecting suppliers with sustainable working conditions whilst safety aspects dominated the chemicals and pharmaceutical industries. Based on the results obtained, the authors recommended that managers should consider environmental efforts even more than social efforts as potentials for differentiation, purchasing managers should see sustainable supplier management as a way to increase suppliers' relationship and further developing supplier management skills, among others.

Golini, *et al.* (2012) empirically evaluate the relationship among companies' environmental and social performance and three other kinds of variables; sustainable supply chain management (SSCM) initiatives, supply chain management (SCM) improvement programmes and global sourcing strategies implemented by organisations whilst controlling for internal sustainability programmes. The authors hypothesise that SSCM initiatives explain variations in companies' environmental and social performance, with this relationship moderated by SCM improvement programmes and global sourcing. In order to investigate the above hypothesis, data was obtained from the fifth edition of the International Manufacturing Strategy Survey (IMSS) in 2009 based on a sample of 400 plants located around the world. Information was gathered in terms of company size, production network configuration, competitive strategy and business performance. An exploratory factor analysis (principal component with varimax rotation) was employed in the analysis. The quality of the instruments was checked for discriminant and convergent validity

using Bartlett's test of sphericity and Kaiser-Meyer-Olkin measure of sampling adequacy. A linear regression was then applied to arrive at the study results. Here, two models were constructed; the first attempts to measure the impact of SSCM on financial performance for the past three years; and the second compares the financial performance with competitors in the face of SCM improvement programmes and the interaction effect of SSCM initiatives and SCM improvements. All the models controlled for size, GNI and CSR initiatives. Significant R-squared changes were then estimated by means of the Vuong test.

The results revealed that apart from size, all the control variables impact significantly on both performance measures. There is a positive relationship between the extent to which the firms invest in SSCM initiatives and its achievements of high environmental and social performance. There is also a positive moderating effect of SCM improvement programmes on the direct relationship between SSCM initiatives and company sustainability performance whilst a negative moderating effect of global sourcing was estimated on the relationship among SSCM initiatives, SCM investments and sustainability performance. They concluded that companies with global suppliers perform better than those that rely on local suppliers, but this can only be achieved with strong effort in SSCM.

Colicchia *et al.* (2011) provided evidence of the sustainable strategies currently undertaken by companies and attempted to find out which of the pillars of sustainability was more imminent in the practices of these companies. Their work also attempted to find out the criteria employed by the organisations in priority-setting amongst different initiatives within the same supply chain phase with particular

emphasis on the environmental dimension of sustainability. Ten large multinational companies including Coca-Cola HBC, Electrolux, Henkel, Ikea, Fiat Group, Kimberly Clark, Levi Strauss & Co, Nestle, Pirelli and Tenaris were selected for this study based on their inclination to green initiatives, location, operation in environmentally critical industries and periodic environment strategy reports. A three-pronged research methodology was used to achieve the purpose of the study.

First, a framework was developed to identify the initiatives towards supply chain sustainability based on literature. Frameworks were categorised under five main phases for analysis in terms of green procurement, internal supply chain, external supply chain, warehousing and product design. Based on review of literature, a detailing of initiatives typically utilised to improve environmental sustainability was prepared for each of the phases. The second process involved the application of the framework on the set of companies examining the company environmental report (CER). The CER available on the internet site of the company was examined to understand the current environmental initiatives they are adopting within each phase of the supply chain. The main aim was to gain some insights into the level of understanding and awareness of sustainability issues within the companies reviewed. Third, a sub-set of three companies (Coca-Cola HBC, Electrolux and Nestle) were finally selected for further in-depth interviews based on their environmental sensibility and customer interest on their green practices. The supply chain managers and/or environment managers, working in Italy of the three selected companies were interviewed. At the end of the analysis, it was observed that product/packaging design was at the forefront of sustainable supply chain practices, whereas initiatives addressing warehousing and outbound supply chain seem to be less represented.

Again, results showed a significant variability in the level and type of initiatives undertaken by firms towards environmental sustainability. Specifically, it was observed that companies are gradually implementing more sustainable supply chains, thus, selecting the initiatives to be progressively implemented among those available. The work of Colicchia *et al.* (2011) therefore offers much relevance for academia and industry in terms of measurement, designing and monitoring of sustainability practices and impacts. The work also opens up methodological issues and line of inquiry that can be pursued for future research especially in the analysis of the entire supply chain network of industry.

Walker and Jones (2012) similarly conducted an empirical study that explored both the drivers and constraints of sustainable supply chain using evidence of seven renowned best performing private sector companies in UK. Their work sought to address two main questions; first, the degree of variation in how organisations perceive the internal and external barriers and drivers to sustainable practices and second, how organisations vary in forecasting future sustainable supply chain management. A qualitative approach was principally adopted for this inquiry. First, an explorative study to investigate the barriers and enablers of supply chain management practices was conducted on summer 2006 based on interviews. At least one senior manager in each company was included in the interview.

Secondary data was then pulled together from reports and web sites, including annual reports, environmental/CSR policies, supplier evaluation questionnaires and internal newsletters. The validity and reliability of the study was ensured by two main approaches; subjecting the secondary data through the method of triangulation and the

use of interview protocol. An enveloping framework for analysis was constructed based on literature review and interviewee comments. The data analysis was then conducted iteratively through the course of data collection. At the end of the survey, key drivers to sustainable supply chain management were identified as follows: customer requirements, reputational risk, organisational factors including strategic, people and functional issues and stakeholder involvement (including NGOs and Government). Others include: procurement team's ability to work with other areas of the company, buyers' abilities to embrace new skills, the increasing role being played by the public sector, academics and investors and a desire for a whole industry to be adopting new practices. Meanwhile, such factors including pressures to reduce costs, limited resource, weak processes, communication and knowledge deficiencies, insufficient supplier commitment, cultural barriers, other organisational priorities, the ability of buyers to tackle the subject and accounting methods that focus on short term measures were observed as barriers to sustainable supply chain management.

Morali and Searcy (2010) directed a pilot content analysis on how sustainability principles have been assimilated by Canadian corporations in their supply chain management (SCM) practices. Focusing on five interrelated issues of sustainability, the authors attempted to address the following questions on the measuring tools and standards by which organisations assess the performance of their sustainability initiatives in the supply chain: What indicators are currently used to measure supply chain performance in sustainability? What are the minimum acceptable standards for SSCM? Where in the supply chain does a company's accountability stop? How can suppliers be encouraged to be more sustainable? Analysis was thus limited to examining the organisations' report demographics, supply chain governance,

strategy/policy, monitoring/standards, performance indicators, supplier collaboration and management's commitments. All reports were also restricted to a maximum of three years in order to identify current trends in SCM practices. A sample of 25 out of 98 Canadian companies constituted the sample size for the content analysis.

Key findings derived from the survey are that most companies focus greatly on economic performance, giving least attention to social performances of the supply chain. This is indicative of the fact that the integration of all dimensions of sustainability, according to the authors, is relatively limited in either the strategic or tactical levels of supply chain operations. It was also observed that collaborative initiatives among actors are necessary to enhance sustainability. However, most companies pay less focus on monitoring though they require suppliers to abide by standards.

Calvalho and Barbeiri (2012) also attempt to analyse how sustainability dimensions have been incorporated into the supply chains of technological innovations. The paper tries to establish the linkage between innovation, sustainability and supply chain management and analyses the concept of sustainable innovation, as well as management models that bridge the gap between these themes using Natura Cosméticos (Natura), a Brazilian Cosmetics Company as a case study. An interpretative approach is utilized to understand the induction of sustainability practices within the supply chain in order to observe any generalisation concerning the induction process of focal companies of technological innovations that have integrated all aspects of sustainability in the supply chain. Data was collected mainly through the use of secondary data and semi-structured interview schedule.

Information was gathered on such issues as sustainable business politics and internal practices, innovation, product, production processes, organizational processes and sustainability outcomes regarding social and environmental objectives. At the end of the case study, the authors concluded that “the incorporation of sustainability in the business model, not only through the viewpoint of negative impacts but also of the development of solutions that bring value to the company and to society, is possible when the company aligns its strategic objectives in the social and environmental dimensions to its innovation power and engages current direct and indirect suppliers, as well as develops new partners in its initiatives to find innovation in products and processes.”

Gnoni *et al.* (2011) offer a systematic approach to support a firm to evaluate its own supply chain's environmental performances. The approach integrates index methods for Environmental Performance Evaluation (EPE) with a multi-criteria model based on the Analytic Network Process (ANP). The model built was then applied to the European glass production supply chain network. Three main stages of integration were exposed in the model construct; the first stage involved the definition of metrics for measuring supply chain environmental performance. The second stage involves the development of a strategic decision support system for the purposes of evaluating the environmental performance of the entire supply chain network. Here, a multi-criteria approach based on the Analytic Network Process (ANP) was utilised to obtain a quantitative scale for environmental performance measurement. The third and last stage involved the assessment of criticalities of the supply chain management. According to the authors, this stage entails the analytical verification of results derived from the ANP model to check for consistency. The consistency index was

formulated as: $CI = (\lambda_{max} - n) / (n - 1)$. Where n is the number of components evaluated in the pairwise comparison matrix, and λ_{max} is the largest eigenvalue characterizing the matrix. Applying the systematic model to the glass production supply chain, the authors realised that at the supplier level, optimizing the use of resource will enhance environmental impact. At the production level, an investment to optimize emission releases was suggested, whilst improving packaging efficiency was highlighted for the customer level in order to improve the environmental performance of the whole supply chain.

Foster (2013) particularly focuses on current sustainability best practices moulded in the food industry. The paper demonstrates that embedding sustainability as a DNA in the business practices of organisations will enhance the probability of business success than just transforming practices. This is so because, according to the author, sustainable consumption has become a prime concern to customers globally; therefore, driving business innovation and strategic advantage. The study employed two main methods of analysis. The initial analysis involved a systematic examination of 19 academic journals on sustainability to establish central themes and global practices. The second method of the study included a website research of many different companies in the food industry to discover who utilizes the best practices of sustainability in the industry. This was then narrowed down to eight most sustainable food companies examining their contribution to green environment and production lines. At the end of the analysis, the author observed that a greater number of the organizations do not only have sustainability in their DNA but pursued the triple bottom line of sustainability. Forster (2013) concluded that irrespective of the industry in which the companies' operations evolve, it is vital for DMU's to recognize that

pinning sustainability as the core of business practice will improve companies' reputation, customer retention, attractiveness and eventually ensure success.

Mefford (2011) provides the economic rationale to operate a sustainable global supply chain. The author suggests that engaging in social sustainability efforts results in economic benefits to businesses. The paper describes a transitional model that illustrates how lean production and quality management result in sustainable corporate behavior that in the long run, translates into higher stock valuations. Three main channels of transition are described by the theoretical model; the first shows the impact of sustainable supply chain behavior on end users. This channel suggests that customers are typically oriented towards firms that create green products which allow firms to tender higher prices for their green products and consequently obtain increased sales. The second channel on the other hand illustrates the effects of sustainable supply chain efforts on production through the distinguished ability it provides the organization in terms of pooling of quality labour and enhancing workers' retention. As suggested by the model, the skilled and highly motivated employees not only perform efficient tasks but are willing and able to improve processes leading to higher quality and productivity which lead to lower costs of production. The last channel typifies ethical supply chain behavior as the best guarantee for augmented stock valuation through reduced financial risk.

The model also demonstrates the possibility of cross linkages among channels. A direct linkage is shown between the first and second channels: improved production processes leading to higher quality and lower prices increases brand equity as customers experience better-performing and more reliable products, as well as higher

perceived value creating an enhanced market share and monopoly power. A reverse cross-linkage is formed through higher sales producing possible economies of scale and scope. These economies come from the more cost-effective volume of production as well as experience or learning curve effects as sales increase. Cross-linkages according to the model also exist between the marketing and production channels and the financial risk channel producing greater profits as an upshot.

Bask and Kuula (2011) measure supply chain level environmental sustainability using Nokia Corporation as a case study. The paper illustrates three main aspects of environmental sustainability: sustainable product design, sustainable sourcing and supply chain coordination and sustainable product end-of-life management operations with seven metrics under each aspect. The metrics considers the manufacturers; involvement in strategic activities related to materials management at the supply chain level. For the purposes of operationalization, the evaluation metrics were constructed as indicators illustrating key concerns under each of the three strategic aspects of environmental sustainability in materials management. Qualitative metrics were determined under each of the strategic elements used in applying the model to empirical data. A 5-stage maturity level model was then used to evaluate the level of use of each of the chosen metrics to spot potential improvement areas and priorities in more detail. Data was then retrieved from the company's web page for two months; October – November, 2009. It was concluded at the end of the study that the company performed better under all aspects of environmental sustainability. The author observed with concern that though the pursuit of green performance can be costly, companies can prioritize strategies to attain specified targets relative to budget.

Closs, *et al.* (2011) exhibit empirical evidence on the role played by supply chain management to create a sustainable value chain. Building on a strategic framework, the paper specifically objectivizes to illustrate how major firms are implementing each sustainability dimension to enhance their competitiveness. The study typically applied an inductive approach using a grounded theory methodology to develop a framework for sustainability. Data were then collected through the use of interviews, observation, review of such documents from large, global firms in the food, pharmaceutical, electronics and retail industries that demonstrated remarkable motivation for sustainability practices. Data were then coded, distilled and then finally aggregated into core sustainability dimensions with an overarching goal of ensuring that the sustainability conceptualization is sufficiently comprehensive and reflective. The description of the sustainability initiatives were then independently categorized by multiple researchers through two iterations resulting in four primary sustainability dimensions: environmental, ethical, educational and economic. The results of this coding were validated by presenting the sustainability framework to 24 executives responsible for sustainability at 8 firms and 5 academics whose focus areas include sustainability but are outside the academic discipline of the authors. At the end of the coding, principal initiatives were identified under each dimension. For instance,

1. Environmental: conservation (water, energy and nature), usage reduction (waste and recycling, greenhouse gasses and end of life management) and business practice management (packaging, facility construction and sustainable sourcing)
2. Ethical: employee relations (code of conduct and volunteerism), community development (avoiding child/forced labour, disaster relief and reducing

poverty) and business practice management (product safety, responsible marketing and product traceability).

3. Educational: employee relations (workplace safety, work life balance, healthy lifestyle), talent development (diversity/inclusion and training) and business practice development (supplier training, business continuity and sustainable workforce)
4. Economic: internal management (strategic sourcing, continuous improvement and transportation optimization) and external management (supplier management and market generation)

The authors ardently concluded therefore that though the inclusion of the traditional environmental and ethical dimensions are critical for preserving cultures and global resources, educational and economic dimensions generate significant augmenting implications to long term growth. They therefore recommend that a balance between the four dimensions is required to guarantee long term viability for all stakeholders (labour, firm and society).

Sammon and Hanley (2007) undertook a research that attempted to depict the benefits of becoming a fully-fledged eco-sensitive corporation. Given the need for the researchers to achieve an in-depth understanding of e-supply chain initiatives within an organisation focusing on the impact of e-business on the supply chain, a single exploratory case study research design was chosen. The primary data collection methods used for the study were: survey questionnaires, in-depth interviewing and document analysis in an effort to ensure triangulation in the data collection effort. A survey of 20 Intel personnel (Ireland and US) was conducted with a response rate of

80 per cent (16 responses) of which 14 (70 per cent) were usable. At the end of the survey it was concluded that e-supply chain initiatives transforms companies' business processes.

Tencatti *et al.* (2010) measure the sustainability along a global supply chain using the case of Vietnamese enterprises. The purpose of the paper was driven to find out the impact of sustainable sourcing policies that hold the supply chain network of multinational companies with particular emphasis on suppliers within the chain. Research questions were consequently raised about the process through which CSR is reaching the Vietnam. Out of 59 companies, a total of 25 enterprises positively responded to the questionnaires. Enterprises were selected on the basis of three criteria. Foremost, in terms of industry: footwear constituted 32% of the firms in the sample, garment 32% and seafood 36%. Secondly, among the ones operating within the three sectors, the enterprises that operated strongly in the export market were selected. The third criterion involved the firm size measured by the number of employees in the organization based on the rationale that the larger the firm size, the wider the effects of CSR on the firm's operations. At the end of the analysis, it was concluded that the monetary and non-monetary costs of complying with international standards may turn out to be unsustainable and prohibitive for many enterprises, especially for small and medium-sized suppliers. A major collaboration between public and private efforts, local and international authorities, managers and workers were therefore strongly recommended to ensure more enabling environment for sustainability.

Flint and Golicic (2009) also carries out a qualitative study to establish the link between sustainability and competitive advantage using New Zealand wine industry. The work follows others which utilises the ground theory methodology of study. Data was gathered mainly through the use of in-depth interviews, observations and document analysis. The managers from wineries, retailers and restaurants were sampled for the interviews. The findings show a strong willingness and practical initiative towards sustainable supply chain network by leveraging sustainability-related competencies for competitive advantage. Within this context, the emergent theme of searching for advantage through sustainability involves: pursuing and leveraging sustainability, telling a story that involves sustainability, managing supply chain relationships around sustainability and experimenting with sustainability initiatives. The authors finally concluded that although sustainability initiatives such as organic, bio-dynamic and low carbon emissions can all be used to differentiate companies and supply chains in some way, marketing purposes need not be (nor should they be) the sole reason for pursuing them.

The review of empirical studies on SSCM has particularly been relevant to grasp the main concepts and findings that are eminent and vital for this study. Key concepts highlighted in most of these studies include: Sustainability, Supply Chain Management, Sustainable Supply Chain Management, Social Responsibility, Economic Sustainability, Supplier Monitoring, Performance, Measurement, etc. The underlying theme of Sustainability from the different authors explicitly demonstrates that for long-term economic performance, corporations must pay attention to their social, economic and environmental obligations. The empirical review also highlights several interesting trends in studies on SSCM, particularly the wide variety of ways in

which corporations address SSCM issues. The key findings from the studies suggest a business case for the managerial adoption and integration of SSCM. This and other findings have been relevant in constructing the conceptual/theoretical framework and shaping the resulting research prepositions and methodology for the study.

2.8 CONCLUSION

The literature demonstrates that sustainable practices, induced by economic, environmental and social concerns result in a number of competitive advantages. These include cost savings through: strategic supplier capabilities, production efficiency, reduced health and safety costs, reduced mitigation related costs and increased operational efficiencies. Further, these practices result in revenue generation through: enhanced reputation, increased quality, gaining competitive advantages by proactively shaping future legislation and being more attractive overall to customers, employees and suppliers. Therefore, the current focus for these companies is not on why they should implement SSCM practices, but on how chain partners are performing in terms of initiatives towards reaching sustainability. However, whilst the literature on sustainability in the supply chain is abundant and growing, a relatively small amount of research has been conducted to assess the sustainability performance of firms as they relate to the supply chain phases within such organisations. In particular, there are key gaps related to a system-wide analysis of supply chain sustainability. Most of the studies concentrated on individual organisation's perspective and also, most studies have looked only at the direct effect of sustainable practices on chain performance, with few looking at the moderating effect of Supply Chain Improvement Programmes. The purpose of this paper is thus to highlight these key gaps and to provide insight into how they might be addressed.

CHAPTER THREE

THEORETICAL FRAMEWORK

3.0 INTRODUCTION

This chapter of the study presents the theoretical framework of the study. The framework discusses the interrelationships among the variables that are deemed to be integral to the dynamics of the situation being investigated. The major features of the framework include clear explanations of the variables relevant to the study, a discussion on how the variables are related to one another (this is done for the important relationships that are theorized to exist among these variables) and a schematic diagram of the framework presented to aid readers to see and easily comprehend the theorized relationships. Following these are appropriate hypotheses to test the relationships that are theorized and the logic/concepts that underpin each. A subtle operational definition for sustainable supply chain management is also proposed to arrive at the set objectives and conclusions that are relevant to the case under study.

3.1 SUSTAINABLE SUPPLY CHAIN MANAGEMENT: AN OPERATIONAL DEFINITION

Scanning through the literature, it is observed that the concept of sustainability has been severally defined as the integration of social, environmental and economic responsibilities (Carter and Roger, 2008; Stonebraker et al. 2009; Carter and Easton, 2011; Forster. 2013). Golini *et al.* (2012) therefore emphatically state that a sustainable business should necessarily aim at consciously and continuously moderating its environmental and social impacts, assuring the possibility of future

generations in meeting their needs. NZBCSD (2003) eventually adopts this principle on supply chain to indicate that a sustainable chain engages the management of raw materials and services from suppliers to service providers to customer and back with improvement of the social and environmental impacts explicitly considered.

Extracting from the above, it is obvious that the end product of a sustainable supply chain brings long term viability and eco-social benefits to its actors. It creates, protects and ensures the growing long-term environmental, social and economic value for all stakeholders involved in bringing products and services to the market. Closs *et al.* (2011) hitherto corroborates that a sustainable supply chain signals the firm's capacity to plan for, mitigate, detect, respond to and recover from potential global risks. Curtailing potential risks invariably puts actors within the chain on the pedestal to be commercially viable in the long term. This long term viability comes as a competitive advantage accruing to the organization and actors within the chain. Competitive advantage is therefore an offshoot to sustainable management (Kaufmann and Carter, 2010; Closs et al. 2011; Forster, 2013). Mefford (2011) typically avows that sustainable business practices are corporate policies and actions that attempt to satisfy the various stakeholder groups of the firm in order to ensure long-term competitiveness.

In this light, this work proposes an operational definition for sustainable supply chain as the management of economic, environmental and social impacts emanating from the operations of businesses, throughout the lifecycles of goods and services with the sole aim of reaping immense competitive advantages to actors within the supply chain. Within the cocoa chain, competitive advantage is measured under seven key

dimensions: *Production Efficiency; Innovation Capacity; Company Reputation; Operational Performance; Strategic Capabilities, Resource Pool and Market Share.*

The attainment of the overall competitive advantage through the efforts of meeting economic, environmental and social responsibilities is what makes a supply chain sustainable. Consequently every business within the chain is mandated to pursue initiatives to meet the 3BL dimensions of sustainability. The task of this research is therefore to measure the degree to which actors within the cocoa chain in Ghana are functioning in terms of initiatives to reach sustainability. A number of initiatives under each dimension of sustainability, after scanning through the literature have been highlighted below:

3.1.1 ECONOMIC DIMENSION

Economic dimension refers to initiatives taken by players within the cocoa chain that reap direct internal and external economic benefits to actors, the communities and the host nation. Economic initiatives are categorised under three broad phases: waste reduction, strategic sourcing and institutions or systems. Waste reduction here refers to all efforts to minimize bad products or low quality grades in the chain due to negligence, delays, short-circuited cocoa processing, etc. Efforts are directed through technology, management, process and design. Strategic sourcing, on the other hand, includes all institutional procurement processes that continuously improve and reassess the business' purchasing activities (procedures, methods, and sources) to optimise value to the company. It considers key aspects such as the appraisal of the firm's budgets for procurement, the landscape of the supply market, negotiation with suppliers and periodic review of supply transactions. Institutions or systems consider

such initiatives that improve structures and arrangements to enhance financial gains to the organisation. It includes efforts at improving quality, warehousing and transport optimisation and inventory control. These initiatives translate into increased financial performance through cost savings to the organisation, but focusing on economic dimension alone does not assure reaping overall competitive advantage and thus, sustainable cocoa supply chain network.

3.1.2 SOCIAL DIMENSION

The social dimension includes all socially responsible practices that include both individual-level human safety and welfare and societal-level community development (Awaysheh and Klassen, 2010). “Thus, by extension, social practices and performance in operations and the supply chain encompass all management practices that affect how a firm contributes to the development of human potential or protects people from harm, thereby capturing both positive and negative aspects respectively. Examples include: workforce policies for safety or diversity, product safety” (Awaysheh and Klassen, 2010) and human right issues such as child labour and workers’ remuneration and stakeholders’ interests. Social initiatives can therefore be grouped under three classes as workplace efforts, community developments and institutions or system policies to improve social performance. Institutions or system policies pertain to all ethical issues reflecting International Labour Organization’s standards and other social concerns that are most prevalent in the cocoa sector and how practitioners are helping to eradicate or meet such benchmarks. Typical examples include: forced labour, stakeholder interests, collaboration, etc.

3.1.3 ENVIRONMENTAL DIMENSION

The environmental dimension deals with initiatives that consider environmental impact of the business operations, by embracing environmental principles in all aspects of the supply chain; production, suppliers, purchasing and marketing (Curkovic and Sroufe, 2011). Practical examples of such issues include: loss of biodiversity, use of chemicals and fertilizers, hazardous product designs, increased air, soil and water pollution and other product and process failures. Clearly, cost pressures on supply chains enhance the likelihood of both minor disruptions and catastrophic events for individual firms, as well as for the global economy and environment. This work therefore considers efforts within the cocoa chain that consider conservation, usage reduction and green purchases. The purpose for pursuing environmental initiatives is thus to access environmental prospects that contribute markedly to revenue growth and competitive advantage to the businesses. This study therefore posits that there is a unique interplay of the tripod dimensions of sustainability earlier defined to arrive at the long term viability of the entire supply chain. This therefore requires an explicit pursuit of all three dimensions to arrive at a competitive advantage for players within the chain. This analogy is illustrated in the next section.

3.2 THEORETICAL FRAMEWORK AND HYPOTHESES BUILDING

The theoretical model is built on the premise that a supply chain must necessarily measure all the strands of sustainability for it to achieve long term competitive advantage for all practitioners. This is because all the dimensions and their related outcomes are highly interconnected. Again competitive advantage has been measured

under six decision levels as shown in Fig. 3.1 below, which synthesises the research model.

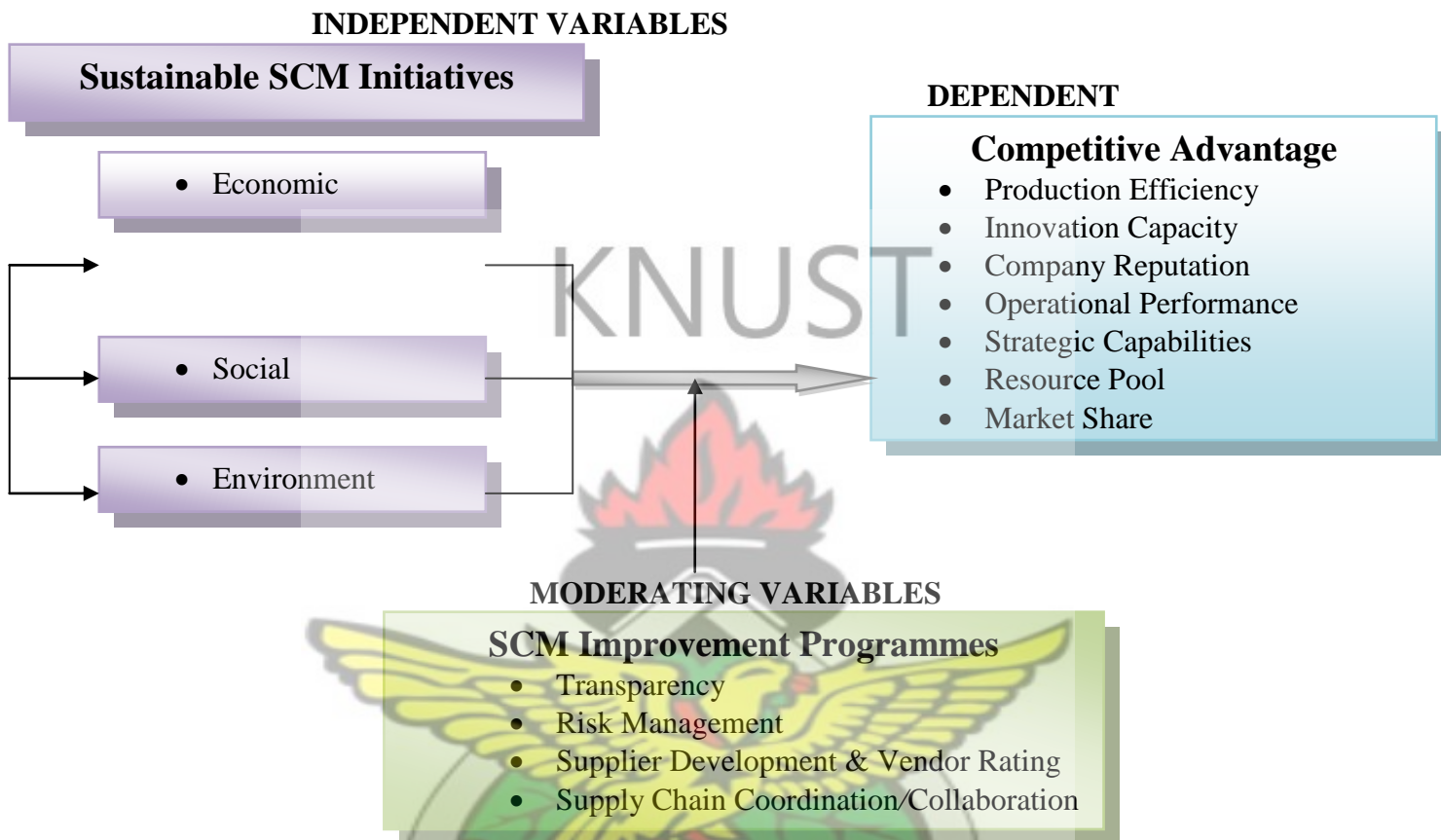


Fig 3.1 Theoretical Framework
Source: Author's Construct (2014)

3.2.1 THE LINK BETWEEN SOCIAL AND ENVIRONMENTAL DIMENSIONS

Mefford, (2011) demonstrates that environmental programmes do not only directly affect the environmental performance of the focal firm but foster some social gains that foster good business operations. This is so because, such initiatives come in the form of joint problem solving sessions, information sharing, establishing goals and resource sharing among practitioners. This fosters mutual learning, cooperation, joint

commitment and willingness to plan and work towards environmental improvements associated with material flow within the chain. It may also come in the form of the adoption of new processes and production techniques that are not environmentally friendly but help to improve the health of not only workers but also, the end user of the product. Again, this cannot be achieved without fruitful collaboration among players and this eventually results in learning curve effects among organisations. Even so, socially responsible practices such as community development or building workers' welfare would also require eradicating third party effects associated with the daily functions of the organisation. It may require using environmentally friendly equipments, reducing wastage and wanton destruction of resources in the community or recycling of materials. All these efforts have positive impacts on the environment and these are obtained out of social initiatives. These social initiatives, it must be said, improve the social performance of the supply chain but also trigger some environmental impact.

Winter and Knemeyer (2013) suggest that no matter how proactive or committed the organisation is to its vision, it can only be successful if it can adequately marry its business model with the environmental and social elements of sustainability. Bask and Kuula (2011) also observe a current trend in how businesses run their corporate social goals today; in that it encompasses entire supply chain as opposed to the earlier focus on only individual company's domain. They confer that companies are gradually understanding the relevance of managing environmental impact in the same way as their commercial performances in order to deliver effective corporate social obligations.

Carter (2005) also states that inter-organizational learning between players, especially demanders and suppliers, concerning environmental and social activities impact on suppliers' performance. Colicchia *et al.* (2011) cites Rao and Holt (2005) who point to the fact that often, environmental initiatives are implementable through the conscious organization of awareness seminars for suppliers, bringing together suppliers to share problems, informing suppliers about the benefits of cleaner production and technologies, arranging for funds to help suppliers to purchase equipment for sustainability improvement. It will therefore not be out of place to induce that environmental efforts derive some social results that augment initiatives taken to improve social performance. The reverse is also feasible. This leads to the following preposition:

H1: There is a Positive Cross Effect between Social and Environmental Dimensions of Sustainability.

H1a: Social Initiatives aside its Direct Social Impact carry Environmental Effects that augment Environmental Efforts undertaken to Improve Environmental Performance of the Supply Chain.

H1b: Environmental Initiatives aside its Direct Environmental Impacts carry Social Effects that augment Social Efforts undertaken to improve Social Performance of the Supply Chain.

3.2.2 THE LINK BETWEEN SOCIAL AND ECONOMIC DIMENSIONS

A connection also exists between social and economic dimensions of supply chain. Mefford (2011) purports the possibility of reaping greater profitability and higher stock valuation due to socially responsible business practices. Theory suggests that consumers respond favourably to firms which they perceive to be ethical. Human right issues such as child labour are typical concerns of end users of cocoa products. This can affect the premium that host nations enjoy on their cocoa products since

reputation is very important in winning good premium on the price of cocoa. Bad reputation and negative publicity affect brand equity, reduce sales and price and ultimately, constrain revenue thresholds. The sweatshop labour issues also emphasize the economic argument. Indeed the literature suggests that well motivated and empowered employees can assure efficient work delivery without supervision and are constantly oriented towards team and individual success. Lee and Faff (2006) observe that a corporate sustainability discount exist in stock prices of companies listed on Dow Jones Global Index (DJGI).

Mefford (2011) also constructs a framework that explains how socially responsible business practices affect shareholder value and reduce financial risks, especially those associated with lawsuits at both employee and consumer levels. According to the author, *“firms that treat their employees as assets rather than costs are much less likely to have disgruntled employees venting their anger through discrimination, disability, sexual harassment and unlawful dismissal lawsuits and claims”*. Similarly, when the organization is willing to pursue pure economic initiatives that improve the economic performance of the supply chain through goals of improving quality of brands, optimization, strategic sourcing, etc., it will require targeted investments that eventually cover sweatshop conditions of minimal or poor training and responsibility, improving workers’ ergonomics, low wages and dangerous and dirty tasks at the work place. It will also require putting up the right channels for distribution, transportation and warehousing which improve the status of the community as well.

Awaysheh and Klassen (2010) also propose that as the dependency of the focal organization increases on its customers, the firm’s use of supplier socially responsible

practices decreases. To them, it is possible for a firm confronted by strong competition to exploit socially responsible practices as a business strategy. More so, firms who are operating in socially sensitive industries or mostly dependent on customers can be easy target to NGOs, downstream customers and the general public to be pushed to improve workforce conditions in their supply chains. This therefore goes beyond the internal financial evaluation of businesses to focus on all other corners of the chain that impinge on the financial performance of the organization. In the cocoa sector, this linkage is most prevalent. For instance lower incomes and prices for cocoa farmers do not only put at risk the sustainability of cocoa growing, but compels farmers to seek for cheap labour who are all children. Studies show that over 283, 000 children in Cote d'Ivoire, Cameroon, Ghana and Nigeria, all younger than 13 years with some not older than 5 years, work under hazardous conditions. Children are often forced to work for long hours using dangerous equipment, exposed to pesticides and subjected to physical abuse (Griek et al., 2010). Based on the above premise, the following hypotheses are raised:

H2: There is a Positive Cross Effect between Social and Economic Dimensions of Sustainability.

H2a: Social Initiatives aside its Direct Social Impact carry Economic Impacts that augment Economic Efforts undertaken to improve Financial Performance of the Supply Chain.

H2b: Economic Initiatives aside its Direct Economic Impact carries Social Effects that augment Social Efforts undertaken to Improve Social Performance of the Supply Chain.

3.2.3 THE LINK BETWEEN ENVIRONMENTAL & ECONOMIC DIMENSIONS

Colicchia *et al.* (2011) posits that the application of environmental strategy to production processes lead to improvement from both environmental and economic

point of view. Approaches to reducing resource usage, efficient technology, eco-friendly production lines and products and waste management practices affect the cost shares of business. which in turn improve their financial performance. This is done through information sharing and proactive collaboration among players of the supply chain, on even the planning and design of products, assessing the impact of material flow, etc. Improving the quality of cocoa and reaping of higher economic returns hinges on good agricultural practices by planting high yielding, disease resistant cocoa plantlets, as well as responsible cocoa farming towards more responsible environmental stewardship and removing the footprints of cocoa operations at all tiers of the cocoa chain. Conservation of the environment by building the capacity of stakeholders, improving infrastructure and traceability efforts have direct economic benefits such as improvement of productivity, quality cocoa beans, increased revenue whilst protecting the biodiversity and the ecosystem upon which cocoa production depends. This leads to the following hypotheses:

H3: There is a Positive Cross Effect between Environmental and Economic Dimensions of Sustainability

H3a: Environmental Initiatives aside its Direct Environmental Impact carry Economic Impacts that augment Economic Efforts Undertaken to Improve Financial Performance of the Supply Chain.

H3b: Economic Initiatives Aside its Direct Economic Impact carry Environmental Effects that augment Environmental Efforts undertaken to Improve the Environmental Performance of the Supply Chain.

3.2.4 A THREE-FOLD OR A SINGLE-FOLD?

Extracting from the literature, it is understood that all the dimensions of sustainability have some overlapping effects. The question that pops up is whether focusing on one strand will result in significant improvement in all strands of sustainability and

thereby ensuring long term competitiveness of the supply chain. Sloan (2010) believes that though sustainability has a three-fold measure, a supply chain that explicitly measures either environmental or social performance will perform better in all the dimensions of sustainability, however, the same cannot be said for economic performance. The author therefore makes an argument for prioritizing a single dimension of sustainability though not the economic dimension.

Kaufmann and Carter (2010) also share in this preposition, with a slight deviation. They put forward the preposition that economic performance is the outcome of both social and environmental performance. However, they deviate from Sloan (2010) by illustrating that there could be no relationship between social and environmental performance. Rogers and Carter (2008) somewhat insist that while it may be true that each dimension has an overlapping effect, it does not justify practicing only a single dimension. This will yield a second best result. According to them, true sustainability arises at the point where all three dimensions intersect and this requires multiple activities where an organization explicitly and comprehensively incorporates social, environmental and economic goals in developing strategic vision and long-term strategic objectives.

BSR (2010) confers to the three dimensional focus of organisations to derive long term economic outcomes. They state that socioeconomic development and the environment act as secondary impacts of economic performance aside the direct increase in incomes and job creation domino-effect of sustainable economic initiatives. Goncz et al. (2007) also corroborates that firms must attach equal weights to what they christened as economic stability, ecological compatibility and social

equilibrium. Rogers and Carter (2008) state that the inclusion of supply chain management activities in pursuit of sustainability even adds more to the benefits continuum available to focal firms. When merged with a comprehensible long-term business strategy, the supply chain management activities in sustainability efforts create a set of processes which cannot easily be duplicated.

This work in principle follows the school of thought that believes that a supply chain must necessarily measure all levels of sustainability in order to attain true sustainability. The argument raised is that there may be, for instance, purely social issues which may not reflect any environmental impact, though the two are expected to be strongly positively related. A simple case may be initiatives to eradicate forced labour or working under hostile conditions. Meanwhile, this particular scenario may be a very critical issue within the supply chain, especially that of the cocoa chain. In this case, focusing on one dimension will result in a second best outcome as deduced from Roger and Carter (2008). This argument can be raised for all the dimensions, hence, the relevance of measuring all the three dimensions of sustainability individually and separately within the supply chain; to arrive at the first best outcome. Based on this, the following hypotheses are raised:

H4: *A Tripod Goal (Engaging in all Three Dimensions of Sustainability at a Goal) has a Stronger Impact on Competitive Advantage than Focusing on a Single Strand*

H4a: *Organizations that Attach Equal Weights to all Dimensions of Sustainability on its Supply Chain Perform Better on Sustainability Performance*

H4b: *Organizations that Measure all Three Dimensions of Sustainability Perform Better than Those that Do Not.*

3.3 COMPETITIVE ADVANTAGE: A MEANS TO AN END

The triple bottom line suggests that at the intersection of social, environmental and economic performance, there are activities that organizations can engage in which do not only positively affect the natural environment and society, but which also result in long term economic benefits and competitive advantage for the firm (Rogers and Carter, 2008). At this unique point of intersection, overall sustainability is also observed (Rogers and Carter, 2008). Closs *et al.* (2010) observe that practicing the tripod pillars of sustainability ultimately leads to improved profitability and efficiency over the long term. They assert that current business ethics require enterprises to assemble new, environmentally sustainable and socially friendly systems while enhancing shareholder value. Kaufmann and Carter (2010) also suggest that focal firms that practice sustainable practices gain a competitive edge over those within the chain that do not. They measure competitive advantage under seven decisive areas including production efficiency, community support, innovation capacity, company reputation, attractiveness for employees, supplier management skills, supplier strategic capabilities and supplier operational performance.

Closs *et al.* (2010) also estimate that sustainable enterprise strategies make businesses achieve long term viability. They also measure competitive advantage in three decisive areas including operational efficiency gains, enhancement of people and their communities and resource efficiency. BSR (2010) also suggest that sustainable supply chain management is key to maintaining the integrity of a brand, ensuring business continuity and managing operational costs for firms. Indeed, a number of empirical works have confirmed the linkage between sustainability and competitive advantage (Vasileiou and Morris, 2006; Markley and Davis 2007; Hart 2007; Flint and Golobic,

2009; Mefford, 2011; Golini et al. 2012). From the above, this work also makes the following hypotheses:

H5: Engaging in Sustainable Supply Chain Initiatives Leads to Higher Competitive Advantage to Firms

H5a: Economic Dimension Has a Positive Effect on Competitive Advantage

H5b: Social Dimension Has a Positive Effect on Competitive Advantage

H5c: Environmental Dimension Has a Positive Effect on Competitive Advantage

As identified earlier, this work measures competitive advantage in seven vital thresholds in terms of Production Efficiency, Innovation Capacity, Company Reputation, Operational Performance, Strategic Capabilities, Resource Pool and Market Share.

3.3.1 PRODUCTION EFFICIENCY

Kaufmann and Carter (2010) define production efficiency as all processes that result in the attainment of minimal inefficiency (less waste). To them, production efficiency grants both positive environmental and economic impact on the chain. The idea of production efficiency connotes overall improvement in production systems which also include the determination of leanness. Time management is also of essence as staff efficiency is key in improving profitability. Other key considerations in obtaining production efficiency are also maximizing quality, equipment efficiency, layout and workplace design and value stream mapping. All these initiatives geared towards production efficiency are undertaken in response to sustainable practices for environmental, social and economic performance. Hence, pursuing sustainable supply chain management must correspond positively to the attainment of production

efficiency. That is, pursuing sustainability initiatives triggers practices and corporate policies that supplies efficient value production. The simple reason is that sustainable environmental actions, for one, lead to transformation of environmental challenges into economic opportunities which provide a better deal for actors. For instance, the improvement in the overall environmental performance of products throughout their life-cycles, resource utilization efficiency and or reduction of hazardous production lines and systems aid in the attainment of maximum output with the inputs used. Kaufmann and Carter (2010) also state that resource efficiency can also lead to lower costs, higher quality and more stable processes which improve economic performance. Again, social initiatives such as training, embracing of new and better technologies, time management and workplace design and safety are social efforts which are geared towards efficiency and improving competitiveness. Based on this, the following hypotheses are raised:

H6: All the Dimensions of Sustainability Correlate Positively with Production Efficiency

H6a: Economic Dimension is Positively Related to Competitive Advantage of Production Efficiency

H6b: Social Dimension is Positively Related to Competitive Advantage of Production Efficiency

H6c: Environmental Dimension is Positively Related to Competitive Advantage of Production Efficiency

3.3.2 INNOVATION CAPACITY

The positive learning curve as a result of collaboration between actors within the chain or handling complex and dynamic business practices and technologies improve the overall innovation capacity of the supply chain as a result of pursuing sustainable action plans and efforts. Supplier capacity building and remediation, cross-functional

collaboration among managers and research and development augment skill sets and technical know-how of the overall supply chain. This makes the actors have a competitive edge over opponents within the same global supply chain. Technological innovation has become a major driver of economic change. Innovation relies on intangibles such as creativity, knowledge and experience. However, these intangibles are fostered as the actors within the supply chain endeavour to improve social, economic and environmental performance of their business activities. The old methods of economic engagements are substituted for newer, safer, convenient and best practice methods over time and this builds the quantum of knowledge and technology. Supply chain management experts underscore the role of organizational learning in achieving sustainable competitive advantage by stating that the rate at which an organization learns may become the only sustainable source of competitive advantage.

Goh (2003) also notes that many organizations have embarked on continuous learning as a strategy to stay competitive. They encourage employees to learn new skills continually to be innovative and to try new processes and work methods in order to achieve the strategic business objectives of the organization. Again, external collaboration among actors improve innovation capacity as it also requires the development of internal processes, systems, knowledge and structures to support on-going learning to deal with the increasing complexity found in the multi-stakeholder domain. Based on these, the following hypotheses are raised:

H7: All the Dimensions of Sustainability are Positively Related to Innovation Capacity

H7a: Economic Dimension is Positively Related to Competitive Advantage of Innovation Capacity

H7b: Social Dimension is Positively Related to Competitive Advantage of Innovation Capacity

H7c: Environmental Dimension is Positively Related to Competitive Advantage of Innovation Capacity

3.3.3 COMPANY REPUTATION

Companies build an inimitable process and products through the reputation they obtain when they pursue sustainability. This reputation sets them on the edge above their competitors within even the same supply chain (Kaufmann and Carter, 2010). In the same vein, when the company is noted for undertaking unethical, environmentally dangerous and economically unacceptable ventures or policies, its reputation is soiled and this does not only drive away customers and investors from its line of operations and hence less profits, but it equally plunges the organization into myriads of reputational risks and legal risks. This is despite its quality products or pricing strategy. Indeed, experts declare that reputation is a stakeholder's expectation of value against an organization's peers and competitors. Each stakeholder has different expectations of value. By promising and meeting expectations over time, the organization builds trust with its stakeholders.

The more organizations differentiate their value with their various stakeholders versus competitors, they build a trusted relationship that creates both a barrier to competition and a hedge against reputational risk if crises occur. This advantage is fostered or derived through the pursuit of sustainable practices. Sustainability therefore drives trust, which in turn drives reputation. In the long run, a paradox emerges: the best performing firms are not those who objectivize to succeed, rather, they are those who

set out to behave in a sustainable manner. Success and prosperity are best achieved as byproducts, collateral results and secondary outcomes; service to a broader cause ultimately drives not just trust and reputation, but success as well. Based on this, the following hypotheses are raised:

H8: Pursuing Sustainable Practices Builds the Reputation of Actors in the Chain

H8a: Economic Dimension is Positively Related to Competitive Advantage of Reputation

H8b: Social Dimension is Positively Related to Competitive Advantage of Reputation

H8c: Environmental Dimension is Positively Related to Competitive Advantage of Reputation

3.3.4 OPERATIONAL PERFORMANCE

Kaufmann and Carter (2010) states that strong governance, monitoring and auditing exercises obligated as a result of pursuing sustainable efforts over production processes, systems and designs drive the organization or the entire supply chain to performing well operationally, both in quality and reliability. This comes as a result of the focal firm(s) improving internal alignment, being proactive in the market and employee empowerment through informed and participatory workplace setup that ensures fair working conditions. Quality of goods and services improves brand loyalty which in turn affects long term viability. Quality and sustainability are therefore inseparable pair; only the truly excellent is sustainable. Sustainable initiatives are geared towards creating the best value for money and this highlights the need to ensure food safety, good taste and high calorie levels, not neglecting the impact on future generations and society. This principle and action to improve on quality and

reliability in a sustainable manner eventually improve the operational performance of the organization and the entire supply chain. These result in the following hypothesis:

H9: Pursuing Sustainable Practices Improves the Operational Performance of Actors within the Chain

H9a: Economic Dimension is Positively Related to Competitive Advantage of Operational Performance

H9b: Social Dimension is Positively Related to Competitive Advantage of Operational Performance

H9c: Environmental Dimension is Positively Related to Competitive Advantage of Operational Performance

3.3.5 STRATEGIC CAPABILITIES

Focal organizations can be expected to possess added strategic muscle in terms of management skills and innovation capabilities that allow them to survive and increase their value over time due to their involvement in sustainable practices (Kaufmann and Carter, 2010). This is because, implementing sustainability practice can itself be used as a strategy, and when the supply chain is monitored, audited, governed and actors pursue initiatives and practices with the critical level of commitment, the skill sets they derive will place them on an advantageous position above their competitors. This is mainly as a result of the sensitivity to the future which enables creative thinking and appraisal; investment in resources and an approach to socially ethical and environmental matters that are integral to the progress of the business. Business strategic capability is therefore a major component in remaining financially viable and growing despite the presence of competitors. This leads to the hypothesis below:

H10: Pursuing Sustainable Practices Improves the Strategic Capabilities of Actors within the Chain

H10a: Economic Dimension is Positively Related to Competitive Advantage of Strategic Capabilities

H10b: Social Dimension is Positively Related to Competitive Advantage of Strategic Capabilities

H10c: Environmental Dimension is Positively Related to Competitive Advantage of Strategic Capabilities

3.3.6 RESOURCE POOL

Attractive working conditions boost employee satisfaction and thus help the company to retain personnel (Kaufmann and Carter, 2010). Attractiveness is obtained not just by remuneration but also by factors such as the employees' ability to reconcile their private lives, families and health situation with the demands of their careers. The socially responsible organisations will typically treat their workers well in terms of safety standards, working conditions and remuneration. Even so, Kaufmann and Carter (2010) underscore the point that workers normally harbour pride working for leaders of sustainability. It is also true that financial performing firms are easy attracters of resources both human and physical. They earn it as a result of the associated economies of scale derived from being financially sound and thriving. Again, financial performance is highly enhanced when the organisation or actors commit not only to sustainable economic practices, but undertake both social and environmental action plans for sustainability. Ehnert (2009) posits that undertaking sustainable initiatives is not only relevant for attracting and retaining talent, but more generally, for maintaining a healthy and productive workforce. These result into the following hypothesis:

H11: Pursuing Sustainable Practices makes Focal Organizations more Attractive to Resources

H11a: Economic Dimension is Positively Related to Competitive Advantage of Resource Pool

H11b: Social Dimension is Positively Related to Competitive Advantage of Resource Pool

H11c: Environmental Dimension is Positively Related to Competitive Advantage of Resource Pool

3.3.7 MARKET SHARE

Alderson (1957) posits that competitive pressures have necessitated firms to seek and find a function that enables them to sustain their positions in the market place. Extant literature demonstrates that one such opportunity lies in sustainability which provides an opportunity for firms to differentiate themselves in the market in which they exist. To this end, many firms now pursue sustainable behaviours not only because of ethical concerns, but equally because of some perceived competitive gains that result from engaging in sustainable efforts. Demonstrating the economic value of a sustainable supply chain, Mefford (2011) argues that firms that engage high efforts in sustainable practices stand to gain significantly from brand equity, which not only makes for loyal customers who purchase more of a company's products, but also allows higher prices to be charged with less discounting required to match competitors' prices. He further adds that such customers consolidate their business with few preferred firms, thus granting such companies a strong market position. These result into the following hypotheses:

H12: Pursuing Sustainable Practices Improves the Market Share of Actors within the Chain

H12a: Economic Dimension is Positively Related to Competitive Advantage of Market Share

H12b: Social Dimension is Positively Related to Competitive Advantage of Market Share

H12c: Environmental Dimension is Positively Related to Competitive Advantage of Market Share

3.4 THE MODERATING EFFECT OF SCM IMPROVEMENT PROGRAMMES

This study also conjectures that the direct linkage between sustainable supply chain initiatives and performance will be significantly moderated by such supply chain management improvement activities as transparency, risk management, supply chain coordination and supplier development and vendor rating. Literature suggests that a continuous improvement programme can transform an organization into a continual learning unit with self-improving mechanisms and systems and this constantly sets the outfit ahead of its competitors. It is also apparent that improving supply chain management can drive a turn-around in tumultuous times, manage sustainability risks and optimize operational performance. Granted, pursuing sustainability initiatives in the overall supply chain reaps comprehensible benefits to actors within the chain. However engaging in these SCM improvement programmes entrenches these benefits and mitigates against risk of failure (Roger and Carter, 2008). This section therefore, seeks to highlight the moderating effect of each of these areas and their relationship with sustainability. The four constructs were selected based on their consistent appearance in extant literature and sustainability reports; though it may be argued that this selection is not exhaustive.

3.4.1 TRANSPARENCY

Transparency is simply defined as the extent to which information flows within the supply chain. It involves how focal firms engage their stakeholders in their activities and constant reporting and receiving feedback, to both secure buy-in and improve supply chain processes (Roger and Carter, 2008). Suppliers can proactively communicate their efforts, performance and goals through a sustainability report, enabling continuous improvement and closer engagement with buyers. This builds

trust and confidence within the supply chain and helps bolster reputation and legitimacy. The pursuit of sustainability presents a challenge to firms to act in a transparent responsible manner and embrace the prospect of public scrutiny (Hart, 1995). The cost of secrecy and covering wrongdoings can be very devastating to the progress of the organisation. This encourages focal firms to maintain standards, thereby ensuring performance. Transparency also requires systems that capture traceability. Opara (2002) maintains that the capacity for full trace-back and trace-forward at any stage in the supply chain is crucial to confronting falling consumer confidence and general public concern about the rising incidence of food-related deaths and illnesses. Aside the obvious advancement in information and communication technology that has helped improve and intensify calls for transparent supply chain networks, transparency can be improved through vertical coordination across a supply chain as well as horizontal coordination across networks (Roger and Carter, 2008).

The advantages to the organization in its sustainability efforts are that not only do end users become confident about the operations of the organization, but its workers, investors and the entire community are constantly engaged and feedbacks factored into processes. Indeed, the company's brand is as important as its products' brand especially in a global supply chain network within a globalized hyper-networked world where information can go viral within a matter of minute. It is therefore anticipated that companies that build trust through transparency and credibility can better protect their brand and hence succeed than those which do not. Mefford (2011) emphasizes that "strong brand equity not only makes for loyal customers who purchase more but also allows higher prices to be charged with less discounting

required to match competitors' prices." Based on these arguments, the following hypotheses are raised:

H13: Transparency has a Positive Impact on Competitive Advantage

H13a: Transparency Positively Moderates the Direct Linkage between Sustainability Dimensions and Overall Competitive Advantage

4.4.2 RISK MANAGEMENT

Risk management is the continuing process of identifying, analyzing, evaluating and either accepting or mitigating against uncertainty and potential losses, followed by the coordinated and efficient application of resources to monitor, minimise and control the likelihood or impact of detrimental occurrences while maximizing the attainment of opportunities within the supply chain. Roger and Carter (2008) also state that risk is "the probability of variation surrounding an anticipated outcome." Shrivastava (1995), cited in Roger and Carter (2008) equates the importance of managing risks to the short term financial performance of the organization. To the authors, business units must attach the same commitment to the management of their financial performance to managing business risks.

Literature highlights six types of risks associated with supply chain network including financial risks (cost of claims and liability judgments), operational risks (labour strikes), perimeter risks (weather and political change), consumer and strategic risks (management changes or loss of reputation), compliance risks (human rights, labour laws and environmental risks) and reporting risks. Mefford (2011) highlights the importance of hedging against risks, especially risks of legal suits from employees, consumers and the general public by incorporating sustainable supply chain practices.

To the author, risk improvement can even improve the share price of an ethical firm. “The confluence of risks and opportunities associated with environmental, social and economic performance has made sustainability a strategic priority for companies as part of their overall business strategy. Shareholder expectations around sustainability are also placing pressure on organizations. The investment community (including investors and regulators) has become increasingly prescriptive in asking boards to mitigate risks tied to evolving regulations, shifting global weather patterns and heightened public awareness of climate change issues; any of which can affect a company’s business” (Ernst and Young, 2013). Based on the above, the following hypothesis is raised:

H14: Risk Management has a Positive Impact on Competitive Advantage

H14a: Integrating Risk Management Construct in the Sustainability Efforts of Firms Positively Moderates the Direct Linkage between Sustainability Dimensions and Overall Competitive Advantage

4.4.3 SUPPLIER DEVELOPMENT AND VENDOR RATING

Current global economic barometer has called for the increased collaborative relationships and strategic ties between organizations and their suppliers to overcome the myriads of challenges and risks arising from more volatile operating business environments. Supplier development has therefore become central in current strategic management issues, for the sole purpose of improving supplier capabilities in order to deliver better quality, timely and low cost products and services (Hales and Arumugam, 2012), bring in innovation to support clients’ sourcing and procurement targets and sustainable development objectives (Gupts and Mangolis, 2011) while at the same time increasing profitability for all supply chain participants. It goes beyond

simple auditing of suppliers to check for compliance or whether they are delivering on-time or fulfilling quality goals. Supplier development is actually developing suppliers in much the same way employees are developed. It is aimed at improving suppliers' performance, not browbeating them into charging less or simply auditing and rewarding them. Instead, supplier development is all about providing suppliers with what they need to be successful in the supply chain. Brown *et al.* (2001) indicate that strategic supplier capabilities are essential for sustainable supply chain network. Extant literature also corroborates the standpoint that a buying company's performance and ability to create value is strongly perpendicular to the performance of its suppliers. Thus, vendor assessment and development are important variables for sustainability performance.

Gupta and Mangolis (2011) state that “supplier development initiatives lead to enhanced collaboration between clients and their suppliers as well as to efficient and effective usage of resources by adopting lean practices.” The end result of waste elimination in the supply chain through developing the capabilities of suppliers enriches all sustainable development efforts. Hence, focal firms that are more receptive to supplier feedback and ideas have found them to be an important source of innovation and process improvements (Goffen and Rothenberg, 2000; Carter 2005; Gualandris and Kalchschmidt, n.d; Golini et al. 2012). This invariably helps the buying companies to hedge against risks and is better prepared for gains in the market than competitors. The following hypotheses result from the above arguments:

H15: Supplier Development has a Positive Impact on Competitive Advantage

H15a: Supplier Development & Vendor Rating Positively Moderate the Relationship between Sustainability Dimensions and Overall Competitive Advantage

4.4.4 SUPPLY CHAIN COLLABORATION

Gupts and Mangolis (2011) posit that an effective collaboration between actors within the supply chain results in competitive advantage accruing to the focal firm, as it ensures not only the procreation of dynamic ideas but helps the existing organization to create immutable products and services to the market place. Hence an effective collaboration between actors; suppliers, buyers, end users and 3-tier organizations are important for supply chain excellence. “Successful collaboration relies on the development of mutual trust, as well as the willingness to share information that can benefit all the members. The goal is to treat all suppliers, outsourcing partners, customers, and service providers as an extension of your organization” (SAP, 2007).

Literature suggests that three levels of collaboration are necessary for the driving of a good sustainable effort; upstream (company-supplier-outsourcing partners), downstream (company-customers) and internal collaboration (within the parameters of the organization). When the focal organization utilizes collaboration as a strategy, all partners including the smallest identify with its strategic and tactical supply chain efforts are included (SAP, 2007). Collaboration creates a bond between actors; a strategic relationship that hinges on a pillar of trust, shared vision and objectives. Dyer and Singh (1998) consent that the relational view of inter-organizational competitive advantage infers that close ties among actors promote mutual trust, permits the transference of important knowledge and engineers reciprocal monitoring and learning. Based on the above arguments, the following hypothesis is raised:

H16: Supply Chain Collaboration Positively Impacts on Overall Competitive Advantage

H16a: Supply Chain Collaboration Positively Moderates the Relationship between Sustainability Dimensions and Overall Competitive Advantage

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CHAPTER FOUR

RESEARCH METHODOLOGY

4.0 INTRODUCTION

This chapter presents the methodology that was employed for the conduct of the study. It examines the six basic aspects of research design; purpose of the study, types of investigation, extent of researcher interference, study setting, unit of analysis and the time horizon of the study (Cavana, *et al.*, 2009). It further discusses other issues as regards the data collection methods, the study population and sampling design, methods of data analysis, validity and reliability tests and how ethical issues were addressed throughout the process.

4.1 RESEARCH PHILOSOPHY

The way we think about research, our choice of research approach and our views on judgments in society suggest that we perceive certain factors and occurrences as more relevant and important than other alternatives (Saunders *et al.*, 2011). This is no different in the field of research. According to Saunders *et al.* (2011), the three pivotal approaches to thinking about research philosophy are: Epistemology, Ontology and Axiology. Research methodology and instruments adopted by researchers are greatly influenced by the three major approaches to research thinking and that to a large extent, forms the foundations of research. In Epistemological Position, the researcher is concerned with accrued knowledge deemed to be acceptable in a specific field of study. At one extreme end of this philosophy's continuum is the *Positivist* view, which postulates that principles of the natural scientist should be used to explain natural phenomena. In contrast, the *Interpretivist* view emphasizes the unique role of

humans as players of social activity and argues the importance of research among humans/people rather than objects (Saunders *et al.*, 2011). In Ontological Position, the researcher's approach considers the subjective and objective influences of his observations. The two main aspects of this philosophical view are *Objectivism* and *Subjectivism*. Objectivism underscores that the world and its social realities exist external to their very own social actors, whereas *Subjectivism* postulates that reality is not objective and external but socially constructed by human perceptions (Saunders *et al.*, 2011). Axiological Positioning is primarily centered on values. Positivists maintain that science and process is value-free. However, social constructionists or Subjectivism argues that values pertaining to humans ultimately influence the interpretations and conclusions resulting from research and observed facts (Saunders *et al.*, 2011).

Ultimately, this study was influenced by a myriad of factors that can be attributed to the three main aspects of research philosophy explained above. For the purposes of this study, which explored and tested an existing theory, both the interpretivism and positivist views were espoused.

4.2 RESEARCH APPROACH

Research approaches have been explicated and categorised differently by various authors in research (Yin, 2003; Saunders *et al.*, 2011). This study employs the mixed method in its investigation. The first aspect employs a quantitative approach to conduct an investigation on how sustainable practices drive performance in the chain and then moves on to conduct a qualitative study to gain insights into the flow process

of cocoa across the entire domestic chain of cocoa in Ghana and the specific risks inherent in the chain that impact on goals of sustainability

4.3 RESEARCH PURPOSE

Every research can be broadly categorized under any three major types according to its purpose; exploratory, descriptive and explanatory research (Cavana, *et al.*, 2009; Saunders *et al.*, 2011). Exploratory research is developed based on grounded theory which is intended as a flexible approach to formulate theory based upon generic principles of theoretical saturation, constant comparison method of analysis and theoretical saturation (Glaser and Straus, 1967). The exploratory research design also aims at exploring the specific nature of a problem. However, when using the descriptive research, the goal is to reveal an accurate profile of events, persons or situations. The descriptive research can be related to both an extended version of exploratory and a piece of explanatory research design (Op.cit, 2009). The explanatory study establishes relationship between studies and variables, meaning that the aim is to study situations or problems, trying to find a relationship between variables (*ibid*). Cooper and Schindler (2003) give a similar categorization by stating that research can function as providing data and information for obtaining certain conclusions (reporting), describing and defining a phenomenon (descriptive) and trying to explain a phenomenon (predictive).

The main purpose of this study is to assess how the domestic supply chain of cocoa in Ghana is being managed for its sustainability. In achieving this, the study set out to achieve specific objectives. Due to the uniqueness of these specific objectives, it became expedient to employ all three types of research purposes. At one end, the

study employs exploratory research to explore the flow of cocoa and the risks across the various stages in the domestic chain. By examining how sustainable efforts drive performance in the chain, the study first of all makes a descriptive analysis of the performance of players in the implementation of sustainable practices, which was necessary for establishing the pattern of variability in the implementation of sustainable initiatives among the players in the chain. The study further explains relationships among the key variables that have been raised as hypotheses within the theoretical framework; hence, an explanatory research at this stage of the study.

4.4 TYPE OF INVESTIGATION

According to Cavana *et al.* (2009), three approaches exist for deciding on the type of investigation; clarification, correlational and causal. In this study, the researcher employs all three approaches. The clarification approach was employed for the qualitative aspect of the study to gain a clearer understanding of the flow processes of the cocoa chain and an in-depth understanding of the specific risks that impact on goals of sustainability at every stage in the chain. For the quantitative study, the correlational and causal approaches were employed to test the relationships that exist among the variables in the theoretical framework. The correlational relationship indicates the movement of the variables while the causal relationship explains how a variable or concept causes a change in another concept or variable (Cavana, *et al.*, 2009). The clarity of the concepts, correlational and causal relationships are presented and discussed in chapters 8 and 6 of the study respectively.

4.5 EXTENT OF RESEARCHER INTERFERENCE

In this study, the researcher had a very minimal interference with the normal flow of work in all the stages or organizations in the cocoa chain from where data were gathered. No manipulation of variables was necessary for gaining a clear understanding of the concepts or relationships between variables.

4.6 UNIT OF ANALYSIS

There are various units of analysis that can be employed in every research work. Cavana *et al.* (2009) categorises them as individual (individual studies), dyads (two-person interactions), groups (group interactions), organisations (organizational issues) or cultures. The specific type to use largely depends on the level of aggregation of the data collected during data analysis stage (Cavana, *et al.*, 2009). In this study, the researcher employed the organization as the unit of analysis. The organizational level was appropriate to answer the research questions and in each case, the researcher's interest was at the organisational level though data were gathered from individual employees of the firms at each stage of the chain.

4.7 STUDY SETTING

The study is purely a field study which sought to gather data from the natural environment where work flows in a normal setting. Since no artificial setting was necessary to test any relationships between variables, the researcher describes the setting for this study as a non-contrived setting. Though interview and administering of questionnaires had some sort of effect on the normal flow of work in some sense, this interference was very minimal with no planned manipulation, hence, a non-contrived setting (Cavana, *et al.*, 2009).

4.8 TIME HORIZON

Even though the data gathering process lasted for some few months, it was appropriate that the data be gathered just once as per the period of the study in order to meet each of the research objectives. In other words, apart from the pilot test, there was no conscious effort to repeat any data collection from the units. This therefore lends this research to a cross-sectional study, unlike longitudinal studies where cases are studied usually for more than one point in time (Cavana, *et al.*, 2009).

4.9 STUDY POPULATION

The entire group of people, elements or event of things of interest the researcher desires to investigate is known as population (Cavana, *et al.* (2009), In this study, the population consists of all players or actors within Ghana's cocoa supply chain. Due to the extensive nature of the value chain, this research primarily concentrated on the domestic value chain; from the farm gates to the take-over point. Indeed, cocoa is traded through a local and international supply chain and is marketed as a variety of products at different stages in the chain (Cappalle, 2009). The players in the domestic value chain who were employed for the study included farmers, purchasing clerks, licensed buying companies and the Cocoa Marketing Company of COCOBOD, etc. Because the activities of the players in the chain are somewhat different as regards function, it renders the study population a heterogeneous type. In the case of its size, the total number of cases that make up the study population is not known (for all the categories of cases put together), though the specific size of some players is known.

4.10 SAMPLE SIZE AND SAMPLING TECHINQUES

Sometimes, some constraints make it very difficult for a researcher to study all elements within a given population. Where there exists compelling reasons to study only some elements within a given population, there is the need for the researcher to go through a systematic process, referred to as sampling. In order to select a sufficient number of elements from the population so that by studying them and understanding their properties or characteristics, it would be possible to generalize the properties or characteristics to the population elements (Cavana, *et al.*, 2009). This subset of a given population is what is referred to as sample.

In this study, there were compelling reasons for the researcher to study only a subset of the entire population. Primarily, it was not practically possible to examine every member of the thousands of farmers, PCs and LBCs within the domestic chain of cocoa in Ghana. Additionally, the time required to complete this study simply did not permit such a full coverage, notwithstanding the constraints from both logistics and human resource. Equally so, there seems to be no theoretical justification for studying all cases of a given population with highly similar characteristics, as exists within each stage of the cocoa chain in Ghana. Therefore, it was rationale for the study to draw an appropriate sample from the given population. In this section, the sample components, sampling methods/techniques and the sample distribution for both the qualitative and quantitative aspects of the study are presented.

4.10.1 SAMPLING: QUALITATIVE

The current assessment focused on Ghana's domestic supply chain, which encompasses the production and marketing of cocoa beans and semi-finished cocoa

products from their origin up to the point of export. Hence, assessing risks that pose a potential threat to the downstream supply chain beyond Ghana's borders was beyond the scope of this study. Indeed, the domestic chain of cocoa comprises a wide range of actors; input suppliers; farmers; traders; transporters; other service providers and processors. The study used purposive and convenience sampling techniques to sample four major players within the domestic chain for the qualitative study. These included Farmers, Purchasing Clerks (PCs), License Buying Companies (LBCs) and the Cocoa Marketing Company (CMC).

Convenience sampling in the sense that the time required for the completion of the study limited a relatively wider coverage and purposive because, these players constitute the first four upstream suppliers from the farm gate and since the study was more interested in finding the risks that relate more closer to the point of origin of the chain, their inclusion became necessary. Additionally, each of these players was purposely selected because of their fundamental roles played in the chain that bring cocoa beans to the take-over point. Therefore, to have a system-wide assessment to reflect the domestic value chain makes their inclusion justified. As shown in Table 4.1 below, 25 key players were sampled for interviews including 10 farmers, 5 PCs, 5 LBC District Managers, and 5 CMC employees and then 14 focus groups constituting 5 farmer groups, 5 groups of PCs, 2 groups of LBC District Managers and 2 groups of CMC employees. The average number of participants for each focus group was 8.

Table 4.1 Sample Size and Distribution

Method	Players	Respondents/Groups	Interviewee Characteristics
Interviews	Farmers	10	Main cultivators: Large & Small
	PCs	5	Main cultivators: Large & Small
	LBCs	5	District & Zonal Managers
	CMC	5	Manager & Warehouse & Operations Employees
Total		25	
Focus Group Discussion	Farmers	5	Main cultivators: Large & Small
	PCs	5	Main cultivators: Large & Small
	LBCs	2	District & Zonal Managers
	CMC	2	Manager & Warehouse & Operations Employees
Total		14	

Source: Author's Construct (2014)

4.10.2 SAMPLING: QUANTITATIVE STUDY

For the quantitative study, the study used a purposive sampling technique to select farmers, PCs, LBCs and the COCOBOD since these constitute the major players in the value chain of cocoa. Due to the numerous units at each stage of the chain, a convenience sampling method was employed to select 200 respondents, comprising 50 farmers, 40 PCs, 90 LBC district managers and operational officers and 20 CMC officials. In all, the study used a sample size of 200 (see Table 4.2).

Table 4.2 Sample Size and Distribution

Actor/Player	Sampled Respondents
1. Farmers	50 Main cultivators: Large & Small
2. Purchasing clerks	40
3. LBCs	90 district managers & operational officers
4. CMC	20 officials
Total	200

Source: Author's Construct (2014)

4.11 TYPES AND SOURCES OF DATA

There are two main data types for the conduct of every research work; primary and secondary data. This study made use of both primary and secondary data. Jankuwics (2002) defines primary data as consisting of materials that the researcher has gathered himself through systematic observation, information from archives, the results of questionnaires and interviews and case study compiled. The nature of the research required that data be gathered from a primary source. The primary instruments for gathering primary data were questionnaire, interview and focus group discussion. The data were basically drawn from primary sources by administering questionnaires to the various actors that were sampled for the quantitative study. Interviews and focus group discussions were also held with some few selected respondents for the qualitative aspect of the study. Secondary data were gathered from journals, articles and books. The secondary data for this study was primarily for the purpose of reviewing related literature and for the construct of the theoretical framework of the study. Arguments from such sources also became relevant to guide the flow of discussions.

4.12 METHODS OF DATA COLLECTION

The qualitative study employed two primary methods for gathering data from respondents: interview and focus group discussions whilst a questionnaire use employed for the quantitative study.

4.12.1 INTERVIEW AND FOCUS GROUP DISCUSSION METHODS

An unstructured interview was employed to gather qualitative data from farmers, PCs, and some selected employees of LBCs and the CMC, for mapping the flow process of

cocoa and identifying the risks at the various stages within the cocoa chain that impact on goals of sustainability. Following initial analysis of baseline data and meetings with some selected farmers, PCs and officials of some LBCs and the CMC, the researcher conducted in-depth interviews with some selected chain players mainly in the Ashanti and across the Eastern and Western Regions of Ghana's cocoa production belt. Focus group discussions were also held differently for the selected players in the chain with an average of 8 members for each group. In both cases, an interview guide was used, which was designed to reflect the four major supply chain phases at each stage of the chain; purchasing, internal operations, warehousing and out-bound transportation as they relate to the three major dimensions of sustainability; economic, social and environment. An audio was primarily employed to capture the data for both the interviews and focus group discussions and in some cases, hand written notes were made as a support.

Both methods provided the researcher with very rich data that could otherwise be very difficult to ascertain through a questionnaire, and though supply chain mapping and risk identification were the focus for this method, the interviews revealed very interesting and informative data that enhanced the researcher's understanding of the results from the quantitative analysis. The major disadvantage was that, both methods were time consuming, further worsened by the illiteracy levels of some farmers and PCs who required that the interviews be conducted in the local dialect. This made the transcription more difficult as the data needed to be translated into English for further analysis, but it was all necessary to bridge possible barriers in communication for enriched data.

4.12.2 QUESTIONNAIRE METHOD

The primary method of collecting data for the quantitative study was through questionnaire. A well-structured questionnaire was designed to solicit primary data from all sampled respondents for the quantitative study. The responses were to aid in testing all the key variables in the theoretical framework of the study. To this effect, one set of questionnaire was designed for all the categories of respondents. Out of the 200 questionnaires administered, 177 were obtained representing 88.5% response rate. The questionnaire method was particularly beneficial in soliciting for quick responses.

4.12.1.1 MEASURES

The questions in the research instrument were categorized into five major parts; A – F. Part A solicited data on the profile of the organization such as the supply stage, annual revenue, etc. Part B, C and D dealt primarily with the initiatives towards economic, social and environmental sustainability respectively. Part E measured chain partners' commitment towards SCM Improvement Programmes (moderating variables) and the final part F, measured the supply chain performance in terms of 7 key competitive advantages; production efficiency, innovation capacity, company reputation, operational performance, strategic capabilities, resource pool and market share. All questions in the instrument were predominantly closed-end questions measured on a 7-point likert scale. The open ended questions were provided to solicit for data that were not possible to design with specific responses.

4.12.2 PRE-TESTING OF QUESTIONNAIRES

According to Cavana, *et al.*, (2009), a prudent researcher will conduct various tests of the questionnaire before collecting the actual data for analysis. Based on this premise,

the study carried out three very important tests; face validity, content validity and a pilot study. According to Burns (1994), face validity addresses the concern of whether the questionnaire truly measures the concepts being investigated. This author further explains that, an important dimension to this test questions whether the intended respondents will find the wording of the items clear and understanding. Accordingly, the study sampled a small number of respondents across the 4 major selected players to answer the questions, after which an interview was conducted to find out if there existed any areas of confusion or ambiguity. This assisted the researcher to re-phrase some of the aspects of the questions to reflect the industry under study. To check for content validity, the items that measured the constructs were checked against literature. Additionally, copies of the questionnaires were given to experts in the field of the study to examine each item and make a judgement on whether each item did really measure the theoretical constructs nominated and so the final questionnaire took all comments and suggestions into consideration.

The questionnaire was also pilot tested to ten (10) respondents, selected by simple random sampling. This small sample size was directed by the suggestion made by Fink (2003b, cited by Saunders *et al.* 2009) that a minimum of ten (10) responses is ideal for pilot testing. The pilot test enabled the researcher to determine any probable problem inherent in the questionnaire for appropriate corrections and also reduce any mistake that might possibly occur (Martin and Polivka, 1995). It was equally beneficial in testing for the appropriateness of the content of the questions, the level of sophistication of the language, the sequencing of the questions, among others.

4.12.3 FINAL ADMINISTRATION PROCEDURE

After pilot testing, final adjustments were made to obtain a more effective and credible instrument, and the questionnaires were administered to the research participants to respond to through personal contact by the researcher. For those farmers and PCs who lacked proficiency in reading, interviewer administered approach became necessary. During the interview, the questions in the instrument were translated into the respondents' language for their understanding, without changing the meaning or philosophy. This was essentially relevant to avoid any form of bias and also to ensure that the constructs measured what they intended to. Respondents were first informed of the purpose of the research and were assured of confidentiality of their responses and anonymity of their identities before given the questionnaire to answer.

4.13 METHOD OF DATA ANALYSIS: QUALITATIVE

Content analysis was primarily employed for analysing the qualitative data. According to Patton (1990), content analysis deals with the process of identifying, coding and categorizing the primary patterns in a qualitative data. Adopting from Cavana, *et al.* (2009), the process of the content analysis for this study followed as this: after data was gathered through interviews and focus group discussions, all raw data were prepared and organized and all audio recordings transcribed. To improve on legibility and ease in analysis, all such data were typed and formatted. The transcription made reflected the exact proceedings from the interviews and focus group discussions. For recordings in 'twi' however, translation was made in English, and to ensure for accuracy care was taken to avoid any form of misinterpretations. Following this, source coding of all raw data was made; in a short line of

alphanumeric symbols, each of the interview and focus group documents was uniquely, logically and efficiently coded. The data was uniquely coded to ensure that future reference could be traced easily and flexibly to each piece of raw data, and logically coded for ease in remembering all such data. It also needed to be efficiently done as the code was to be used a number of times in the content analysis. The coding reflected the type of data (whether interview or focus group), the type of respondent, the number of interactions per respondent and the page numbers of each raw data. To avoid possible data losses, copies of the data we made and the original copies, safely stored.

Afterwards, theme coding was made to reorganize the data according to conceptual themes. This was carefully done through thorough and repeated reading of all the notes and transcripts. As the reading was taking place, appropriate codes were made against the raw data as the themes emerged. As subsequent themes were being identified, comparative analysis was made between them and the previously identified ones to identify for similarity, consistency, flow, among others. All indicated passages that were coded were transferred to files; each file for each theme assisted by a computer processing package. Next, all the data coded according to the themes and filed were read through a number of times to explore the possibility of creating new concepts and then if new ideas may emerge. To further improve on the analysis, all the initially coded themes were reviewed, examined and developed and they were also investigated to identify causes and consequences, conditions and interactions, etc. and concepts that cluster them together for improved clarity and meaning. Through this process, subthemes emerged and relationships between subthemes identified.

After this, a review was made to determine which aspects of the data needed to be included or excluded in the final write-up and then mapping was made to establish relationships across different categories of the data. The final report was then written. The process was more iterative; often times, theme files and raw data were re-visited to check, question or support various arguments made in the report. The analysis was presented relative to each sampled player in the chain, and specifically for the risks, the discussion was made according to four supply chain phases for each player.

4.14 DATA ANALYSIS: QUANTITATIVE

Cavana, *et al.* (2009) categorizes four major steps in quantitative data analysis; getting data ready for analysis, getting a feel for the data, testing the goodness of data and testing the hypotheses. Accordingly, the study adopted these steps for analyzing the data collected. First and foremost, all questionnaires obtained were edited, which included checking for completeness and inconsistencies, while ensuring against any form of bias. Also, the questionnaires were checked for possible blank responses for appropriate measures. Generally, blank responses were observed to be few and all such data were included in the analysis but the study omitted the cases where the data relating to a particular analysis were missing. After such corrections, the data were coded and keyed using the Statistical Package of Social Sciences (SPSS) Software. After these preliminary tests, the data was analysed using the same software and to ensure for validity and reliability, various tests were made (*see* next section). The analysis included the descriptive analysis of the data to reveal patterns of the sustainable practices among practitioners, as an attempt to investigate if practices vary among them. The descriptive analysis also presents the phase(s) of the supply chain that are of prime focus to practitioners. The second section of the analysis gives a

correlation analysis between observed variables in order to establish the direction of relationships, as to whether any interactions or cross effects exist among the dimensions of sustainability and whether this effect is significant or otherwise. The final part of the data analysis gives the regression analysis for testing the various hypotheses raised.

4.15 VALIDITY AND RELIABILITY

Patton (2001) states that validity and reliability are two features which any qualitative researcher should focus on while designing a study, analyzing the results and judging the quality of the study. Buchan (2004) shows that the importance of ensuring validity and reliability of research instruments by saying that, quantitative research has a great investment in reliability and validity. If the data is not reliable and valid, if the assessment techniques are not reliable and valid, if the design features do not create satisfactory internal and external validity, the research is worthless in scientific eyes. This study therefore took into consideration these two key factors during the course of the research right from inception to completion. During the administration of questionnaires, the hand delivery strategy was employed to ensure that the data was gathered from the target respondents. In the same way, interviews for the qualitative study were personally carried out by the researcher. While the interview was being conducted, notes were taken to serve as an alternative reference to audio records which were also utilized and later transcribed to avoid any form of interviewer bias and the possibility of omitting any important data that might affect the validity and reliability of the study. During the analysis stage, data collected were presented and analyzed just as provided in the questionnaires. In areas where editing was done, caution was taken to avoid any form of researcher bias.

4.15.1 RELIABILITY OF RESULTS

The sampled data were subjected to a number of reliability tests to check for the internal consistency of the survey responses. The Cronbach alpha was calculated for all the items in the data. Generally, an alpha of above 0.7 was preferred and used to gauge the reliability of the instruments. Results show that the survey responses were very compact with the calculated Cronbach alpha ranging from 0.741 to 0.975. The alpha levels of each sub category are reported in Table 4.3 below:

Table 4.3: Cronbach's Reliability Tests

Variable	Cronbach's Alpha	Number of Items
Sustainability Pillars		
Economic	.881	33
Environmental	.892	27
Social	.860	26
Moderators		
Transparency	.893	7
Risk management	.748	6
Strategic Collaboration	.827	5
Supplier Development	.741	8
Competitive Advantage		
Production Efficiency	.784	6
Innovation Capacity	.856	6
Companies' Reputation	.883	6
Operations Capacity	.828	5
Strategic Capacity	.823	6
Resource Pool	.853	4
Market Share	.775	3
All control variables	.791	10
Overall variables	.975	162

Source: Author's Construct (2014)

Although the high alphas suggest a corresponding high average correlations between items in the scale and hence greater reliability; further tests were necessary to examine the dimensionality and the robustness of the scales utilised in this work. Factor and Parallel Analysis were used in that regard.

4.15.2 FACTOR AND PARALLEL ANALYSIS

Due to the large number of items and sample size used for this study, the need was raised to condense the large set of itemised scale to a smaller and manageable set of dimensions. Factor analysis was used in this attempt; to summarise the data into a set of coherent subscales that conceptually have similar measurement. To verify whether factor analysis is suitable for this data as discussed by Tabachnick and Fidell (2007), the data was given to a series of tests including Bartlett's test of sphericity and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy. According to Tabachnick and Fidell (2007), Bartlett's test of sphericity should be significant at more than 95% confidence level whilst the KMO index should range from 0-1, with 0.6 suggested as the minimum value for a good and appropriate use of factor analysis. The Principal Component Analysis (PCA) with Direct Oblimin rotation was appropriated for this task of identifying the structure underlying the groups of related variables. The PCA grouped the data into a series of coherent subscales made up of items that loaded successfully on each structure or component. For the purposes of robustness, items that loaded more than 0.4 absolutely were selected for each subgroup for the analysis. The conventional rule of thumb is to select, overall, only the structures or subgroups with eigenvalues of more than one. However, due to the inherent limitations of factor analysis in determining the optimal solutions of components that must be selected for analysis; statisticians generally recommend the use of Parallel Analysis to augment the use of PCA in order to arrive at optimal solutions (O'Connor, 2000). The focus of Parallel Analysis is to determine the number of components under the factor analysis that statistically account for the variance more than the components derived from a random data of the same size. This means for Parallel Analysis, the actual eigenvalues of the PCA are compared with

typically 95th percentile random data eigenvalues. The decision is to accept all components of the actual PCA results whose eigenvalues is greater than that of the criterion random data eigenvalues. This technique is repeated for all the PCA conducted to select optimal components useful for further analysis.

4.15.3 PRINCIPAL COMPONENT ANALYSIS FOR ENVIRON. DIMENSION

Results show that all the data was suitable for PCA. Prior tests of the 26 environmental sustainability items resulted in a Bartlett's sphericity value of 2718.4 (sig. = 0.000) with a KMO value of .851, exceeding the recommended value of 0.6. The performed explanatory factor analysis showed that overall, 54.979% of the total variance is explained with four (4) components recording eigenvalues above 1. Each of the four components explained 33.581%, 8.248%, 7.734% and 5.416% of the variance respectively. An inspection of the scree plot however showed that only three components are appropriate for analysis. Factor loading were also always higher than 0.07. The result of the PCA Analysis on the environmental sustainability items are shown on Table 4.4 below. Three (3) out of the 26 items were excluded for further analysis as they loaded significantly on more than one subgroup (highlighted in red in the table below).

Table 4.4: Factor Analysis (PCA) for Environmental Dimension

	Pattern Matrix ^a				Structural Matrix				Communalities
	1	2	3	4	1	2	3	4	
Makes every effort to incrx shipment consolidation to ensure travel optimization	.755	-.039	.115	.029	.771	.133	.332	-.247	.476
uses reusable or at minimum recycled shipping containers and plastic pallets	.704	.134	-.030	.113	.759	.067	.577	-.167	.664
Organizes periodic workshops on driver skill improvement	.703	-.119	.399	.109	.739	.162	.370	-.528	.642
ensures the combined use of road and rail and sea transportation and inland navigation	.670	.090	.076	.022	.735	.244	.256	-.569	.711
adopts techniques to measure and reduce energy consumption from lights, heating, ventilation and air conditioners	.659	.070	-.190	-.125	.704	.239	.289	-.250	.612
we ensure for energy for energy efficiency	.599	.027	.025	-.345	.683	.251	.188	-.168	.516

improvement in operations									
implement energy efficiency materials handling equipments	.594	-.067	.160	-.311	.676	.223	.320	-.440	.649
we utilize green power and cogeneration plants	.556	.032	.118	-.217	.662	.212	.037	-.352	.585
adopts techniques to improve energy efficiency of loading processes	.508	.269	-.208	-.173	.565	.388	.011	-.394	.203
employs advanced systems to load shipments to increase the degree of vehicle utilization	.493	-.199	.007	-.007	.565	.320	.225	-.343	.682
uses energy efficient trucks for the transportation of the cocoa beans	.470	.183	.038	-.125	.453	-.092	.118	-.134	.576
Has good vehicle maintenance and disposal systems+	.445	.179	.411	.204	.004	.801	-.071	-.256	.660
we ensure that potential suppliers source from environmentally friendly sub-suppliers	-.170	.831	-.168	-.134	.224	.778	.089	-.225	.488
we consciously seek suppliers that outperform their competitors regarding emission or waste	.070	.768	-.055	-.017	.455	.684	.432	-.369	.458
we prioritize suppliers that provide re-usable and recyclable packaging	.213	.568	.262	-.117	.356	.601	.586	-.032	.651
we consciously seek suppliers that are leaders in efficient and clean operations	.178	.546	.262	.231	.332	.779	.015	-.151	.635
Ensures the discrepant operational offices/depot warehouses are regularly sanitized	.118	-.140	.760	-.041	.200	.125	.726	-.197	.540
Emphasizes the importance of the application of materials that are environmentally friendly	-.063	-.006	.729	-.122	.194	.135	.721	-.217	.540
Adheres to the regulated environmental practices outlined by COCOBOD	-.077	.007	.725	-.146	.534	.288	.546	-.055	.502
We ensure verification of supplier compliance with environmental legislation	.129	.380	.478	-.086	.366	.494	.524	-.282	.738
We ensure for waste reduction, reuse and recycling of materials+	-.099	.040	.414	-.775	.265	.252	.342	-.785	.509
We increase water system efficiency	.197	-.025	.022	-.674	.439	.188	.169	-.741	.608
we ensure treatment and recycle of hazardous wastes	-.114	.317	.092	-.635	.208	.465	.193	-.685	.242
We have an ecological mgt systems to ensure for sustainable practices and regulatory compliance	.256	.145	.303	-.490	.541	.232	.032	-.633	.376
Uses alternative fuels to transport the cocoa beans to the districts and depot sheds+	.402	.048	-.164	-.499	.554	.369	.469	-.659	.490
We ensure for waste water treatment	.233	-.042	.007	-.322	.339	.088	.107	-.395	.539
Cronbach Alpha									
Eigenvalue	8.731	2.144	2.011	1.408					
Percentage of variance explained	33.581	8.248	7.734	5.416					
Cumulative percentage of variance explained	33.581	41.829	49.563	54.979					
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.851								
Bartlett's Test of Sphericity (Approx. Chi-Squar)	2718.4 (sig. = 0.000)								

Source: Author's Construct (2014)

Further analysis to check for the correctness of the four (4) components was conducted using the Parallel Analysis. Random numbers were generated using Monte Carlo simulation. The analysis confirmed the scree plot result of only three components. Three components of the actual eigenvalues of the PCA exceeded the

corresponding criterion values for a randomly generated data matrix of the same size (26 variables \times 177 respondents). The three component solution explained a total of 49.563% of the variance, with component 1 contributing 33.581%, component 2 contributes 8.248% and the third component explained 7.734%.

Table 4.5: Comparison of eigenvalues using Horn's Parallel analysis: Env. Dimen.

Component number	Actual Eigenvalues of PCA analysis	Criterion value - parallel analysis	Decision
1	8.731	1.7803	Accept
2	2.144	1.6420	Accept
3	2.011	1.5457	Accept
4	1.408	1.4745	Reject

Source: Author's Construct (2014)

From Table 4.5 above it is shown that the PCA result for component 1, 8.731 was greater than the associated criterion value of 1.7803 for the parallel analysis. The decision was therefore to accept component 1 as efficient solution. On component 2, PCA Analysis also exceeds the associated value for the Parallel Analysis. PCA estimable eigenvalue of 2.144 was greater than 1.6420 criterion value obtained by the Parallel Analysis. The decision again was to accept component 2 as very efficient. The same decision was taken for component 3 as the PCA value of 2.011 exceeded the 1.5457 criterion value suggested by the Parallel Analysis. However, for component 4, PCA Analysis revealed an eigenvalue of 1.408 which was statistically lower than the Parallel Analysis result of 1.4745 at 5% significance level. The verdict was to reject component 4 as an optimal solution.

4.15.4 PRINCIPAL COMPONENT ANALYSIS FOR ECONOMIC DIMEN.

The next section of the factor analysis was to proceed to subject all the 33 economic sustainability items also to a PCA and then Parallel Analysis. Pre-suitability test showed that the economic dimension items were factorable. KMO value obtained was .871 with a Bartlett's Sphericity coefficient of 3020.396 (Sig. = 0.000). Overall, 57.903% of the total variance is explained. This was close to the percentage of explained variation obtained for the items of environmental dimension. However, PCA results showed five (5) components recorded eigenvalues of above 1. Each of the five components explained 33.008%, 9.887%, 6.500%, 4.830% and 3.678% of the variance respectively. Again these results compare to the early PCA results for the environmental dimension items. The result of the PCA Analysis on the economic sustainability items are shown on Table 4.6 below. Results show that five (5) out of the 33 items (highlighted in red in Table 4.6 below) were excluded for further analysis as they loaded significantly on more than one subgroup or did not significantly load in any component at all. Again, Parallel Analysis was conducted to further ascertain the correctness of the five (5) subgroups selected by the PCA Analysis. Monte Carlo simulation of random data with the same number of variables and sample size was conducted (32 variables \times 177 respondents). Results show that only three components of the actual eigenvalues of the PCA exceeded the corresponding criterion values for a randomly generated data matrix of the same size. The three component solution explained a total of 49.395% of the total variance. Component 1 explained the highest with 33.008% of explanatory power. This is followed by component 2 with 9.887% whilst component 3 had the least power with just 6.5%. The rest of the results are shown on Tables 4.6 and 4.7 below.

Table 4.6: Factor Analysis and Cronbach Alpha for Economic Dimension

	Pattern Matrix ^a					Structural Matrix					Communalities
	1	2	3	4	5	1	2	3	4	5	
We choose fuel efficient modes of transport	.890	.031	-.047	-.103	-.096	.884	-.074	.241	-.396	.188	.407
We use automated systems	.803	-.035	.197	.335	.039	.841	-.095	.315	-.485	.150	.564
We use load planning tools to optimize loads and traffic	.797	.200	.121	-.127	-.081	.838	.107	.385	-.431	.224	.353
We ensure cleaner fuels are used for transport	.787	.005	.034	-.227	-.143	.753	-.117	.367	-.021	.172	.628
We use schedule planning tools to schedule deliveries	.642	.041	.272	-.137	-.095	.749	-.157	.401	-.540	.262	.633
We choose the right type of carriage for quality of beans	.579	-.106	.157	-.284	.021	.745	-.039	.492	-.411	.154	.597
Supplier organisation has well qualified managers/workers	.504	.345	-.175	-.269	.150	.637	-.402	.020	-.302	.495	.482
Cleaner processes	.465	-.194	.112	-.334	.253	.621	-.260	.247	-.593	.297	.573
Seeds/beans/inputs is key to selecting suppliers	.455	.088	.239	.045	.195	.560	-.368	-.034	-.394	.476	.144
Lean production	.412	-.398	-.231	-.184	.390	.558	.325	.049	-.467	.419	.727
control systems in place +	.516	-.425	-.176	-.029	.427	.714	-.193	.350	-.606	.458	.649
We use route planning tools to minimize transport distances+	.326	-.056	.102	-.018	.031	.558	.073	.381	-.240	.342	.486
Supplier has the ability to supply affordable & quality bean	-.005	.755	-.136	-.070	.093	-.043	.556	.109	-.464	.554	.643
Supplier has good cost control/reduction efforts with good costs performance relative to industry	.102	.667	-.017	-.098	.278	.378	.586	.208	-.171	.125	.716
Supplier part per million defect performance is high	.062	.602	.063	.041	-.053	-.071	.774	-.120	-.077	.233	.529
Supplier supplies the right amount/quantity specified	-.096	.496	-.068	-.216	.322	.144	.707	.052	-.227	.450	.547
We reduce the number of stock-keeping units through vendor consolidation or standardization	.194	-.007	.750	-.002	.095	-.010	-.085	.065	.009	.060	.425
We implement automated storage and mechanical handling systems powered by alternative energy	.248	.119	.743	.122	-.045	.004	.565	.540	-.269	.441	.661
We implement bar coding, RFID or MRP technology to track inventory precisely	.236	-.139	.688	.043	.082	.451	-.015	.816	-.276	.202	.633
PCA CONTINUED	Pattern Matrix ^a					Structural Matrix					Communalities
	1	2	3	4	5	1	2	3	4	5	
We make full use of available height for cartons, pallets and racking and share excess space with other users	-.154	-.041	.596	-.241	.118	.403	.079	.786	-.131	.061	.595
We optimise efficiency of picking methodology in the warehouse	.155	.015	.413	-.347	.004	.467	-.154	.756	-.227	.160	.668
We ensure that stored bags of cocoa are kept free of dirt, dead insects, cocoons, webbing etc	.074	.064	-.137	-.774	.032	.155	-.004	.613	-.356	.182	.449
We frequently fumigate the warehouse	.148	.148	.034	-.760	-.110	.409	.003	-.028	-.502	.184	.462
we store bagged cocoa beans on	.100	.205	.114	-.698	.023	.396	.127	.246	-.793	.188	.655

pallets and stabilize cocoa stacks against collapse											
our warehousing have adequate ventilation and spacing between stacks of cocoa to reduce mould	-.006	.019	-.058	-.693	.149	.323	.076	.066	-.781	.287	.674
Best quality standards	.240	-.037	.132	-.449	.145	.275	.057	.111	-.723	.354	.760
Suppliers have a high commitment to total quality regulations by COCOBOD++	-.010	-.012	.111	-.470	.432	.380	.210	.306	-.772	.304	.719
Warehouse is used to store cocoa beans	.410	-.243	.019	-.410	.099	.321	.071	.247	-.621	.576	.796
Warehouse have sufficient lightening system++	.137	-.058	.288	-.379	.136	.492	-.029	.319	-.612	.350	.772
Supplier has high performance to promise	-.186	.212	.110	.051	.733	.087	-.124	.224	-.293	.298	.652
Supplier has a relatively reduced lead-time	.009	.266	.267	.022	.656	.240	.376	.309	-.244	.716	.681
Quality management systems	.378	-.078	-.087	-.224	.400	.013	.356	.092	-.129	.710	.672
Eigenvalue	10.893	3.263	2.145	1.594	1.214						
Percentage of variance explained	33.008	9.887	6.500	4.830	3.678						
Cumulative percentage of variance explained	33.008	42.895	49.395	54.225	57.903						
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.871										
Bartlett's Test of Sphericity (Approx. Chi-Square)	3020.396 (Sig. = 0.000)										

Source: Author's Construct (2014)

Note:

* The Principal Component Analysis (PCA) with Oblimin rotation was used. Factor loadings with more than 0.40 absolute value is selected

* Major loadings for each item are bolded.

+ All items that loaded on more than one factor were excluded

++ All items that loaded feebly were excluded

Analysis of the respective correlation matrix tables show that intercorrelation between the five selected PCA components of the economic dimension ranges from $-0.373 < r < 0.304$ with most of the components having weak negative correlations. Observation of the structure matrix also shows that most of the items had an inverse association with components 2 and 4. Most of the positive correlations loaded on component 1, 3 and 5 respectively. Indication shows that component 2 and 4 is a coherent clump detailing strategic sourcing and warehouse activities respectively; with a weak and negative correlation between them ($r = -0.17$). This

gives a hint concerning economic sustainability practices within the chain. It is therefore to be expected that respondents will score low on warehousing and strategic sourcing activities on the whole. Meanwhile Parallel Analyses of the economic dimension factors indicate that only components 1, 2 and 3 were suitable to be selected for further analysis. Economic dimension was therefore aggregated according to the items that loaded efficiently on any of these three factors with the criterion load size set at above 0.4. The Parallel Analysis result is shown on Table 4.7 below. As shown on Table 4.7, component 1 from the PCA analysis had an eigenvalues of 10.893 which was far greater than the eigenvalue of 1.9198 of the parallel analysis. The decision was therefore to accept component 1 as efficient solution.

Table 4.7: Comparison of eigenvalues using horn's parallel analysis: Economic Dim.

Component No.	Actual Eigenvalues of PCA analysis	Criterion value - parallel analysis	Decision
1	10.893	1.9198	Accept
2	3.263	1.7862	Accept
3	2.145	1.6934	Accept
4	1.594	1.6185	Reject
5	1.214	1.5403	Reject

Source: Author's Construct (2014)

On component 2, PCA analysis showed an estimable eigenvalue of 3.263 which was also greater than the 1.7862 criterion value obtained by the parallel analysis. The decision again was to accept component 2 as very efficient. The same decision was taken for component 3 as the PCA value of 2.145 was greater than the 1.6934 criterion value suggested by the Parallel Analysis. However, for component 4, PCA analysis revealed an eigenvalue of 1.594 which was statistically lower than the parallel analysis result of 1.6185 at 5% significance level. The verdict is to reject component 4 as an optimal solution. Again the decision was to reject the fifth

component since the PCA eigenvalue 1.214 was significantly lower than the criterion value of the Parallel Analysis. Having set the optimal components for the operationalization of the economic dimension, the study undertook to extract the efficient components necessary for the measurement of social dimension.

4.15.5 PRINCIPAL COMPONENT ANALYSIS FOR SOCIAL DIMENSION

In all, 26 variables were collected for the Principal Component Analysis and Parallel Analysis. Prior to the factor analysis, variables were pretested for factorability. The Bartlett's sphericity was very significant with an estimated Chi square of 2718.409 (Sig. = 0.00). The Kaiser-Meyer-Olkin measure of sampling adequacy statistic was also above the accepted value of 0.6. The KMO value was .861 supporting the factorability of the correlation matrix. It can be deduced from the factor analysis results that items of the social dimension show more average correlations than the economic and environmental dimensions. Analysis of the respective correlation matrix tables show that inter-correlation between the five selected PCA components of the social dimension ranges from $-0.311 < r < 0.332$, with most of the components having weak negative correlations. Observation shows that components 3 and 4 correlated negatively and weakly with component 1, 2, 5. Indication shows that component 1 and 2 is a coherent clump detailing transportation activities and internal operations respectively; with a weak and positive correlation between them ($r = 0.105$). This gives a hint concerning social sustainability practices within the chain. It is therefore to be expected that respondents' will focus attention on transportation and internal operations. The PCA revealed the presence of five components with eigenvalues exceeding 1, explaining 33.596%, 16.158%, 7.119%,

4.797%, and 4.207% of the variance respectively. The combined explanatory power of the five components is 65.878% of the total variance. The result of the PCA Analysis on the social sustainability items are shown on Table 4.8 below. Again, Parallel Analysis was carried out to further examine the exactness of the five (5) subgroups selected by the PCA Analysis. Monte Carlo simulation of random data with the same number of variables and sample size was conducted (26 variables \times 177 respondents). Results show that only three components of the actual eigenvalues of the PCA exceeded the corresponding criterion values for a randomly generated data matrix of the same size. The three component solution explained a total of 56.874% of the total variance. The rest of the results are shown on Tables 4.8 and 4.9 below.

Table 4.8: Factor Analysis and Cronbach Alpha for Social Dimension

	Pattern Matrix ^a					Structural Matrix					Communalities
	1	2	3	4	5	1	2	3	4	5	
Trucks are inspected especially containers used to transport hazardous materials	.786	-.108	-.111	.025	.021	.794	-.011	-.238	-.217	.293	.746
Thorough inspection is done for all tanks or containers used to store hazardous	.665	.115	.245	.070	-.121	.763	.109	-.305	-.582	.568	.785
our transportations systems are planned with load planning software	.664	-.227	-.190	-.127	.072	.741	.066	-.113	-.536	.478	.756
our warehouse layouts are planned	.597	-.045	.055	-.308	.192	.738	-.099	-.299	-.332	.364	.792
we schedule regular removal and proper disposal of hazardous waste	.556	-.032	-.130	-.319	.265	.682	.104	-.227	-.625	.395	.658
Goods transportation security plans are carefully conducted	.509	-.051	-.076	-.444	.077	.641	.215	-.206	-.561	.341	.765
Our sites are selected to lower traffic and noise on society	.489	.082	-.047	-.369	.058	.606	.131	-.354	-.278	.447	.583
Transportation of hazardous items are conducted under safe conditions	.471	.043	-.219	-.019	.252	.601	.154	-.290	-.572	.559	.730
We station the safety of our workers at the workplace	.072	.867	-.031	.034	-.037	.146	.874	-.191	-.155	-.033	.705
Provides employees with drinking water and access to medical treatments, canteens and housing	.081	.783	-.181	.357	.143	-.094	.811	-.187	-.283	-.057	.669
Respect for freedom of association and collective bargaining	-.240	.782	-.073	-.203	-.038	.351	.763	-.164	-.248	-.019	.559
ensures that applicable legal	.303	.721	.010	-.047	-.121	.134	.750	-.315	.108	.073	.700

restrictions on working hrs are complied											
Ensures that overtime is on a voluntary basis	-.164	.699	-.064	-.134	-.070	-.060	.721	-.165	-.211	-.085	.568
Donates to local charity organisations and contribution to community development	-.096	.682	.159	-.232	.385	.146	.684	-.031	-.440	.391	.543
Refuses to engage in any discriminatory practices such as any distinction, exclusion or preference	.052	.381	.665	-.091	-.075	.085	.572	-.595	-.183	-.329	.796
Staff of suppliers are paid a salary that is clearly above the minimum wage	.052	.331	-.727	-.080	.020	.254	.483	-.809	-.256	.165	.413
Adequate working conditions at supplier site is ranked as a key selection criterion	.068	.334	-.715	-.138	-.069	.253	.468	-.789	-.285	.098	.689
Ensures that employees receive a decent wage to meet employee satisfaction	.042	.327	-.561	-.161	-.469	-.018	.387	.569	-.102	-.136	.738
We are strict on the kind of people we employ. we do not employ under age workers	.062	.068	-.121	-.828	-.004	.347	.263	-.243	-.874	.289	.663
Supplier does not employ children under age 18 and force labour	-.012	.019	.073	-.804	.038	.239	.166	-.030	-.807	.272	.425
we optimize safety and efficiency of warehouse layout	.368	.035	-.112	-.439	.304	.629	.177	-.284	-.667	.578	.667
PCA CONTINUED	Pattern Matrix ^a					Structural Matrix					Communalities
	1	2	3	4	5	1	2	3	4	5	
Workplace safety at suppliers locations meets international standards	-.001	.148	-.143	-.076	.616	.325	.233	-.570	-.349	.702	.487
Transportation safety regulations are applied	-.034	-.125	.158	-.145	.595	.484	.253	-.216	-.325	.635	.638
We train warehouse workers	.267	.221	-.044	-.027	.535	.580	.198	-.466	-.215	.613	.652
We ensure all floors/racks are labelled to guide movement for safety precaution	.385	.132	-.313	.116	.477	.166	-.137	.081	-.274	.607	.631
Cronbach Alpha											
Eigenvalue	8.735	4.201	1.851	1.247	1.094						
Percentage of variance explained	33.596	16.158	7.119	4.797	4.207						
Cumulative percentage of variance explained	33.596	49.754	56.874	61.671	65.878						
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.861										
Bartlett's Test of Sphericity (Approx. Chi-Square)	2718.409 (Sig. = 0.00)										

Source: Author's Construct (2014)

Note:

* The Principal Component Analysis (PCA) with Oblimin rotation was used. Factor loadings with more than 0.40 absolute value is selected

* Major loadings for each item are bolded.

+ All items that loaded on more than one factor were excluded

++ All items that loaded feebly were excluded

From Table 4.8 above, it is shown that five components were selected by the PCA Analysis detailing the social dimension. Eigenvalues exceeded the value of 1 from 8.735, 4.201, 1.851, 1.247 and 1.094 respectively. The problem is whether these components are optimal. According to O'Connor (2000), the component problem arises as any under-extraction will result in a compression of variables into a smaller factor space. The resultant effect is a loss of important information, a neglect of potentially important factors, a distorted fusing of two or more factors and an increase in error in the loadings. Over-extraction on the other hand, diffuses variables across a large factor space, potentially resulting in factor splitting, in factors with few high loadings and in researchers' attributing excessive substantive importance to trivial factors. It is for these reasons that the parallel analysis is crucial to discover the effect solution for estimation. Table 4.9 highlights the results of the parallel analysis results. As shown on the parallel analysis table below, the eigenvalue of component 1 which was 8.735 for the PCA Analysis exceeds the eigenvalue of 1.7892 of the Parallel Analysis. The same result was obtained for component 2 and 3 which had values of PCA 4.201 and 1.851 statistically greater than their respective criterion values of 1.6680 and 1.5754. Hence the decision was set to accepting the first three components of the factor analysis.

Table 4.9: Comparison of Eigenvalues Using Horn's Parallel Analysis: Social Dimen

Component number	Actual Eigenvalues of PCA analysis	Criterion value - Parallel analysis	Decision
1	8.735	1.7892	Accept
2	4.201	1.6680	Accept
3	1.851	1.5754	Accept
4	1.247	1.4963	Reject
5	1.094	1.4240	Reject

Source: Author's Construct (2014)

However, for component 4, PCA Analysis revealed an eigenvalue of 1.247 which was statistically lower than the Parallel Analysis result of 1.4963 at 5% significance level. The verdict was to reject component 4 as an optimal solution. Again the decision was to reject the fifth component since the PCA eigenvalue of 1.094 was significantly lower than the criterion value of the Parallel Analysis of 1.4240.

4.15.5 PRINCIPAL COMPONENT ANALYSIS FOR MODERATORS

The next section of the factor analysis was to conduct PCA analysis for all the moderators. 26 variables were collected for the Principal Component Analysis and Parallel Analysis. The Bartlett's sphericity was very significant with an estimated Chi square of 2539.907 (Sig. = 0.00). The Kaiser-Meyer-Olkin measure of sampling adequacy statistics was also above the accepted value of 0.6. The KMO value was .846 supporting the factorability of the correlation matrix. The PCA revealed the presence of four components with eigenvalues exceeding 1, explaining 38.892%, 9.840%, 6.686%, and 5.691%, of the variance respectively. The combined explanatory power of the five components is 61.109% of the total variance. Analysis of the respective correlation matrix tables also show that there is a positive intercorrelation between the four selected PCA components of the moderators ranging from $0.082 < r < 0.343$. The results of the PCA analysis on the moderators are shown on Table 4.10 below. Results show that 1 out of the 24 items (highlighted in red in Table 4.10 below) was excluded for further analysis as it loaded significantly on more than one subgroup. Again, Parallel Analysis was carried out to further examine the exactness of the four (4) subgroups selected by the PCA Analysis. Again, random data with the same number of variables and sample size was generated using the Monte Carlo Simulation (26 variables \times 177 respondents). Results confirmed that

the four (4) components selected by the PCA analysis were optimal, as their actual eigenvalues exceeded the corresponding criterion values of the parallel analysis. The rest of the results are shown on Tables 4.10 and 4.11 below.

Table 4.10: Factor Analysis and Cronbach Alpha for Moderators

	Pattern Matrix ^a				Structural Matrix				Communalities
	1	2	3	4	1	2	3	4	
Transparency									
We receive feedback related to each other's performance vis-a-vis expectations	.720	-.038	.008	.136	.753	.269	.133	.375	.584
information on changing needs	.889	-.068	.036	.004	.871	.278	.173	.298	.763
We share business knowledge of core biz processes and internal operations parameters	.829	-.216	-.052	.158	.793	.129	.066	.390	.688
We have available precisely specified info about output requirement that are clearly understood	.903	-.166	.028	-.077	.818	.165	.146	.198	.700
Accurate/factual information	.915	-.032	.046	-.123	.869	.297	.182	.188	.771
Adequate information	.519	.200	-.048	.018	.594	.395	.068	.237	.388
Reliable information	.621	-.026	.002	-.145	.562	.179	.089	.063	.336
Strategic Collaboration									
We regularly solve problems jointly with our suppliers and customers	-.105	.823	-.005	.043	.223	.792	.100	.191	.636
We include our key suppliers/customers in our planning and goal setting activities	-.023	.975	.003	.277	.289	.620	.104	.397	.454
We frequently interact with suppliers/customers to set reliability, and supply chain standards	.367	.641	.027	-.036	.604	.777	.177	.236	.717
We periodically evaluate the importance of our relationship with our suppliers and customers	.190	.561	.059	.103	.435	.678	.187	.343	.509
We facilitate suppliers and customers ability to seek assistance from us	-.115	.878	-.008	.174	.278	.872	.114	.331	.789
Supplier Development									
We have helped our suppliers to improve their product quality	-.050	-.021	.566	.124	.144	.128	.973	.182	.961
We have continuous improvement programmes that include our key suppliers	.079	.045	.564	.295	.203	.338	.696	.506	.573
We share best practices regarding safe handling and shipping of products with our suppliers	.096	.088	.729	.034	.231	.388	.790	.312	.642
We commit resources to coach our suppliers on how to develop and improve safety standards	.065	.073	.701	.181	.206	.390	.801	.443	.683
We have a policy to phase out suppliers that no longer meet our social expectations	.018	.028	.881	.053	.198	.375	.672	.387	.812
We regularly evaluate suppliers whether they keep up with the latest social, env'tal and economic standards	.193	-.036	.814	.047	.340	.240	.898	.132	.802
our company periodically assess, analyses and evaluate its supply chain risks that impact on goals of sustainability	-.012	.207	.452	.186	.593	.108	.420	.387	.425
We encourage our suppliers to continuously improve safety standards	.045	.085	.451	.445	.168	.364	.644	.623	.606
Risk Management									
We have measures to avoid those risks whose impact on performance seem more costly to rectify	.249	.092	.115	.758	.285	.115	.092	.758	.582

We implement measures to transfer risks to other primary or supporting members of the chain who have built strategic capability to absorb such risks	.354	.111	.230	.677	.554	.230	.111	.677	.589
We belong to associations with prime objective of financing members in case of causalities	.322	.027	.207	.618	.207	.027	.322	.618	.425
For risks that seem difficult to avoid, there are stringent measures to reduce its impacts on performance	.042	.217	-.049	.577	.440	.081	.285	.666	.488
Eigenvalue	10.501	2.657	1.805	1.537					
Percentage of variance explained	38.892	9.840	6.686	5.691					
Cumulative percentage of variance explained	38.892	48.732	55.41	61.10					
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.846								
Bartlett's Test of Sphericity (Approx. Chi-Square)	2539.907 (Sig. = 0.00)								

Source: Author's Construct (2014)

Note:

* The Principal Component Analysis (PCA) with Oblimin rotation was used. Factor loadings with more than 0.40 absolute value is selected

* Major loadings for each item are bolded.

+ All items that loaded on more than one factor were excluded

++ All items that loaded feebly were excluded

As shown, all the four components from the PCA results have Eigen values greater than 1 with component 1 having 10.501. Component 2 had an eigenvalue of 2.657 followed by 1.805 and 1.537 of the 3rd and 4th components respectively. These results were confirmed when the Parallel Analysis was conducted. All the eigenvalues of the four components were greater than the values obtained under the Parallel Analysis. This is illustrated by Table 4.11 below.

Table 4.11: Comparison of Eigenvalues Using Horn's Parallel Analysis: Moderators

Component number	Actual Eigenvalues of PCA analysis	Criterion value - parallel analysis	Decision
1	10.501	1.8400	Accept
2	2.657	1.7164	Accept
3	1.805	1.6187	Accept
4	1.537	1.5353	Accept

Source: Author's Construct (2014)

As shown on Table 4.11 above, component 1 on the PCA results had an index of 10.501 which is higher than its associated criterion value of 1.8400. Again for the 2nd component, results show that the PCA value of 2.657 was higher than the associated criterion value of 1.7164. The same results is seen for the 3rd and 4th factors of the PCA Analysis: PCA (1.805) > Parallel index (1.6187) and PCA (1.537) > Parallel index (1.5353) respectively. Though the 4th component PCA eigenvalue is quite close to the criterion value for the Parallel Analysis, it is quite clear that the PCA index is greater and this is significant at 5% significant level.

4.15.6 PRINCIPAL COMPONENT ANALYSIS FOR COMPETITIVE ADVANTAGE ITEMS

The final stage of the factor analysis was to check for the dimensionality of Competitive Advantage items through the PCA method. Before the factor analysis, the Bartlett's Sphericity and KMO sampling adequacy tests were conducted. The Kaiser-Meyer-Olkin measure of sampling adequacy statistics of .871 exceeded the acceptable lower perimeter of 0.6 The Bartlett's sphericity Chi square of 3495.671 (Sig. = 0.00) also reached statistical significance supporting the factorability of the correlation matrix. The 35 items detailing Competitive Advantage were grouped into 5 subclasses with eigenvalues of 15.137, 2.092, 1.850, 1.479 and 1.283; explaining 59.028% of the total variance. Examination of correlation matrix of the components reveals that the correlation coefficient ranged from $-0.120 < r < 0.431$ with only the 5th subgroup having a weak and inverse relationship with the other components. This is indicative of the fact that for most part, any respondent or unit which is performing high on any spectrum of Competitive Advantage will necessary perform better on the other components. The next task as typified in this work was to conduct

a Parallel Analysis of a randomly generated data of the same characteristics and functions. Tables 4.12 and 4.13 below illustrate the results of the Factor Analysis and Parallel Analysis.

Table 4.12: Factor Analysis for Competitive Advantage

	Pattern Matrix ^a					Structural Matrix					Communalities
	1	2	3	4	5	1	2	3	4	5	
Training and research is a major part of our work	.868	.062	-.141	.036	.043	.825	.385	.241	.179	-.224	.493
We have excellent usage of resources	.764	.091	.007	-.052	.188	.805	.526	.270	.088	-.359	.590
We have steady growth in output and profits	.735	.254	-.135	-.091	-.116	.783	.493	.366	.268	-.485	.727
There are always things to learn within our trade	.677	-.127	.181	.044	-.016	.774	.421	.387	.204	-.376	.575
Our company attracts high applicants who are highly qualified and skilled	.672	.106	.028	.044	-.115	.742	.491	.445	.264	-.410	.723
Our workers are highly committed because of good working conditions	.627	.180	-.039	.095	-.239	.732	.364	.295	.083	-.084	.831
There is incrx knowledge sharing for improved work	.585	-.031	.163	-.103	-.288	.731	.436	.414	.239	-.482	.555
Our reputation is key to our success and our asset	.575	.025	.209	.186	-.026	.730	.408	.614	.151	-.355	.596
Investors want to associate with us because of our financial performance	.557	.131	.054	.075	-.243	.722	.284	.481	.054	-.519	.787
We have a good customer and brand loyalty	.554	.190	.099	.094	-.146	.718	.361	.499	.328	-.313	.707
Our management practices, skills and processes have developed over the yrs	.525	.095	.349	-.020	-.055	.716	.212	.451	.167	-.283	.576
We noted for Eco friendly products and processes	.490	-.080	.416	-.034	-.061	.667	.407	.557	.528	-.381	.694
People are always ready to work with or for us	.420	.065	.273	.388	-.096	.651	.234	.621	.105	-.337	.622
We have good staff retention rate	.254	-.047	.133	.158	.035	.308	.119	.242	.209	-.102	.698
Our response rate is high	-.019	.775	.240	.063	-.006	.418	.843	.443	.256	-.222	.672
we provide reliable/	.211	.603	.031	-.131	-.103	.679	.731	.370	.287	-.167	.550

consistent services to our customers											
We have excellent fill-rate	-.098	.602	.363	.076	-.215	.394	.710	.553	.262	-.412	.597
PCA CONTINUED	Pattern Matrix ^a					Structural Matrix					Communalities
	1	2	3	4	5	1	2	3	4	5	
Our parts per million defect performance is excellent	.287	.562	.067	-.148	-.210	.594	.706	.380	.056	-.413	.186
our process stability is excellent+	.456	.527	.058	.101	.114	.486	.690	.290	.049	-.279	.582
our management skills has improved because of the commitment to sustainable practices+	.442	.499	-.118	.102	.032	.605	.667	.206	.264	-.185	.662
we are noted for quality cocoa beans/product by trading partners and other stakeholders	.254	.463	-.128	.215	-.227	.605	.639	.245	.376	-.483	.094
we produce at less cost relative to competitors/industry	-.004	.438	.150	.407	.312	.505	.620	.201	.365	-.384	.134
suppliers want to deal with us first before others	.345	.434	-.140	.207	-.305	.209	.503	.225	.482	.139	.628
we mostly record the most minimum waste resulting from internal and external operations	.103	.232	.659	-.183	.094	.498	.317	.773	.060	-.404	.678
pursuing sustainability has given us more market share	.148	.080	.657	-.097	-.149	.713	.383	.760	.291	-.426	.622
we are particularly noted for high product availability	-.182	.067	.635	.291	-.237	.419	.390	.708	-.031	-.164	.700
we are noted for our social responsibility to our clients and the community	.418	.031	.523	.121	-.103	.252	.259	.689	.393	-.417	.769
Our investment in sustainability resources has given us less cost	.398	-.050	.516	-.026	-.024	.603	.247	.678	.113	-.305	.363
Our reputation has never fallen in the market	.053	.461	.474	.115	-.077	.495	.643	.656	.298	-.338	.552
We are always able to meet our targets for the year	.249	-.008	.077	.810	-.013	.429	.286	.304	.865	-.217	.636
There is always higher preferences for our cocoa bean	-.020	.051	-.084	.550	-.130	.107	.159	.040	.560	-.173	.633

due to its quality											
Pursuing sustainability is our main strategy**	.038	.054	.045	.256	-.028	.189	.196	.194	-.271	-.139	.654
PCA CONTINUED	Pattern Matrix ^a					Structural Matrix					Communalities
	1	2	3	4	5	1	2	3	4	5	
Our company has a higher market share	-.114	.066	.164	.090	-.801	.272	.225	.391	.203	-.836	.675
Our market share continues to grow than our competitors	.071	.169	.261	.192	-.534	-.172	-.105	-.095	-.057	.595	.703
We are replacing manual and traditional processes with more scientific and sustainable practices	.334	-.361	.231	-.030	-.438	.428	-.089	.412	.041	-.553	.511
Eigenvalue	15.137	2.092	1.850	1.479	1.283						
Percentage of variance explained	40.910	5.654	5.000	3.998	3.466						
Cumulative percentage of variance explained	40.910	46.564	51.564	55.562	59.028						
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.871										
Bartlett's Test of Sphericity (Approx. Chi-Square)	3495.671 (Sig. = 0.00)										

Source: Author's Construct (2014)

Note:

- * The Principal Component Analysis (PCA) with Oblimin rotation was used. Factor loadings with more than 0.40 absolute value is selected
- * Major loadings for each item are bolded.
- + All items that loaded on more than one factor were excluded and highlighted by colour green
- ++ All items that loaded feebly were excluded and highlighted by colour red

As shown on Table 4.12 above, five items (highlighted in red in the table above) were excluded by the factor analysis after the five components were classified. The five components with eigenvalues greater than 1 can explain 40.910%, 5.654%, 5.00%, 3.998%, and 3.466% of the variance respectively. Results of the parallel analysis as shown on Table 4.13 confirmed that only three (3) components were optimal.

Table 4.13: Comparison of Eigenvalues Using Horn's Parallel Analysis: Comp. Adv.

Component number	Actual Eigenvalues of PCA analysis	Criterion value - parallel analysis	Decision
1	15.137	1.9967	Accept
2	2.092	1.8622	Accept
3	1.850	1.7655	Accept
4	1.479	1.6785	Reject
5	1.283	1.6080	Reject

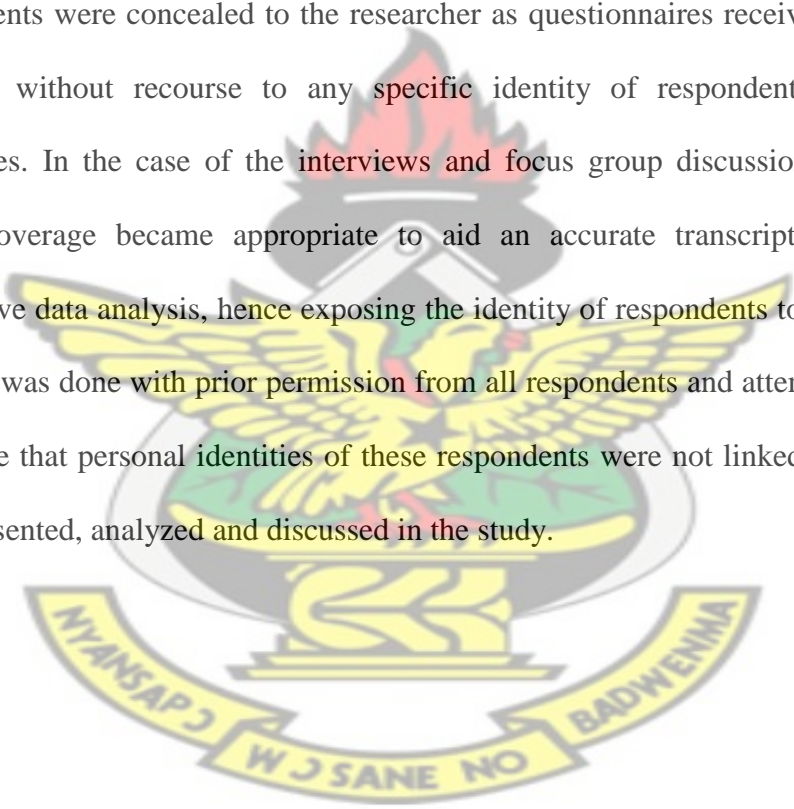
Source: Author's Construct (2014)

As shown on Table 4.13 above, the eigenvalue of component 1 on the PCA table is 15.137. This is statistically greater than the criterion value of 1.9967 from the Parallel Analysis. The decision to select component 1 was therefore justified. For the second structure group, as shown on the PCA table, its eigenvalue of 2.092 is greater than the 1.8622 criterion value received for the Parallel Analysis. This also means component 2 must be retained. The same decision is also arrived for the 3rd subclass obtained by the PCA Analysis; as its eigenvalue of 1.850 was clearly greater than the corresponding value from the Parallel Analysis, 1.7655. Meanwhile for the 4th and 5th components, results of the Parallel Analysis exceeded the PCA results: Parallel Analysis, $PA = 1.6785 > PCA = 1.479$ and $PA = 1.6080 > PCA = 1.283$ respectively. Hence the 4th and 5th components were rejected on the grounds that they were not statistically significant in determining variations of Competitive Advantage. Indeed the three (3) optimal components together explain 51.564%.

4.18 RESEARCH ETHICS

All researches have a responsibility to address ethical issues and this research is no exception. There are various dimensions to research ethics which include social and moral accountability (Canvan *et al.*, 2009). With regard to the former, the researcher

ensured that all work borrowed from other authors have been duly acknowledged in the text. Also, the researcher was careful to include all relevant data and no omission or addition purposely made to persuade readers in favour of any particular argument. Concerning moral accountability, appropriate permission and consent were sought from all respondents; allowing them to willingly participate in the research without any form of coercion or deceit. The researcher equally informed them of the true purpose of the research and further assured them of a great sense of confidentiality. This has duly been ensured throughout this exercise. Moreover, the identity of the respondents were concealed to the researcher as questionnaires received were all put together without recourse to any specific identity of respondents to particular categories. In the case of the interviews and focus group discussions however, an audio coverage became appropriate to aid an accurate transcription during the qualitative data analysis, hence exposing the identity of respondents to the researcher. But this was done with prior permission from all respondents and attempts were made to ensure that personal identities of these respondents were not linked to any kind of data presented, analyzed and discussed in the study.



CHAPTER FIVE

PROFILE OF THE COCOA SUPPLY CHAIN IN GHANA

5.0 INTRODUCTION

This chapter presents a profile of the cocoa chain in Ghana. Because Ghana's cocoa chain does not end on the local front, but on the international market, this chapter first provides a brief highlight on the global cocoa chain, and then moves on to the domestic chain in Ghana. Among the major issues of discussions include cocoa as a world economic good, overview of the cocoa industry in Ghana, a description of Ghana's cocoa supply chain, etc.

5.1 THE GLOBAL COCOA CHAIN

This section presents the global cocoa supply chain in two major parts. The first discusses cocoa as a world economic commodity and the second part describes the global network of cocoa.

5.1.1 COCOA AS A WORLD ECONOMIC GOOD

Cocoa as a commercial commodity has a very complex supply chain network (Traoré, 2009). Its network's complexity emanates from interconnectivity with other products (including sugar and milk); plus its own by-products sometimes re-entering the chain to produce a variety of finished products for the final consumer. Aside its complex chain and the prodigious effort it obligates from players in its supply chain, it is one product that delivers lots of economic gains for agents and the economy as a whole. For instance, the livelihood of millions of many rural households across the world depends on the mainstream product line. More than 90% of the global cocoa

production comes from about 5 million smallholdings and around 14 million workers are employed in primary cocoa production worldwide. West Africa has an estimated 1.2 to 1.5 million cocoa farms, 5-5 hectares in extent, employing around 10.5 million people (TCC, 2015). Africa is by far the largest supplier of the world's cocoa, followed by Asia and Oceania and the Americas. This tropical commodity has the potential to lift many out of poverty in the cocoa producing countries. In Indonesia alone, the world's third largest producer country, the livelihood of an estimated 500,000 farmers depends on cocoa (Stamm and Drachenfels, n.d.). In Sao Tomé and Príncipe, cocoa forms a dominant part of agricultural exports with a share of 94% of agricultural exports in 2005 (FAOSTAT, 2008). Countries like Ghana, Cameroon, Cote d'Ivoire, Brazil, Ecuador and Malaysia also benefit significantly from cocoa. The economy of Côte d'Ivoire is extremely dependent on the world market for cocoa. As the largest producer of cocoa (as shown on Fig. 5.1 below), Côte d'Ivoire export forms about 40% of global supply with an estimated output of 1.4 million Mt in 2012 (EIU, 2012; EIU, 2010).

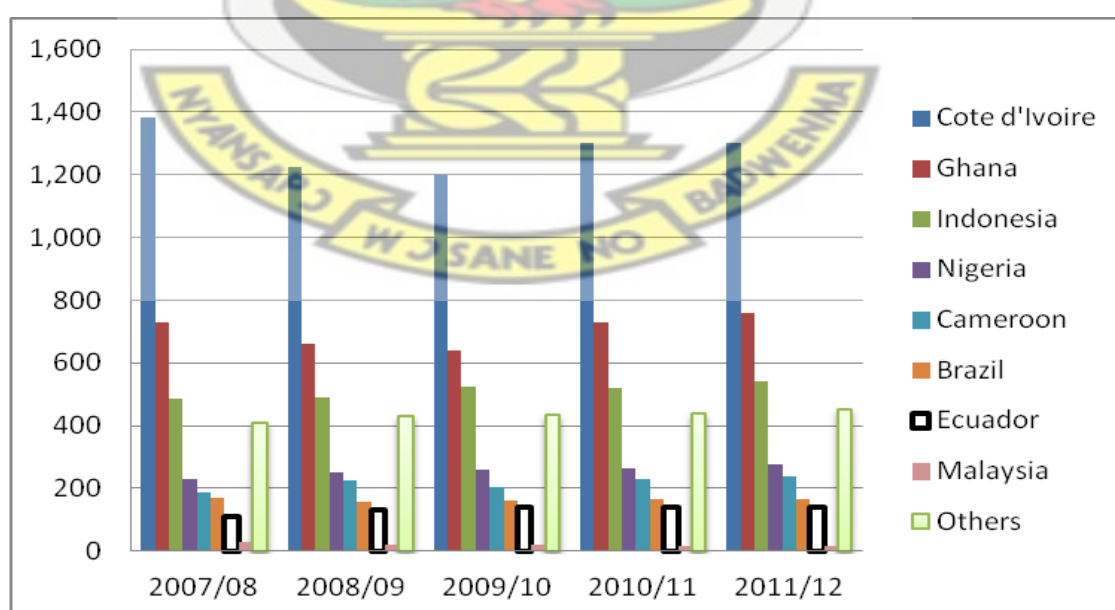


Fig. 5.1: World Cocoa Production (2007-2012)

Source: ICCO (2012); Economist Intelligence Unit (2010)

As a result, most cocoa producing countries are positioning themselves with strategies and policies including supply chain monitoring, strategic investments and governance aimed at boosting production and alleviating poverty. For instance, the government of Indonesia approved a US\$500m three-year investment programme to replace all old cocoa trees with high-yielding hybrids, whilst opening up new regions to cocoa production. The target was to increase cocoa production to 600,000 tonnes in the medium term (EIU 2012). As shown in Fig. 5.1 above, world production trend (2007-2012) shows an average gross production of 5,684 tonnes with Côte d'Ivoire, Ghana, Indonesia and Nigeria holding the highest market share respectively (EIU, 2012).

5.1.2 COCOA AS A NETWORK

“Cocoa travels along a global supply chain crossing countries and continents. The complex production process involves numerous parties including: farmers, buyers, shipping organizations, processors, chocolatiers and distributors” (WCF, 2012). As indicated on Fig 5.1 above, cocoa production is geographically restricted to developing countries who usually export cocoa in its raw form (cocoa beans). “Cultivation of cocoa at the farm level is a delicate process as crops are susceptible to various conditions including weather patterns, diseases and insects. The vast majority of cocoa still comes from small, family-run farms, who often confront out-dated farming practices and limited organizational leverage” (WCF, 2012). Cocoa trees require the safeguard of a tropical rain-forests moist, windless climate and constant warmth, to provide ideal conditions for their growth and well-being. This means cocoa producing areas lie near the equator, with its exterior precincts bounded by the Tropics of Cancer and Capricorn. Different climatic conditions, soil types and

methods of cultivation all contribute to significant differences in the flavours generated by the beans.

There are three categories of cocoa beans usually cultivated and marketed worldwide; criollo (“the native” or the beans with premium organoleptic quality), forastero (“the stranger” or the basic quality) and trinitario (“the blend”). Criollo accounts for only 1% of the world’s cocoa production and is almost fully concentrated in Venezuela, whilst the forastero and trinitario are grown in tropical rainforests of West Africa, tropical Asia and South America with a varying degree of refinement (Berenbiem and Shakya, 2012). Producers sell their cocoa beans via cooperative and or local buyers to exporters. The conveyance of cocoa from the farm gates to the port, on toward to processing companies is managed and controlled by private operators who act as distributing and or shipping agents.

Cocoa beans, upon harvesting, are usually left to be fermented and then dried. When they are sufficiently dried, they are transported for processing. Cocoa processing basically is the preparation of beans to the final consumer. The processing of cocoa involves the transformation of unfinished (intermediate) products; cocoa butter, cocoa liquor and cocoa powder. This operation is known as converting or grinding. The Netherlands, USA, Cote d’Ivoire and Germany are the world’s leading grinders of cocoa (ICCO, 2012). Statistical evidence shows that the majority of cocoa processors in the world are located in Europe, Asia & Oceania, the Americas and then Africa (WCF, 2012). Following recent upturn in global demand for chocolate, processing industries in the main importing countries, especially in the US, Germany, the Netherlands and in producing countries, have already begun to step up activity to

increase stocks, which had hit a downward spiral during the global financial crisis. In the first quarter of 2010, the volume of beans processed in North America, including the US, Canada and Mexico, jumped by 16.2% compared with the year-earlier period, while in Western Europe, boosted by Germany's strong performance, volumes rose by 8.1% (EIU, 2010). Data still indicates the superiority of Archer Daniels Midland (ADM), Barry Callebaut and Cargill Incorporated; together own close to 40% share of world cocoa processors.

Once the cocoa beans have been processed into powder, butter or liquor, they are then shipped or transported mainly to the chocolate or confectionery markets and then to the cosmetic and alcoholic industries for final value addition to the consumer. Evidence also suggests that Nestle, Cadbury, Hershey, Russell and Ferrero, among the top 10 world chocolate manufacturers account for 40% of the world market share. "Cocoa butter and liquor are used to make chocolate, while cocoa powder is used in beverages and other confectionery. Good quality chocolate will contain a relatively high percentage of cocoa (up to 70%)" (Traoré, 2009). An illustration of the world cocoa chain is demonstrated in Fig. 5.2 below:

As demonstrated, cocoa collectors buy the cocoa beans from the farmers or the beans collected by the cooperatives who sell to an exporter on the farmers' behalf. In many producing countries, some or all of the largest exporters are the multinational processing companies themselves or local companies controlled by them. Once shipped to Europe or North America, the beans will be transformed to cocoa butter, cocoa powder and liquor destined to the chocolate, confectionery or to other adjunct industries for value addition.

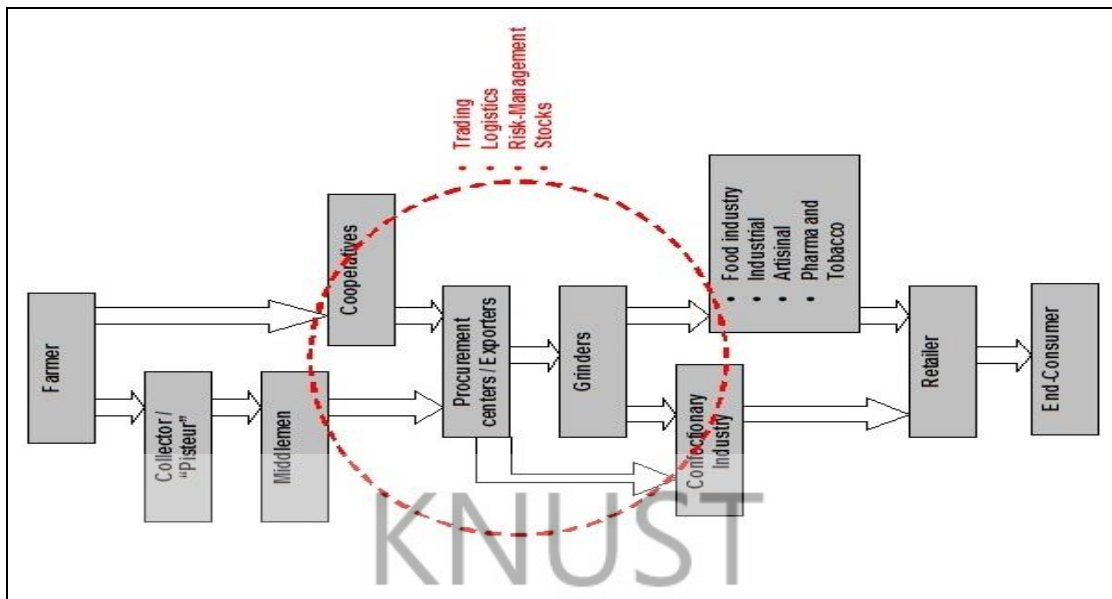


Fig. 5.2: A Simplified World Cocoa Chain

Source: Continaf, B.V

Through this whole process, supply chain and risk management are essential functions, which include the optimization of stocks, managing logistics and price risk management. At the end of the chain are supermarkets and smaller specialist outlets which act as retailers or sale outlets for the final consumer to have access to the varied products created.

5.2 OVERVIEW OF GHANA'S DOMESTIC COCOA CHAIN

Cocoa is a vital cash crop in Ghana. It produces a lot of socio economic benefits to players and the economy as a whole. As the largest foreign exchange earner amongst all agricultural exports in Ghana, it employs a lot of the labour force in the country. Its involvement in the fight against poverty is therefore enormous. About 550,000 cocoa farm owners with an estimated 800,000 smallholder farm households are involved in cocoa production. It is also established that cocoa supports about 55% of the total household income among cocoa farmers in Ghana. However, cocoa is farmed on relatively small but increasing farmlands ranging from 0.4 to 4.0 hectare with an

estimated total cultivation area of about 1.45 million hectares (Frimpong and Anim-Kwapong n.d.; Mohammed et al. n.d.; Bosompem et al. 2011). Cocoa is cultivated mainly in rainforest areas of Ghana within the Volta Region, Ashanti Region, Brong-Ahafo Region, Eastern Region, Central Region, and Western Region where annual rainfall is about 1,000-1,500 millimetres. The crop year begins in October, when purchases of the main crop begin, while the smaller mid-crop cycle starts in July.

Ghana is by far the second leading producer of cocoa in the world with a 550 kilograms per hectare (kg/ha) average yield. Though second leading producer of world cocoa, yield is very low compared to 800 kg/ha in Côte d'Ivoire, or 1700 kg/ha in Malaysia (Appiah, 2004; cited in Bosompem *et al.*, 2011). The Cocoa Marketing Board (CMB) is the sole buyer of all harvested cocoa beans. Ghana sells most of its cocoa production, over 90% of which is of grade 1, ahead of the harvest season through forward contracts. Furthermore, a price premium is placed on cocoa imports from Ghana due to superior content of fats, propensity for higher yields in butter due to lower levels of stones and unwanted materials, little to no bean defects and the reputation for consistent and reliable supply of cocoa. Presently, Ghana exports a bulk of her cocoa in the raw form with only about 40% of the produce being processed locally. However the sector is still dependent on traditional and rudimentary methods of production especially at the farm level (Kolavalli and Vigneri, 2005).

Though Ghana receives a lot of foreign exchange from cocoa exports due to international reputation, cocoa production has not been consistent over time. Statistics show that from the early 1960s to the early 1980s, output of cocoa in Ghana declined by 60% due to internal and external shocks and poor overall economic management.

According to Bulir (1998) cited in (Kolavalli and Vigneri, 2005), “in 1982-84, prolonged drought and bush fires took a heavy toll on cocoa trees, particularly in the Brong Ahafo and Ashanti Regions, and producers had few incentives to replant.” Apart from the natural disasters, Bulir (1998) also reports that excessive taxes on the sale of cocoa locally induced farmers to smuggle cocoa to Côte d’Ivoire. According to the author this accounted for 25% of the observed massive decline in cocoa output. These production trends are captured on Fig. 5.3 below. As displayed on Fig. 5.3, the production of cocoa plateaued until the late 1980s with the lowest occurring in 1981/1982 season. However, by 1985, production propped up along an increase in farm area harvested. This was possibly as a result of the Cocoa Rehabilitation Program rolled out under the ERP during the 1980s. The second reason for the recent boost in production was the introduction of improved practices and hybrid seeds, plus extensive support systems and policies offered by the government to farmers in order to promote and reach national cocoa targets.

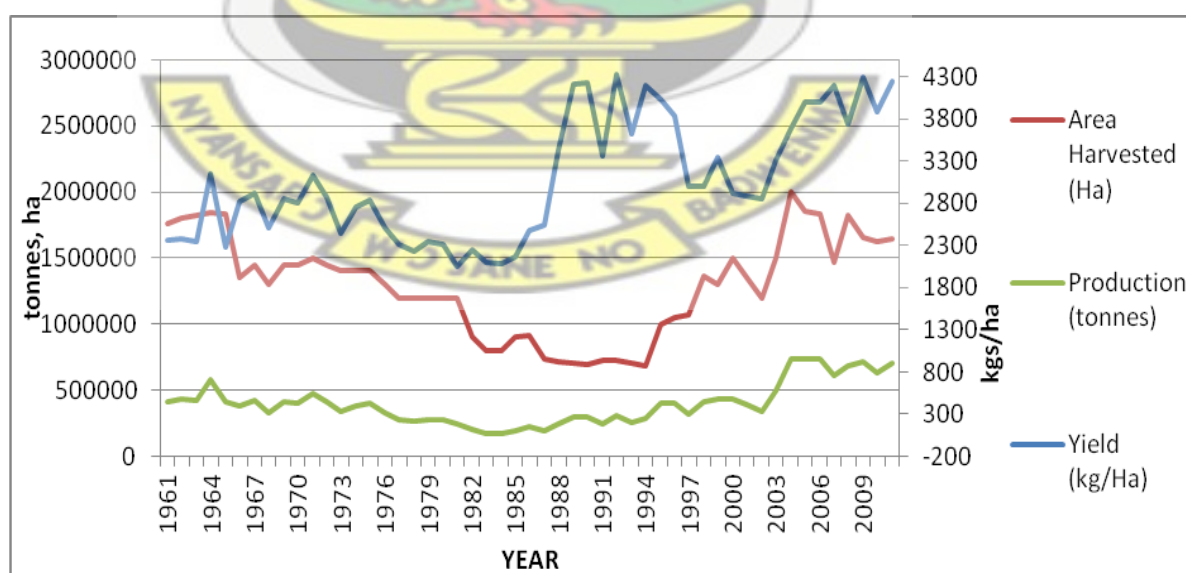


Fig 5.3: Annual Trends of Cocoa Production, Area Harvested and Yield per Hectare in Ghana (1961-2011)
Source: FAOSTAT (2015)

These practices included the shift away from the slash and burn method of cultivation, increase use of fertilizer, greater control of pests, adoption of improved varieties and increasing the F.O.B price offered to local farmers for their cocoa beans. World cocoa prices have steadily increased from 1990 onwards, with the exception of 1998-2000 and 2005-2006. This, combined with a higher share of the price being passed on to farmers, has offered farmers increasing real producer prices, and hence a boost to farmer confidence and production (Kolavalli and Vigneri, 2005). Data also indicates that cocoa yield per hectare in Ghana is about the lowest. What results in annual increases in production is mainly as a result of the consequent increases in farm area harvested. Hence, there is a strong association between production and area harvested in Ghana. For instance, the FAO data suggests that between 2005 and 2004, the area under cocoa cultivation went up by as much as 500,000 ha.

5.3 A DESCRIPTION OF THE GHANA COCOA SUPPLY CHAIN

As already indicated, the functional organism that connects at various levels diverse economic agents with different utilities and motives; to work cohesively through the barest flow of material and information to attain a final value which is at the lowest cost and the highest speed in order to satisfy the taste of the final consumer illustrates what is referred to in literature as supply chain. It is an activity which includes: purchasing, manufacturing, warehousing, transportation, customer service; demand planning, supply planning and supply chain management. Like all goods, the production and marketing of cocoa is undertaken by a network of organized entities coming together. Below in Fig 5.4 are the key members that contribute to the production and exportation of cocoa in Ghana.

Table 5.4 Key Members in Ghana Cocoa Production and Export

1. COCOBOD
2. Input suppliers
3. Farmers
4. Licensed Buying Companies
5. Haulage companies
6. Cocoa Marketing Company
7. Local processing companies, wholesalers and retailers.

Source: Author's Construct (2015)

There are also flows and processes between and within these parties which include: cocoa beans and products, funds, information, inputs, services and bonuses. Smallholder farmers exchange cocoa beans for money, inputs and bonuses. The smallholder farmers produce for the Cocoa Marketing Company (CMC) through the License Buying Companies (LBCs). Quality of cocoa beans from up-country is ensured by the Quality Control Division of COCOBOD. This cocoa supply chain starts with the farmers. Unlike other agricultural products, cocoa is not planted in commercial plantations but by smallholders in small scales often mixed randomly with other crops.

COCOBOD report indicates that a total of 1.7 million farmers are engaged in cocoa production in Ghana with about 1-2 hectares of cocoa farmland. Average economic lifespan of farm lands in Ghana ranges between 20-50 years. The average cocoa fruit requires about five months to ripe giving the right farm conditions. Meanwhile, within its maturity period, the cocoa fruit is subject to both diseases and pest infections including the swollen shoot and capsids. Farm implements used by cocoa farmers include machetes, axes, harvesting hooks, pruners, ladders and chain saws (Nbabuine, 2012, ILO and GAWU, 2014).

Deep yellowish cocoa pods are indications that the cocoa is ripe for harvesting. Upon harvesting, a wooden baton or machetes is used to break open and the wet beans scooped with either the hand. They are then left for days under a shed to be fermented to allow the chocolate flavour develop upon roasting in the factories. Fermentation requires that heaps of about 90-250 kilograms of wet cocoa beans are left to dry on plantain leaves. The heap of wet beans is subsequently covered with more plantain leaves at little to moderate sunlight. To ensure even fermentation and good chocolate flavour, farmers are required to turn or stir the heaped cocoa beans after every 3 working days. On the second day of fermentation, every corrosive liquid in the beans is naturally extracted (Nbabuine, 2012). After fermentation, the beans are then dried 7-10 days under full sunlight. According to Nbabuine (2012), good quality results demands that the drying of the beans is gradual and monitored until it is able to crackle in the hand when rubbed together.

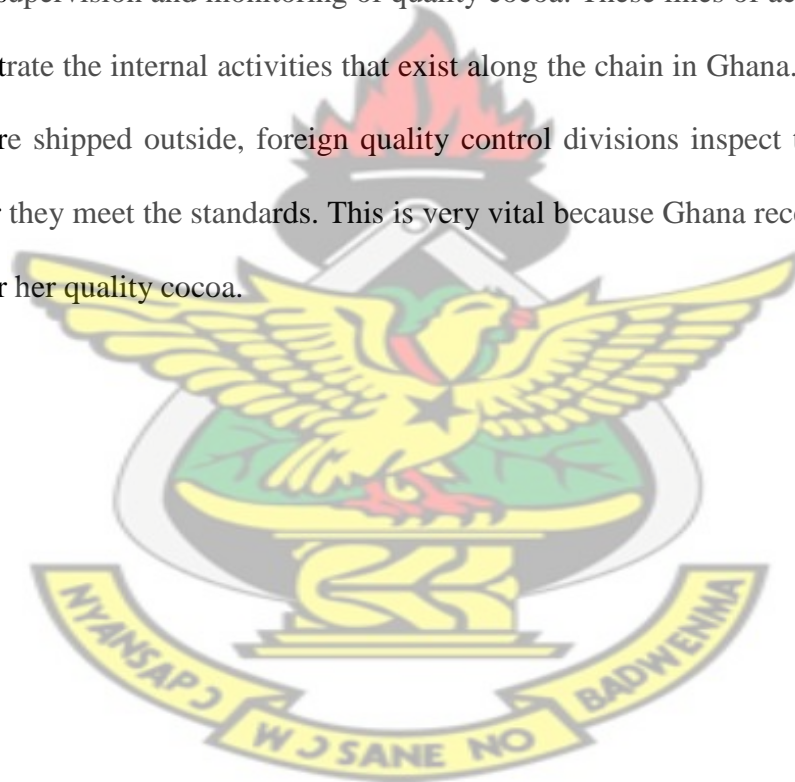
Farmers have the choice of selling their cocoa beans to a number of LBCs (who can either be local or foreign companies) or their agents in each cocoa community. License Buying Companies (LBC) are internal marketing companies who purchase cocoa beans in the interests of COCOBOD. "It is required that, the LBC has a permanent buying location where the farmers bring their graded beans sealed in export sack by the Quality Control Division for them to buy" (Nbabuine, 2012). COCOBOD is therefore tasked with the responsibility of ensuring that quality of cocoa before they are sold. When the quality of the beans is compromised, the Quality Control Division of COCOBOD is mandated to reject the beans. As a result before the LBC makes a purchase, they evaluate the cocoa beans on its moisture content and then later weighed on certified scale in the presence of the farmer. When the quality

of cocoa is compromised, COCOBOD rules require the LBC to reject the beans being sold by the farmer. However, some farmers may find possible ways of selling low quality beans to other LBCs who are in stiff competition for cocoa beans or worse still, the farmers smuggle these cocoa beans to neighbouring countries. Thus, to avoid losing in the competitive market, LBCs assume part of the quality control responsibilities from the farmers (example, drying and sorting). The LBC then evacuate every quantity of cocoa to the Cocoa Marketing Company (CMC) where they in turn sell them at a fixed price to the government. The services of private cocoa haulers are used by the LBCs to haul graded and sealed cocoa to take over points in Tema port, Takoradi port and an inland port at Kaase, Kumasi, where officials of the Cocoa Marketing Company (CMC), a subsidiary of COCOBOD, purchase, and store only the quality premium cocoa for overseas shipment (Nbabuine, 2012).

There are a number of responsibilities that the COCOBOD is tasked to perform in order to ensure that the quality of Ghana's cocoa is at the highest premium before they are sold in the local and international markets. First, the seed production unit of COCOBOD ensures that high quality seeds with high yielding propensity are distributed to the farmers. Again, training programs are organised for farmers by the extension office of the disease control unit. Extension officers are also required to conduct farm visitations to monitor and train farmers on disease control and chemical applications.

The sale of cocoa beans is conducted at both the domestic market (domestic and multinational processing companies) and to the foreign markets. Revenue generated is then used to pay farmers and to support the economy. Cocoa is the second highest

contributor of Ghana's total revenue. A high percentage of total quality cocoa produce are shipped overseas whilst the remaining are sold in the domestic market to domestic grinders and chocolate manufacturers. Others are also sold to adjunct industries that use cocoa beans as raw material inputs. The domestic chocolate manufacturers create a variety of final cocoa products that are sold at the local market through retailers or at multinational trade houses for the international market. Through recent improvement in port system and the establishment of bulk storage facilities in Takoradi harbour especially, there has been a considerable reduction in losses and packaging costs and greater supervision and monitoring of quality cocoa. These lines of activities basically demonstrate the internal activities that exist along the chain in Ghana. Once the cocoa beans are shipped outside, foreign quality control divisions inspect the beans to see whether they meet the standards. This is very vital because Ghana receives a premium price for her quality cocoa.



CHAPTER SIX

QUANTITATIVE DATA ANALYSIS

6.0 INTRODUCTION

The current chapter presents all the quantitative analysis of the study in three major sections. The first section highlights the descriptive analysis of the data to reveal patterns of the sustainable practices of players in the chain, in order to attempt to investigate if practices vary among practitioners. The descriptive analysis also presents the phase(s) of the supply chain management that are of prime focus to practitioners. The second section gives a correlation analysis between observed variables in order to establish the direction of relationships. This will clearly give a hint as to whether any interaction or cross effects exist among the dimensions of sustainability and whether this effect is significant or otherwise. The final part of the quantitative data analysis gives the regression analysis. The regression analysis is partitioned into two parts. The first part utilises generalised linear models specified in hierarchical form to check the impact of sustainability on competitive advantage. The second part specifies the moderating effects of supply chain management indicators as *transparency, collaboration, supplier development and risk management* on the linkage between sustainability and competitive advantage. Numerous models were exploited to establish the reliability of the study results.

6.1 DESCRIPTIVE ANALYSIS

The descriptive analysis of the survey data attempts to obtain summarised information of the characteristics of the observed variables, especially concerning the relevant sustainable practices along the cocoa chain. It also attempts to probe further if

observed differences exist among actors in the implementation of sustainable strategies plus what the most effective sustainability measures are. Answering this question provides the first step in gaining an in-depth understanding into what contributes to a sustainable supply chain and to learn from industry best practices. The opening section of the descriptive analysis attempts to find out the aspect(s) of supply chain management that players concentrate on in terms of activities towards sustainability. To do this, the data was split into classes of actors and then sustainable management activities observed in an attempt to find the aspects (i.e. *strategic sourcing, internal operations, warehousing and outbound transportation*) of the supply chain that are emphasized under each sustainability dimension. It was generally observed that high variation exists in terms of aspects players emphasized to arrive at a sustainable supply chain.

6.1.1 ASPECTS OF SOCIAL DIMENSION

Using a Likert scale ranging from (1) “strongly disagree” to (7) “strongly agree”, the sampled units gauged their activities in strategic sourcing, warehousing, internal operations and outbound transportation activities. Fig. 6.1 illustrates the aspects of social dimension that are emphasized by each player along the cocoa chain. Results show that the social dimension is more emphasized in the middle of the chain than both upstream and downstream. In the upstream, it is shown that farmers are engaged in tackling mainly the internal aspects/operations of social sustainability. In the middle stream where players give prime attention to social issues for all the aspects of the supply chain, it is revealed that the PCs focus extensively on selecting suppliers which have good social performance. The average score of 6.75 was among the highest in terms of socially responsible strategic sourcing along the chain. This is then

followed by warehouse activities. Internal operations and transportation issues follow respectively in terms of emphasis placed on social aspects of the supply chain by the PCs. For the LBCs, the findings show that equal importance is placed on strategic sourcing, warehousing and transportation aspects pertaining to socially responsible activities. As shown on Fig. 6.1, out of a score of 7, the LBCs obtained an average of 6 for each of the social aspects. However, their activities towards strong working conditions and internally sociable efforts were found to be among the least within the cocoa chain. Results show that LBCs scored an average of 1.9 out of 7, which was the lowest score in terms of scores of socially responsible internal operations among the practitioners.

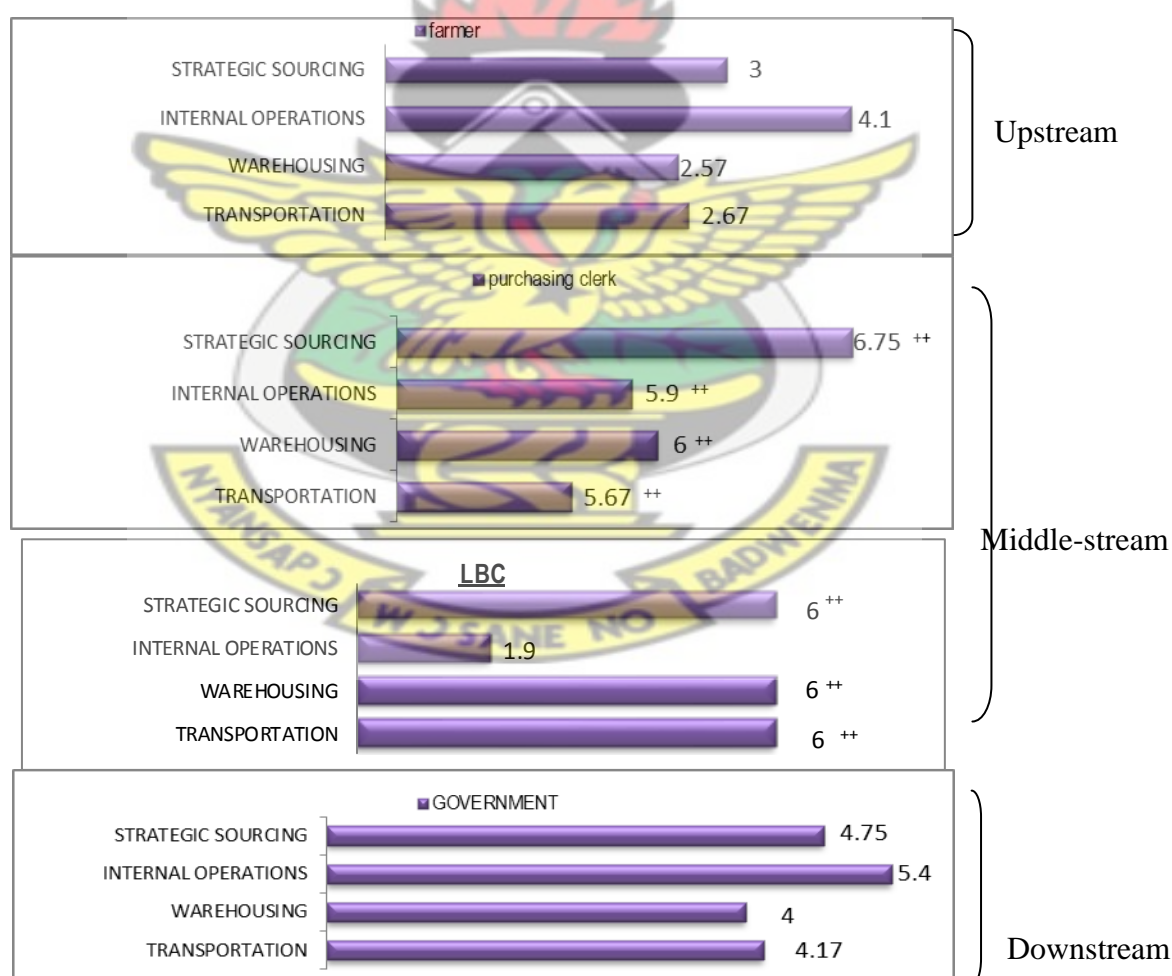


Fig. 6.1: Key Aspect of Social Dimension Emphasised by Practitioners

Source: Field Survey (2014)

Note: ++ Key Emphasis in the Chain

The Government, represented by the Cocoa Marketing Company (CMC) of the COCOBOD, was used to represent the downstream section of the chain, since they act as the main consumers or buyers of unprocessed cocoa. At the downstream section of the chain, it is found that emphasis is placed on internally social responsible operations; followed by the selection of socially responsible suppliers. Transportation and warehousing were found to be the least emphasized social sustainability activity by the CMC. Generally, it is observed that farmers performed weakly on social efforts and thus are the worst performers as compared to other actors.

In terms of general aspects, as illustrated by Fig. 6.1, PCs were found to be the stage with much emphasis on socially responsible strategic sourcing with a score of 6.75. They are followed by LBCs (score of 6) before the CMC (score of 4.75) in that order; farmers had the weakest score (3). On socially responsible internal operations, results show that again, the PCs placed much emphasis (5.9) on this factor. This is then followed by the CMC (5.4). The LBCs had the least score (1.9). This suggests that socially responsible internal operations are not of relevant importance to the average LBC. However, they placed much importance to social activities at the warehouse with a score of 6 out of 7. This was equal to the standard placed on the same factor by PCs. Farmers had the least score (2.57) within the chain. This therefore suggests that working conditions and capacity building of workers in terms of storage of cocoa at the farm level is very poor. On the transportation aspects of social activities, it is shown on Fig. 6.1 that the LBCs were much focused with an average score of 6 out of 7; followed by the PCs, with a score of 5.67 and the CMC with a score of 4.17 placing third. Again, farmers had the lowest score of 2.67 within the chain.

6.1.2 ASPECTS OF ENVIRONMENTAL DIMENSION

Again, respondents were engaged to measure the level of emphasis they placed on activities detailing environmental dimension using the 7-point Likert scale. Observation shows that generally, emphasis on the environmental dimension is low among practitioners within the cocoa chain. The least performance was found among farmers whilst the LBCs and PCs performed relatively better respectively. This is indicative of the fact that very little attention is given to green practices within the cocoa supply chain. Fig. 6.2 illustrates the aspects of the environmental dimension that are emphasized by each player along the cocoa chain. It is shown however that activities increase downstream with much concentration at the middle tiers of the chain. At the upstream section of the chain, findings indicate that farmers performed fairly poor on environmental issues. High emphasis on the other hand was placed on environmentally safe warehousing with a score of 4.17. This is then followed by an environmentally safe strategic sourcing.

At the middle of the chain, it is shown on Fig. 6.2 that the PCs placed much emphasis on environmentally responsible warehousing with a score of 5.33 out of 7, this is then followed closely with internal activities (5.29). Environmentally responsive transportation and strategic sourcing, though low, were also very close (4.67 and 4.62 respectively). On the LBCs, results show that much environmental efforts were geared towards eco-friendly internal operations. The score of 5.86 among the LBCs was found to be even the highest within the entire chain. At the downstream, the CMC placed much premium on environmental performance at the warehouse, with an average score of 4.83. This was also followed closely with environmentally responsible internal operations.

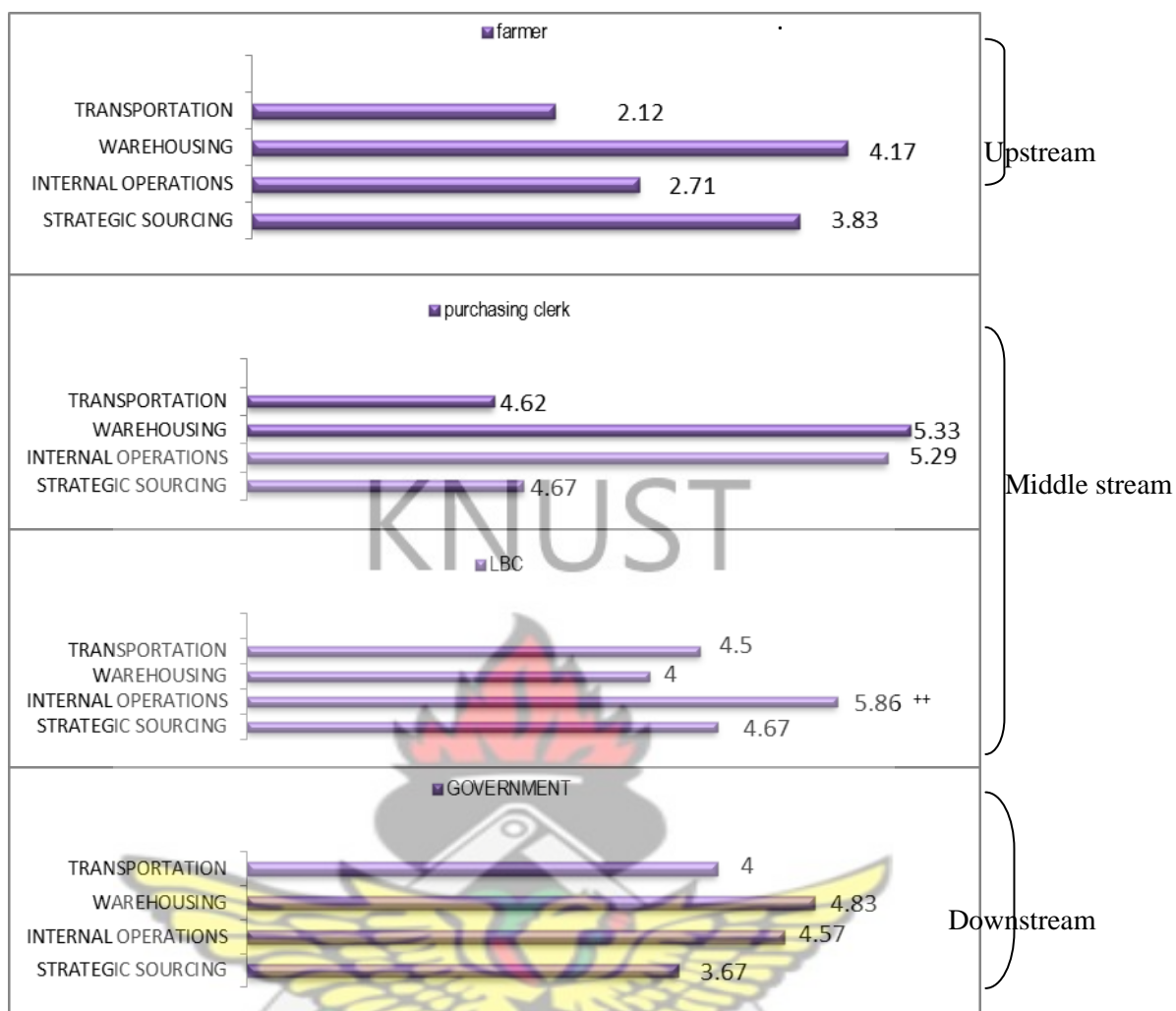


Fig. 6.2: Key Aspects of Environmental Dimension Emphasised by Practitioners

Source: Field Survey (2014)

Note: ++ Key Emphasis in the Chain

In terms of general aspects, as shown on Fig. 6.2, for environmental strategic sourcing aspects of the cocoa chain, the LBCs and PCs obtained the highest scores with an average score. Much difference was not found between activities of the farmers and the CMC in terms of this aspect of environmental dimension of sustainability, as they both assumed a low score. For environmentally responsible internal operations, it was generally found that again, farmers did not concentrate on this aspect. Their score of 2.71 was the lowest along the chain. LBCs and PCs placed the highest emphases on this factor with scores of 5.86 and 5.29 respectively. In terms of eco-friendly

warehousing, the PCs with a score of 5.33, followed by the CMC with a score of 4.83 issued the highest emphasis on this aspect of environmental sustainability. This was to be expected since the PCs were largely responsible and indeed mainly bore all the costs of bad cocoa beans. They are unable to transfer such losses to their mother organisations, hence it is expected that they will place much premium on how the cocoa beans are kept and bagged for transfer downstream the chain. The same risks are faced by the CMC; due to strict international standards and the objective to maintain international reputation of premium quality cocoa. On the transportation aspect, it is shown on Fig. 6.2 that Purchasing Clerks' score of 4.62 was the highest for environmentally responsible transportation.

6.1.3 ASPECTS OF ECONOMIC DIMENSION

Knowing how each subgroup within the cocoa chain responded to both social and environmental activities within the chain, the task was necessitated to find out how their activities compare in terms of efforts to ensure economic sustainability. Again, respondents were engaged to measure the level of emphasis they place on activities detailing economic dimension using a 7-point Likert scale. Fig. 6.3 below illustrates the aspects of economic dimension that are emphasized by each player along the cocoa chain. Observation shows that generally, emphasis on the economic dimension was moderately high among practitioners within the cocoa chain. The least performance was found to be farmers whilst the PCs and LBCs performed relatively better. This is indicative of the fact that much attention is given to reaping economic benefits among the actors of the chain. It is shown however that activities increase downstream with much concentration at the middle tiers of the chain.

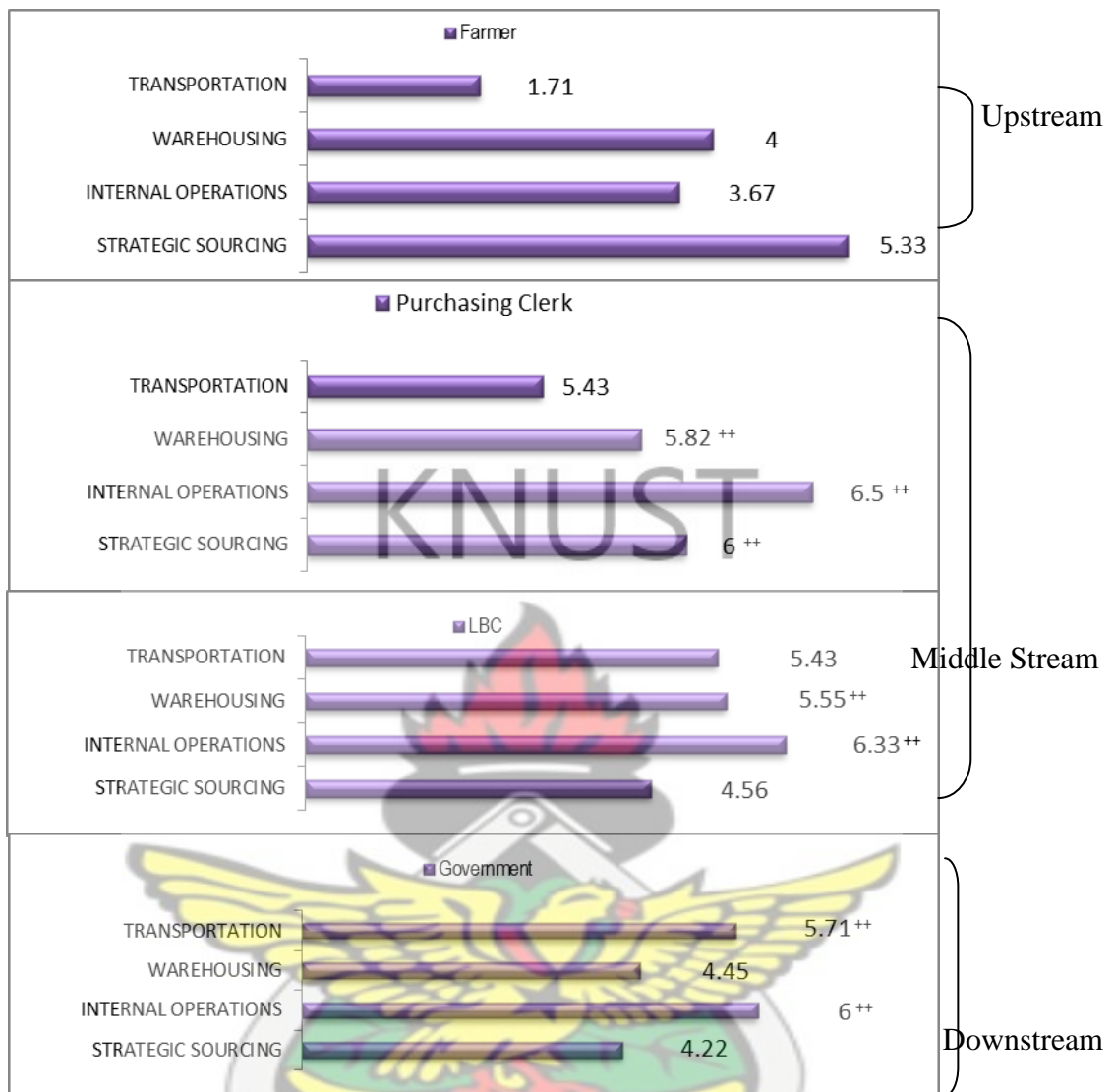


Fig. 6.3: Key Aspects of Economic Dimension Emphasised by Practitioners

Source: Field Survey (2014)

Note: ++ Key Emphasis in the Chain

At the upstream section of the chain, findings indicate that at the farm level, farmers are more focused on economically responsible selection of suppliers (5.33) and then economically responsible warehousing (4 out of 7). The score on supplier selection by farmers suggest that they are primarily occupied by finding supplies that are less costly and suppliers whose products are noted for producing good outputs and yield. At the middle stream of the cocoa chain, results exhibit that PCs place high emphasis

on economically responsive warehousing, internal operations and the selection of suppliers, with the greatest effort geared towards economically responsive internal operations (6.5 out of 7). This focus is similar to the LBCs (6.33 out of 7 for internal operations). However the LBCs placed much emphasis on economically responsible internal operations (6.33) than supplier selection (4.56), opposite to the PCs who placed more emphasis on economically responsible supplier selection than transportation. At the downstream level, economically responsive practices are dominated by internal operations (6 out of 7) and transportation (4.71 out of 7). The CMC does not place much attention on supplier selection (4.22) and warehousing (4.45).

6.1.4 PATTERN OF SUSTAINABILITY PRACTICES AMONG ACTORS

Fig. 6.3 also indicates that as regards economic strategic sourcing, PCs and farmers give more attention to this aspect of economic sustainability. PCs averagely scored 6 out of 7 while farmers scored 5.33 out of 7 for their economic selection of suppliers. At the internal operations level, it is observed that PCs and LBCs scored the highest with farmers giving the weakest attention (3.67 out of 7). Under economically responsible warehousing, it is shown on Fig. 6.3 that again, the PCs (5.85 out of 7) and the LBCs (5.55 out of 7) were the highest performers in terms of emphasis placed on that factor. Again, farmers had the lowest score (4 out of 7). For transportation activities geared toward economically efficient supply chain, results reveal that the LBCs put much emphasis on this factor (5.43 out 7). The score on farmers' activities at the transportation aspect of economic dimension was very low (1.71 out of 7).

The results of the three Figures; 6.1, 6.2 and 6.3 show some interesting patterns and variations concerning sustainable activities within the cocoa supply chain. It is observed that for most parts, farmers do not engage widely in sustainable practices. They are highly involved in economic initiatives than environmental and social initiatives with much emphasis on selection of economically viable suppliers. Indeed one cannot find any clear differences in their environmental and social initiatives. Following the farmers' performance is that of the CMC. Efforts are invested in internal operations specifically those that border on social and economic sustainability. As later highlighted on Table 6.1 below, though efforts are spread evenly across achieving high scores for each dimension of sustainability, the CMC performs relatively high in social and economically responsive internal operations.

Table 6.1: Pattern of Sustainability Practices among Actors

Sustainability Pillars	Farmers	Purchasing clerks	LBC's	Government
Social				
Strategic sourcing	3	6.75 ⁺⁺	6 ⁺⁺	4.75
Internal operations	4.1	5.9 ⁺⁺	1.9	5.4
Warehousing	2.57	6 ⁺⁺	6 ⁺⁺	4
Transportation	2.67	5.67 ⁺⁺	6 ⁺⁺	4.17
Economic				
Strategic sourcing	5.33	6 ⁺⁺	4.56	4.22
Internal operations	3.67	6.5 ⁺⁺	6.33 ⁺⁺	6 ⁺⁺
Warehousing	4	5.82 ⁺⁺	5.55 ⁺⁺	4.45
Transportation	1.71	5.43	5.43	4.71
Environmental				
Strategic sourcing	3.83	4.67	4.67	3.67
Internal operations	2.71	5.29	5.86 ⁺⁺	4.57
Warehousing	4.17	5.33	4	4.83
Transportation	2.12	4.62	4.5	4

Source: Field Survey (2014)

Note: highlighted boxes show concentration

++ Key Emphasis in the Chain

The best performers in the cocoa chain in terms of emphasis on sustainable practices are observed to be PCs, followed by the LBCs. Key efforts from the PCs are spread evenly and intensively on all the dimensions of sustainability. However, it is shown that for most part, PCs place high emphasis on socially responsible activities with high scores in all the aspects of social sustainability practices. The most crucial social aspect focused upon is the social criteria of supplier selection followed by warehousing activities.

From Table 6.1 above, it is also shown (highlighted) that emphasis is placed on economic initiatives by the PCs. Except for the transportation activities the PCs gave equal attention to all the aspects of economic dimension. The LBCs on the other hand placed equal emphasis on both social and environmental initiatives, with greater emphasis on warehousing in both instances. Indeed, higher concentration is shown for economically responsible internal operations (6.33 out of 7). In the case of farmers, it is generally shown that efforts are low across all dimensions of sustainability, except for economically sustainable sourcing where higher emphasis is placed. In a similar manner, the CMC has low commitment in all dimensions of sustainability, except for internal operations where it recorded high efforts for both social and economic dimensions. On more general terms, results show that social initiatives within the cocoa chain is of key attention to players followed by economic dimension. Environmental initiatives were least focused. Again, results shown on Table 6.1 above confirm that least concentrated aspects of sustainable supply chain management are the transportation and strategic sourcing phases of the supply chain. Indeed sustainable transportation of cocoa is a major drawback within the cocoa chain.

6.1.5 THE EFFECTIVENESS OF THE MEASURES OF SUSTAINABILITY

The question that draws attention is whether these aspects or measures are in any way effective in drawing the needed sustainable performance that the cocoa chain require for competitive advantage and if so what kind of competitive advantage each draws. To explore this breadth, the study pegged the level of commitment high and low competitive units in their sustainability practices of strategic sourcing, internal operations, warehousing and transportation. This was an attempt to find out the most effective aspects of sustainability practices within the cocoa chain. The sample units were segregated into high gainers of competitive advantage and least performers with 50.64% of the units being high performers. The radar plots were used to attempt to explore this option in order to examine whether there are significant patterns and significant differences in the practices of high and low competitive units.

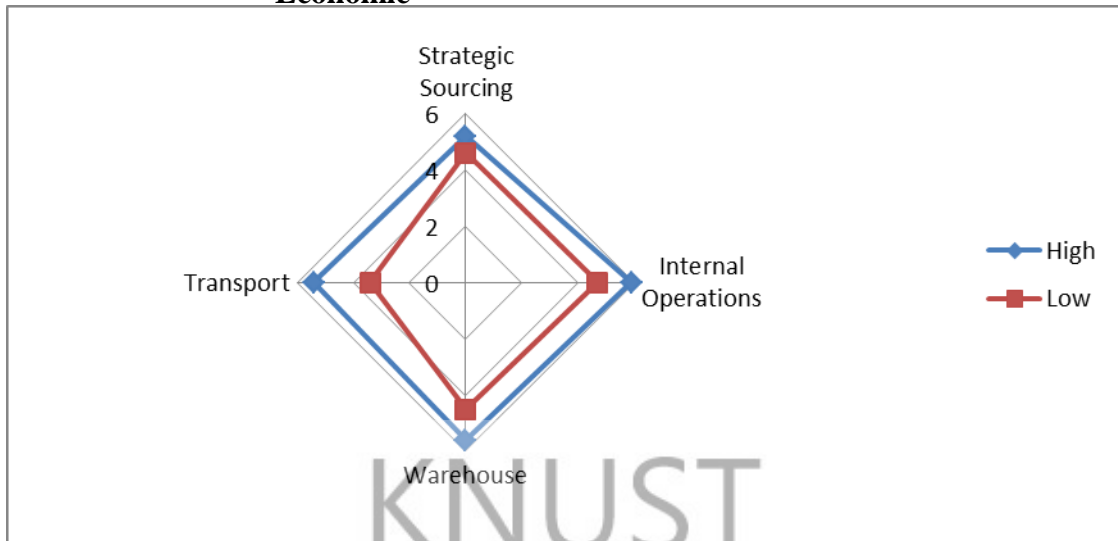
Indeed, units were examined along seven decisive competitive advantages including *production efficiency, innovation capacity, company reputation, operational performance, strategic capacity, resource pool and market share*, which according to literature reflect true competitive advantage in any industry. A higher rank on the radar plot demonstrates high commitment level in terms of sustainability practice and shows the strategic emphasis a group of performers (low or high) place or commit to that practice. However, the researcher was on the lookout for any significant differences between the efforts of high and low performers. This will give a hint on the strategic advantage of venturing into any sustainability practice.

Of the total 177 responses, results show that 50.64% of the units achieved higher competitive advantage in the chain. Radar plots as shown on Fig. 6.4 reveal that

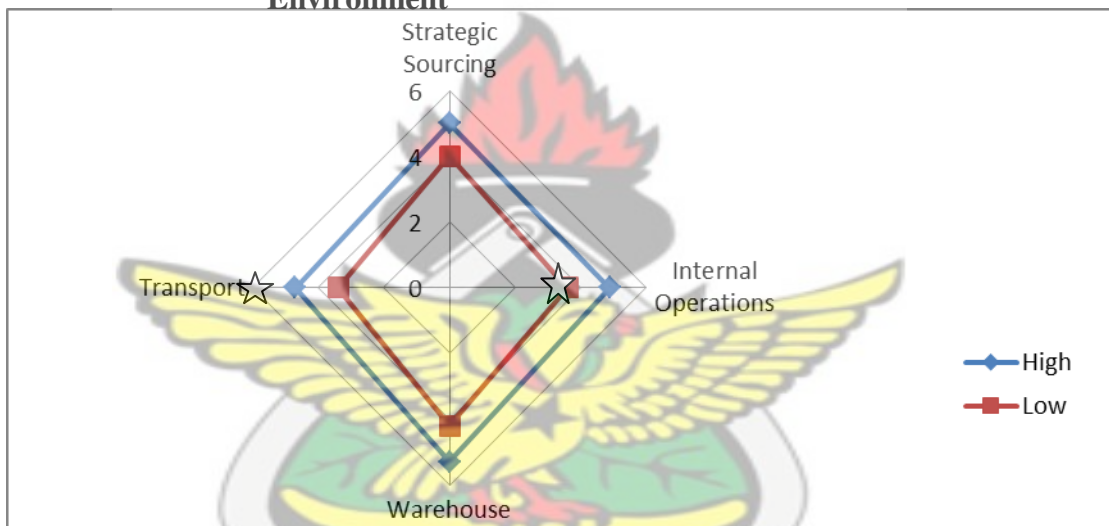
strong efforts in social sustainability practices result in high competitive advantage for units within the cocoa chain. Higher competitive entities clearly show higher commitment to social aspects than lower competitive units. Indeed, for both units, very little efforts were made in the social internal operations. This suggests that higher performing units show greater commitments in social efforts relating to strategic sourcing, warehousing and transportation. As shown on the radar plots below (shown by the stars), there are significant differences in the social efforts of the high and low competitive decision units relating to supplier selection, warehousing and transportation systems. More profitable units however show more efforts in socially responsive warehousing.

On the economic dimension of sustainability practices, the radar plot shows that economically responsible transportation dominated the activities of more profitable and competitive units. All the units however performed weakly or showed little efforts in economic strategic sourcing but invested strong efforts in economic internal operations and warehousing. On the environmental dimension, observations show that environmentally responsible transportation and internal operations dominate the activities of high competitive decision units. However, it is clear that generally all the units, both high and low performers do not show much commitment to environmental practices. Both groups of units scored very low on the environmental dimension as shown on the radar plot. It is therefore deduced that emphasis on transportation aspects is crucial to gaining competitive advantage in the cocoa chain. Indeed, it is shown that though high performers concentrated relatively more on sustainable transportation systems, efforts have been low. The same conclusion can be drawn for strategic sourcing as scores for each dimension is low.

Economic



Environment



Social

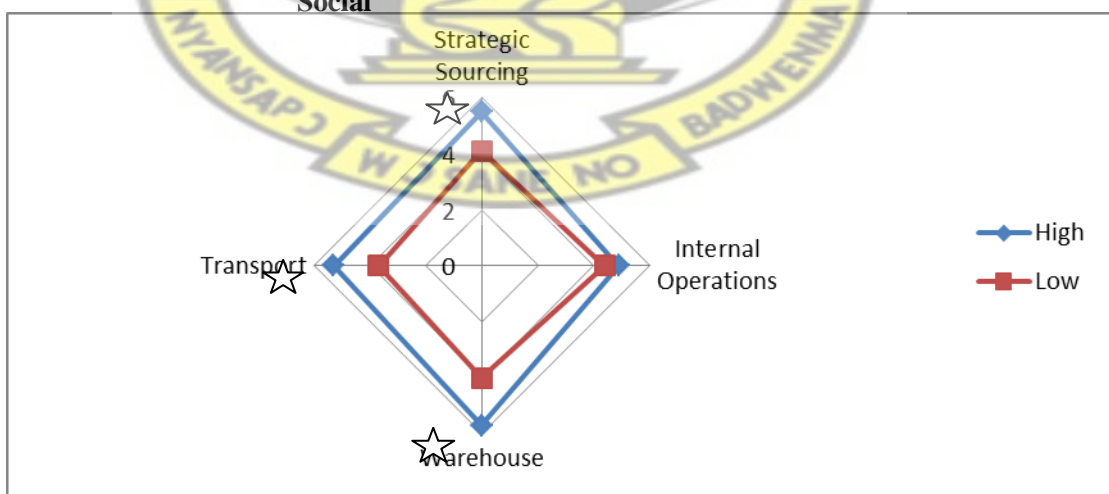


Fig. 6.4: Competitive Advantage against Sustainability Practice
Source: Author's Construct (2014)

Equally, it is also deduced that efforts are high in warehouse management and systems for all the dimensions of sustainability. This suggests that in terms of warehousing, players take holistic perspective in their approach and maintenance of systems, especially for all the high competitive and profitable units. What is significantly clear is that engaging in sustainable practices positively affects the competitive edge of units within the cocoa chain. This confirms hypothesis 5 which states that sustainable supply chain initiatives lead to the accumulation of competitive advantage to firms. Concerning the strategic advantage of sustainable initiatives in reaping steady growth in output and profits, 94% of the respondents attested that the social dimension yielded such results whilst 83% and 97% agreed that environmental and economic brought steady growth respectively; confirming hypothesis 5.

Pattern of sustainability practices among players within the cocoa chain plus the confirmation that efforts in sustainability initiatives lead to competitive advantages, the study endeavoured to investigate the type of decisive competitive advantage that practitioners of sustainability stand to earn from each dimension of sustainability. Solving this question was vital in answering hypothesis 6 – 16. As discussed earlier, competitive advantage was measured by seven (7) decisive competitive advantages including *productive efficiency, innovation capacity, reputation, operational performance, strategic capability, resource pool and market share*. Sustainability dimensions were therefore connected to these decisive advantages to examine what sort of advantage practitioners obtained. All the players within the supply chain were grouped into two (actors and non-actors) according to social, economic and environmental dimensions.

As shown on Fig. 6.5 below, engaging in sustainable initiatives of social, economic and environmental dimensions presents enormous competitive advantages to actors within the cocoa chain. This further confirms hypothesis 5 which stated that practicing sustainable initiatives leads to competitive advantage. It is also shown on Fig. 6.5 below that all the actors accrued higher benefits in all the competitive advantages than non-actors within the chain. On the variants of competitive advantage, it is observed that engaging in social initiatives resulted in benefits of strong strategic capability, resource pool, market share, as well as innovation capacity and operational performance. However, results showed a lower benefit in production efficiency; indeed this was also the case for non-actors as well. It is revealed that actors were engaged with stronger pool of resources as there were significant differences between actors and non-actors in terms of benefits from pooling of resources. This suggests that employer motivation and social responsibility demonstrated by actors within the chain will typically pool resources; both social capital and logistics towards actors. It is seen that not much difference is shown between the strategic capability gains of both actors and non-actors. Indeed, non-actors performed well in terms of reputation and operational performance.

On the economic dimension, it was demonstrated by the associated radar plot on Fig. 6.6 that engaging in economic initiatives resulted in strong gains in all the decisive competitive advantages except for production efficiency. In all the variants of competitive advantage, results show huge differences in benefits accrued by actors and non-actors except for operational performance and production efficiency. Indeed, non-actors demonstrated strong gains in both company reputation and operational performance.

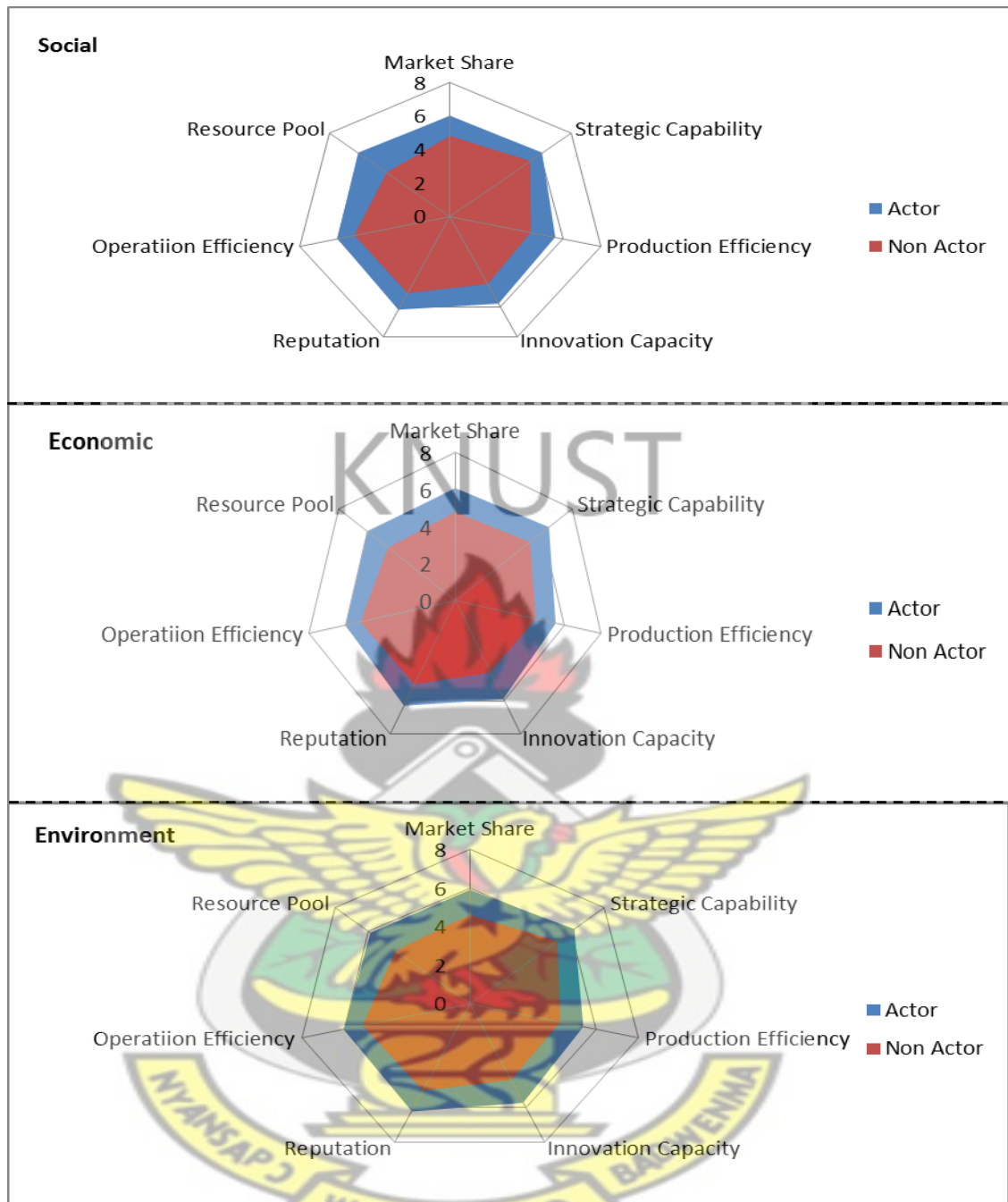


Fig. 6.5: Sustainability Practices and Competitive Advantage
Source: Author's Construct (2014)

Again, it is shown on Fig. 6.6 that engaging in economic practices ensures greater resource pool. Aside economic dimension resulting in higher innovation capacity as there were vast differences in the economic gains, actors received from resource pool and innovation capacity than non-actors. Furthermore, the results show that

environmental practices lead to higher competitive advantage than acting otherwise. For actors, such higher competitive gains came in the form of resource pool, market share and reputation. Overall there were minute distinction between the benefits both actors and non-actors received in the form of operational performance, production efficiency and strategic capability. Gains in production efficiency and innovation capacity as a result of environmental initiatives were relatively low among actors. This suggests that advancement in scientific methodology and green practices along the cocoa chain are sluggish to derive the needed innovation capacity for players within the chain.

From the results, it can also be deduced that gains in production efficiency are generally low. This means that facilities that produce less waste and use resources more efficiently to further disburse lower costs, higher quality and more stable processes are weakly available. However, the results on operational performance, company reputation and strategic capability gains that have overhauled the activities of both actors and non-actors in all spheres of sustainability practice within the cocoa chain are indicative of the fact that due to the strict quality standards set for cocoa production nationwide, actors have gained huge benefits from such undertaking. Indeed, benefits such as strategic capability are evidence to the collaborative efforts by main actors to maintain such standards at a reliable echelon. It is apparent that quality of goods and services improves brand loyalty which in turn affects long term viability. The result on production efficiency therefore supports hypothesis 6 which states that pursuing sustainable practices results in production efficiency. Though benefits to production efficiency were low, it is evident that non-actors are minor beneficiaries to this competitive advantage than actors.

Results also support the assertion that pursuing sustainable practices does not only lead to higher innovation, but pursuing each of the dimensions of sustainability will lead to improved market share confirming hypothesis 7 and 12. Hypothesis 8 is also supported with result on company reputation which states that pursuing sustainable practices improves the organizational reputation of actors within the chain. Again, hypothesis 9 is supported, suggesting that pursuing sustainable practices improves the operational performance of actors within the chain. It is also shown that strong efforts in each dimension of sustainability ensured greater gains in strategic capability supporting hypothesis 10 which states that pursuing sustainable practices improves the strategic capabilities of actors within the chain. Even so, it is evident that overall reputation increases among actors who engage in sustainable practices than non-actors. This also supports hypothesis 11 which demonstrates that pursuing sustainable practices makes focal organizations more attractive to employees.

The next task of the analysis required the researcher to confirm the results obtained through the descriptive analysis to give further validity and reliability of the study results while testing the significance of relationships that have been identified through the descriptive analysis. A correlation analysis was therefore necessitated to execute this undertaking.

6.2 CORRELATION ANALYSIS

In this section, results from the correlation analysis are presented. First, a discussion on diagnostic tests is presented, followed by a correlation matrix that explains the magnitude and direction of associations between the observed variables.

6.2.1 DIAGNOSTIC TESTS

A correlation analysis was administered to determine the strength and direction of the relationship between observed variables. This was compelled to test and examine the conceptual framework and hypotheses consequently evoked. Before the correlation analysis, preliminary tests were conducted to determine whether the data violates the assumptions of *homoscedasticity*, *linearity* and *normality*. A scatter plot (see Fig. 6.6 below) of variables was generated to present a better idea of the nature of associations between values while inspecting for *heteroscedasticity* and *linearity*.

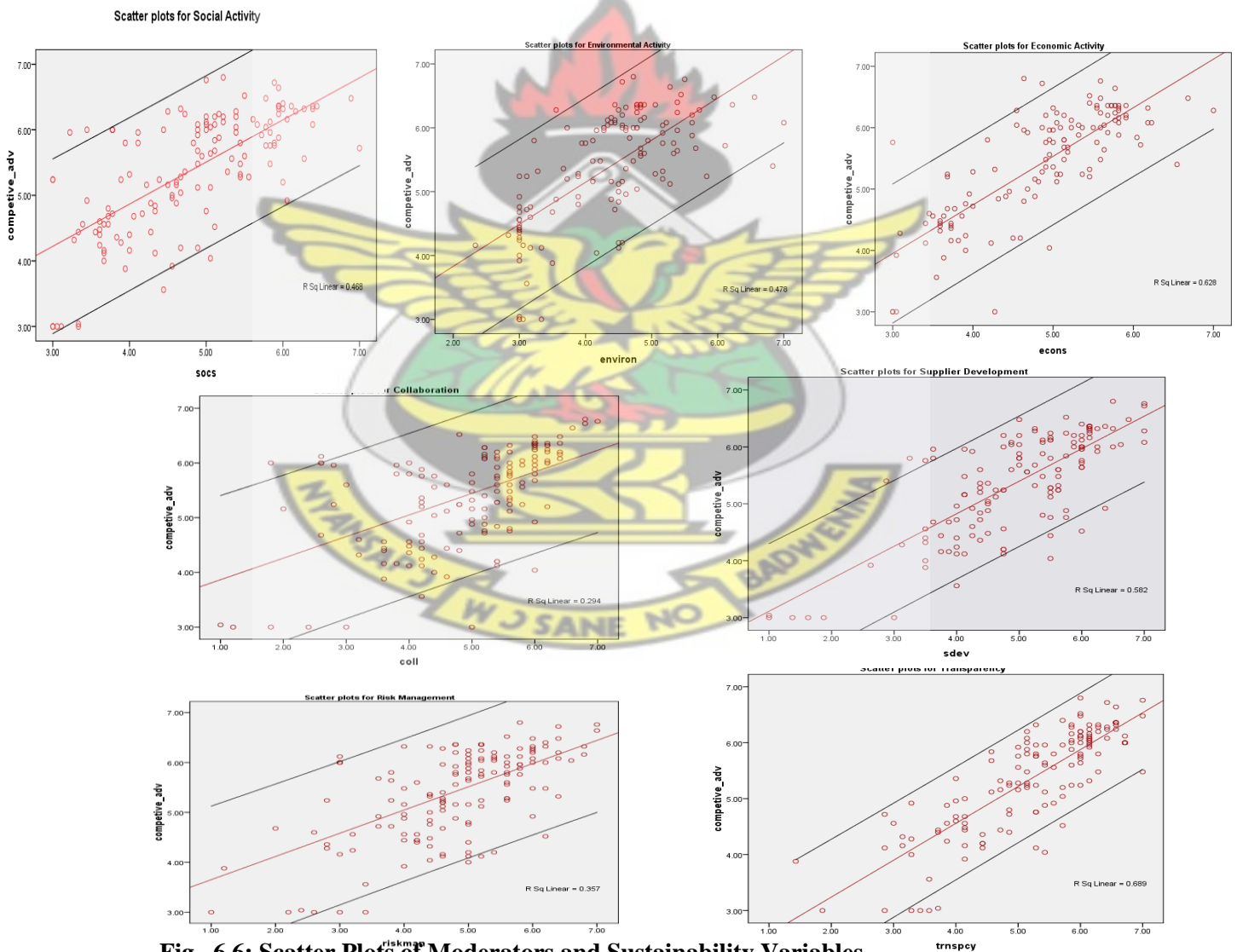


Fig. 6.6: Scatter Plots of Moderators and Sustainability Variables
Source: Author's Construct (2014)

The scatter plots showed that all the variables were fairly distributed in an upward linear pattern with the dependent variable, confirming that the assumptions of *linearity* and *normality* are not violated. Inspection of data points also show that the data points are reasonably condensed with an evenly spread from top to bottom suggesting that the assumption of *homoscedasticity* is also not violated. The displayed results therefore suggest that there is positive linear relationship between moderators and competitive advantage on one hand and sustainability and competitive advantage variable on the other hand.

6.2.2 CORRELATION MATRIX

Given the non-violation of the linearity assumption, the use of the Pearson's Product Moment Correlation was applied to calculate the magnitude and direction of associations between the observed variables. Correlation analysis was advanced in two sections. The first segment was to perform the analysis strictly to monitor how the sustainability dimensions compare with each variant of competitive advantage. This was necessary to test and confirm hypothesis 6-12. The second segment of the analysis was performed to examine the relationships between moderators, sustainability dimensions and total competitive advantage. This was necessary to test hypothesis 13-16 according to the theoretical framework. Table 6.2 below illustrates the correlation coefficients estimated between the sustainability dimensions and the variants of competitive advantage.

From Table 6.2 below, it is observed that overall, there is a positive and significant relationship between all the sustainability variables and the variants of competitive advantage. It is observed that between the sustainability dimensions and production efficiency, association is very strong and positive for the single strands or dimensions.

Table 6.2: Correlation between Sustainability Dimensions and Variants of Competitive Advantage

	PE	IN	CREP	OPER	SCAP	RPL	MS	Overall Sus	ENV	ECO	SOC	SE	SEV	EEV
PE	1													
INNO	.712**	1												
CREP	.760**	.781**	1											
OPER	.721**	.633**	.732**	1										
SCAP	.465**	.523**	.489**	.464**	1									
RPL	.658**	.623**	.677**	.566**	.359**	1								
MS	.617**	.452**	.492**	.445**	.272**	.374**	1							
Overall Sus	.507**	.532**	.552**	.452**	.287**	.630**	.330**	1						
ENV	.474**	.526**	.541**	.443**	.278**	.571**	.552**	.411**	1					
ECO	.512**	.587**	.591**	.398**	.395**	.430**	.338**	.527**	.475**	1				
SOC	.577**	.534**	.487**	.426**	.305**	.506**	.313**	.608**	.376**	.559**	1			
SE	.168	.144	.124	.048	.080	.124	.298**	.674**	-0.1	.196*	.196*	1		
SEV	.126	.095	.081	.155	.021	.099	.114	.166*	.192*	-0.10	.215**	-.092	1	
EEV	.109	.175*	.176*	.107	.326**	.140	.125	0.125	.334**	.227**	-0.07	-.103	-.107	1

Source: Author's Construct (2014)

** . Correlation is significant at the 0.01 sig. level (2-tailed).

* . Correlation is significant at the 0.05 sig. level (2-tailed).

Strongest association is found for the social dimension (0.577) explaining 57.7% (0.577*100) of production efficiency, this is followed by the economic dimension (0.512) explaining 51.2% (0.512*100). However, the results did not show any strong relationship between the integrated dimensions (two strands of sustainability) and production efficiency. Relationships were generally low (correlation coefficients were - 0.168 for integrated social and economic practice; 0.126 for integrated social and environmental practice; and 0.109) and significant. However, there was strong and positive relationship between overall sustainability (tripod dimension) and production efficiency. Results show that it explains 50.7% of total variations in production efficiency (0.507 * 100). Comparing innovation capacity, it is revealed that again, a significant and positive relationship exists between innovation capacity and sustainability dimensions with strong association existing for the single strands and overall sustainability than the integrated dimensions. Strong association existed for economic dimension with a correlation coefficient of 0.587. This is followed by the social dimension (0.534).

This suggests that increased efforts in economic and social initiatives lead to increased innovation capacity. Again, the relationship between innovation capacity and the integrated dimensions were weak with integrated social and environment practices having the weakest, explaining 0.95% (0.095 *100) of the total variation. Meanwhile observation shows that a strong relationship exists for an integrated economic and environmental dimensions and innovation capacity. In terms of reputation, represented by CREP, it is shown that all the dimensions of sustainability have a positive relationship with company reputation. For the individual dimensions, a significant positive relationship exists for economic dimension and company

reputation with a correlation coefficient of 0.591 explaining 59.1% of the total variation in reputation. This is followed by practices in environmental sustainability with an explanatory power of 54.1% (0.541×100) of the total variation in company reputation. As usual, the study did not find any significant relationship between the paired or integrated dimensions and company reputation except for paired economic and environmental initiatives. For overall sustainability, the results show a strong and positive relationship between company reputation and the tripod dimension; with 55.2% power in explaining the deviations in company reputation.

For operational performance, results suggest that all the dimensions both single, paired and triune dimensions have a positive and significant relationship with operational performance. The strongest association was shown between environmental dimension and operational performance with a correlation statistics of 0.443, followed by social dimension (0.426). Between the integrated dimensions, correlations were typically weak with paired social and economic dimensions having the weakest association with operational performance (0.048). Similarly, an overall positive relationship was found between strategic capacity and the dimensions of sustainability. Again, the weakest linkages were found between the paired dimensions and strategic capability. It is realised that social and environmental initiatives had the weakest linkage with the competitive advantage of strategic capability with a correlation statistics of 0.021. It was however found that a significant association existed between integrated economic and environmental dimensions, EEV, with a correlation coefficient of 0.326. For the single strands, it is observed that all the individual dimensions had a significant relationship with the strategic capability

variant; with the strongest association existing for economic initiatives (0.326), followed by environmental initiatives (0.305).

Examining whether the sustainability dimensions conjure resource pool advantages for actors within the cocoa chain, correlation results show that there is a direct relationship between resource pool and sustainability dimensions, with weakest linkages existing for the integrated sustainability approaches. Very significant relationships were however found for environmental initiatives (0.571) and social dimension (0.503). However results show that the tripod (overall) approach is much beneficial in reaping this benefit, with a correlation coefficient of (0.630) explaining 63% of the variations in the resource pool variable. The pattern of relationship did not change in terms of reaping market share. Results again showed that there is largely a positive relationship between market share and all the dimensions of sustainability. Again, the integrated approaches of sustainability showed weaker association power with only integrated social and economic dimensions having the strongest association among the class of integrated dimensions. Meanwhile, results show that for the single strands, relationships are all significantly positive; with environmental initiatives having the strongest linkage explaining 55.2% (0.552×100) of total deviations in market share; followed by economic dimension accounting for 33.8% (0.338×100) of total variation in market share.

Furthermore, it is shown on Table 6.2 above that there are significant cross effects between the sustainability dimensions. Social is positively and significantly linked with environmental initiatives (0.376) and economic (0.559); whereas a strong relationship exists between economic and environmental dimensions (0.475). This

confirms the assumption of a positive interactive and cross effects between the sustainability dimensions. Another interesting observation is yet revealed with results displayed on Table 6.2. It is observed that though all the sustainability dimensions are strongly correlated with one another, their integrated or paired dimensions do not affect all but only the individual dimensions which were factored into the integration. For instance, results on the paired dimension of social and economic initiatives (SE), was positively and significantly related to only social (0.196) and economic (0.196) but not environmental (-0.1). Likewise, the integrated social and environmental dimension (SEV) was positively and significantly related to only social (0.215) and environmental (0.192) but not economic (-0.1). The same pattern was observed for economic and environmental integrated dimension (EEV) which was also positively and significantly related with economic (0.227) and environmental (0.334), but not social initiative (-0.07). Meanwhile, the overall (tripod) dimension correlated strongly with the entire body of possible sustainability dimensions except for EEV which was positive but not significant.

These results confirm the assertion that there is the possibility of integration between the dimensions of sustainability but a combined or paired dimension (SE, EEV and SEV) rarely have an overall effect on sustainability except significant success in the respective dimensions which were focused upon. What is characteristically clear is that competitive advantage is positively correlated with all the dimensions of sustainability; as all the variants of competitive advantage correlated positively with sustainability measures. This confirms the observation made from the scatter plots that competitive advantage and sustainability initiatives are linearly and positively

related. As a result, further analysis of observed variables with a composite competitive advantage variable is justified as results are largely analogous.

6.2.3 RELATIONSHIP BETWEEN MODERATORS, SUSTAINABILITY & COMPETITIVE ADVANTAGE

The next episode of the correlation analysis drove towards examining the relationship between the moderators and sustainability on one hand, and moderators and competitive advantage on the other hand. The composite variable for competitive advantage was used to simplify the analysis. The variants of competitive advantage were therefore summed into one component detailing overall competitive advantage according to the results of the factor analysis. As stated earlier, summing the variants of competitive advantage into a single element was justified since the scatter plots and the first correlation analysis have proven that doing so will give similar results. Table 6.3 illustrates the correlation analysis results between the moderators and competitive advantage. Examination of the association between control variables and competitive advantage shows that competitive advantage is an increasing factor with firm size, with the number of employees (EMP) as proxy. Indeed, firm size increases significantly with all the moderators; transparency (0.592), risk management (0.301), collaboration (0.211) and supplier development (0.361). The same conclusion can be drawn for all the sustainability dimensions except for integrated social and environmental initiative which was not statistically significant.

Again, the other control variables such as the age of the firm (representing experience) and revenue (representing financial performance) also correlated positively and strongly with competitive advantage. Correlation statistics obtained are

0.613 and 0.748 respectively. Indeed, results also show that sustainability performance increases significantly with age; social initiatives (0.496), environmental (0.554), economic (0.566) and overall sustainability (0.464). The correlation results did not show, however, any strong association between age and the integrated sustainability dimensions. The same pattern of results is shown for revenue (financial performance). This suggests that sustainability boosts profitability. The result on stage which represented the flow of activities within the cocoa chain shows that competitive advantage does not only increase significantly from the farm gate downstream, with a correlation coefficient of 0.394, but that sustainability practices and performances also increase downstream. Correlation coefficient between age and social dimension was 0.261; 0.318 for economic dimension and 0.479 for environmental dimension; all being significant.

On the moderators, correlation results show that they are positively and significantly related to overall competitive advantage. The analysis reveals that transparency correlated strongly with competitive advantage (0.826), whereas association between collaboration and competitive advantage was 0.552. For risk management and supplier development, correlation coefficients were 0.613 and 0.7 respectively. Again, it is shown that all the sustainability dimensions excluding the integrated dimensions are significantly and positively related to overall competitive advantage. The analysis reveals that social, economic and environmental dimensions correlated strongly with competitive advantage, recording 0.674, 0.800 and 0.697 respectively and 0.625 for all three combined. For the integrated dimensions which did not show any significant relation with competitive advantage, the records indicate 0.166 for social and economic, 0.125 for social and environment and 0.16 for economic and environment.

This means that the decision to conduct further analysis with the composite competitive advantage was justified.

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Table 6.3: Correlation Analysis between Moderators, Sustainability and Overall Competitive Advantage

	EMP	Stage	AGE	REV	TRP	COL	SDV	RM	ECO	ENV	SOC	SE	SEV	EEV	SusD	CADV
EMP	1															
Stage	.489**	1														
AGE	.469**	.517**	1													
REV	.697**	.580**	.837**	1												
TRP	.592**	.423**	.573**	.764**	1											
COL	.211**	.296**	.480**	.646**	.490**	1										
SDV	.361**	.348**	.484**	.613**	.699**	.565**	1									
RM	.301**	.347**	.443**	.658**	.573**	.737**	.571**	1								
ECO	.496**	.318**	.566**	.775**	.761**	.556**	.761**	.593**	1							
ENV	.449**	.479**	.554**	.714**	.682**	.580**	.596**	.601**	.773**	1						
SOC	.388**	.261**	.496**	.691**	.633**	.671**	.605**	.691**	.751**	.705**	1					
SE	.158*	-0.127	0.111	.221*	0.132	0.02	0.03	0.101	.196*	-0.1	.196*	1				
SEV	0.016	.186*	0.049	0.13	0.123	.268**	.180*	.224**	-0.10	.192*	.215**	-0.09	1			
EEV	.253**	.247**	0.051	0.19	.199*	-0.06	0.14	0.075	.227**	.334**	-0.07	-0.13	-0.103	1		
SusD	.482**	.233**	.464**	.681**	.563**	.464**	.473**	.518**	.574**	.497**	.632**	.212*	.191*	0.1	1	
CADV	.587**	.394**	.613**	.748**	.826**	.552**	.700**	.613**	.800**	.697**	.674**	.166*	0.125	0.16	.625**	1

Source: Author's Construct (2014)

6.3 REGRESSION ANALYSIS

With reference to the established correlation between the observed predictors and competitive advantage, the work endeavoured to draw on multivariate regression analysis to explore the impact of the independent variables on competitive advantage. Numerous regression techniques were employed to decode how significant these independent variables impact on competitive advantage. The Generalized Linear Regression Models were exploited to draw out this undertaken. Variables were added in a hierarchical manner. The hierarchical approach was vindicated for its strength of concurrently allowing for the examination of the interaction effect between the sustainability dimensions and competitive advantage (as was earlier exposed through the correlation analysis). The Generalized Linear Regression (GLR) technique was used to explore; first, the linkage between competitive advantage and variants of sustainability. The second part entails examining the moderating effects of such drivers as *Transparency, Collaboration, Supplier Development* and *Risk Management* on the linkage between the *Sustainability Dimensions* and *Competitive Advantage*.

The validity and fitness of the model is verified using several tests including the adjusted R-Squared and F-statistics. Meanwhile, the Breusch-Pagan and Cook-Weisberg test for heteroscedasticity were used to check whether heteroscedasticity was also present in the model. Again, multicollinearity was inspected using the variance inflator factors and tolerance levels of all variables. The Akaike's Information Criterion (AIC) and the Schwarz's Bayesian Criterion (BIC) and log likelihood tests of robustness were used to check the strength of the model and to select the best model for analysis.

6.3.1 THE GENERALIZED LINEAR REGRESSION (GLR)

Two procedures are adopted in answering the research questions. The first procedure involved the general regression analysis of competitive advantage and sustainability dimensions with the moderators with variables added in a hierarchical manner. The second process involved an examination of the moderating or interacting effects of the moderators. Various analytical techniques including individual moderating effects and combined moderating effects were applied in the second section. The service of the AIC, BIC and log likelihood tests is then exploited to select the best model to be used for analysing the moderating effects.

6.3.2 GLR OF SUSTAINABILITY, MODERATORS & COMPETITIVE ADV.

The first section of the regression analysis involved estimating the singular impact of the independent variables; sustainability dimensions and moderators on the dependent variable (competitive advantage) with variables added in a hierarchical manner. Four models were constructed; **Model 1** captured the direct linkage of control variables and competitive advantage. In **Model 2**, the moderators were included in the modelling to explore their individual impact on the variation in competitive advantage. **Model 3** included the computation of the impact of single strand sustainability dimensions on the dependent variable. Hence, the single sustainability dimensions of social, economic and environmental were added to the previous variables to investigate the variations in competitive advantage. In the final section of the first procedure, **Model 4**, the interactions or paired sustainability dimensions including the overall sustainability (Tripod goal) initiative were all added to the HMR modelling. Before the regression analysis was conducted, preliminary tests were undertaken to check for homoscedasticity and the presence of multicollinearity. The collinearity diagnostics

performed on each variable confirm the absence of multicollinearity and heteroscedasticity in the data. Results of the VIF statistics are all shown below. The conditional indices were also small below 30; further indicating that multicollinearity is not present in the model. Preliminary tests show that all the models are robust. VIF statistics and Breusch-Pagan or Cook-Weisberg test for heteroscedasticity results indicate that multicollinearity and heteroscedasticity are absent in all the models.

Table 6.4: Diagnostics Tests

Diagnostics	Estimate
Akaike's Information Criterion	96.71313
Schwarz's Bayesian Criterion	127.3589
Log Likelihood	-33.35657
Breuch-Pagan/Cook Weisberg	1.20 (sig. =.2738)
Mean VIF	2.28

Source: Author's Construct (2014)

Diagnostics test show that all the variables are not collinear to each other. Mean VIFs for overall models are within acceptable range; below 10. Breuch–Pagan statistics are also not significant for all the four models. Hence, the null hypothesis which states that heteroscedasticity is not present in the model was accepted. Information criterion statistics for model fitness obtained was $AIC = 96.71313$ and $BIC = 127.389$. The ANOVA table results also confirm the robustness of the models. The F-statistics for all the models were statistically significant: [(F (2, 144) = 49.00, $p < .0005$) for model 1; (F (5, 106) = 52.02, $p < 0.000$) for model 2; (F (9, 101) = 34.95, $p < 0.000$) for model 3; and (F (14, 42) = 4.13, $p < 0.000$) for model 4] with significant overall R squares (0.405, 0.7105, 0.7569 and 0.8154 respectively). These high R squares is indicative of the explanatory power of the independent models and the general strength of the models to explain movement of competitive advantage. Examination

of the R square change 0.3055 of model 2 indicates that the moderators impact strongly on competitive advantage. The significant level of the associated F change (F change (4, 64) = 23.036, sig = 0.000) also confirms the strength of the moderators effect.

Table 6.5: Model Summary

Model Summary								
Model	R	R ²	Adj. R ²	Change Statistics				
				R Square Change	F Change	df1	df2	Sig. F Change
1	.6364	0.4050	0.3967	0.4050	49.00	2	68	.000
2	.8429	0.7105	0.6968	0.3055	23.026	4	64	.000
3	.8700	0.7569	0.7353	0.0464	4.005	3	61	.000
4	.903	0.8154	0.773	0.0424	2.095	5	56	.000

Source: Author's Construct (2014)

Furthermore, it is observed on the model summary table above that for model 3, R square change associated for 0.0464 with an F change statistics (F change (3, 61) = 4.005, sig = 0.000) is indicative of the impact of the individual sustainability dimensions on the competitive advantage. The ANOVA table also indicates that the model as a whole is significant (F (14, 56) = 4.13, $p < 0.000$).

Table 6.6: ANOVA Table Results

ANOVA						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	49.5170688	2	24.7585344	49.00	.0000 ^a
	Residual	72.7569819	68	.505256819		
	Total	122.274051	70	.837493498		
2	Regression	74.0373122	6	14.8074624	52.02	.0000 ^b
	Residual	30.1724633	64	.28464588		
	Total	104.209775	70	.938826806		
3	Regression	78.6022565	9	8.73358406	34.95	.0000 ^c
	Residual	25.2399387	61	.249900384		

	Total	103.842195	70	.944019957		
4	Regression	14.815299	14	1.05823565	4.13	.0000 ^d
	Residual	10.7572508	56	.256125019		
	Total	25.5725498	70	.456652675		

Source: Author's Construct (2014)

- a. Predictors: (Constant), Age of Business, Stage
- b. Predictors: (Constant), Age of Business, Stage, Economic, Environmental, Social
- c. Predictors: (Constant), Age of Business, Stage, Economic, Environmental, Social, Economic_Social, Economic_Environmental, Social_Environmental, Overall (Tripod) Sustainability
- d. Predictors: (Constant), Age of Business, Stage, Transparency, Collaboration, Supplier Development, Risk Management, Economic, Environmental, Social, Economic_Social, Economic_Environmental, Social_Environmental, Overall (Tripod) Sustainability

The results of the hierarchical regression analysis are presented in Table 6.7 below. As exemplified on the table, Model 1 demonstrates the effect of the control variables on the dependent variable. Results show that the age of the business (representing experience) and the stage of the unit within the cocoa chain have a significant impact on competitive advantage. Estimated coefficients were 0.560 (Sig. =0.000) and 0.1399 (sig. =0.021) respectively. This result confirms the assertion that competitive advantage is an increasing factor to the experience and the activity engaged by units within the cocoa chain, as was revealed in the correlation analysis. In Model 2, the moderators were sequentially added to the control variables and the variations in competitive advantage observed.

Here, it was revealed again that the age of business still has a significant impact on competitive advantage. The estimated coefficient for age was 0.1873 (sig. = 0.016). Meanwhile the estimate for stage of unit was positive but insignificant (0.0864; sig. = 0.135). This implies that competitive advantage ceases to be a factor dependent on activity if the drivers of transparency, supply chain collaboration, supplier development and risk management are enhanced by the units within the cocoa chain. Results on the drivers or moderators show that all the moderators individually have a

strong effect on competitive advantage. Standardized coefficients show that transparency has a stronger effect (0.514), followed by supplier development (0.214) and then risk management (0.101)). The effect of collaboration on competitive advantage as indicated by the standardized coefficient was small (0.032) though it was significant. Model 3 depicted the inclusion of the singular sustainability initiatives to the modelling. It is observed that the significant effect of the moderators on the competitive advantage did not change except risk management which was positive but insignificant with an estimated coefficient of $B = 0.0343$; $p > 0.05$. Meanwhile all the singular dimensions of sustainability had a positive effect on sustainability; however it was only the social dimension which had a strong effect on competitive advantage. Results obtained for social initiatives were $B = 0.3015$; $\text{sig.} = 0.025$.

This confirms the assertion that focusing on a single strand of sustainability may not effectively impact on competitive advantage. In the last model, model 4; which combines all the variables, it is observed that indeed some producer specific characteristics such as the age of business ($B = 0.1944$; $\text{sig.} = 0.024$) significantly influence competitive advantage. Furthermore, it is shown that transparency ($B = 0.3086$, $\text{sig.} = 0.000$), collaboration ($B = 5.036$; $\text{sig.} = 0.076$), and supplier development ($B = 0.0949$; $\text{sig.} = 0.053$); all have a significant impact on competitive advantage. The results therefore confirm the need for transparency, collaboration and supplier development in the activities of players within the cocoa chain. On the sustainability dimensions, results demonstrate that indeed all the initiatives whether single or integrated have a positive effect on competitive advantage; however it is the

overall sustainability goal that yields significant impact or dividends on competitive advantage.

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Table 6.7 Hierarchical Regression Analysis Results

Model		Unstandardized Coefficients		Standardiz	T	Sig.	Collinearity Stats	
		B	Std. Error	B			Tolerance	VIF
1	(Constant)	2.670748	.2835252		9.42	0.000		
	AGE OF BUSINESS	.5260206	.0759093	.532	6.93	0.000	0.720572	1.39
	STAGE IN COCOA CHAIN	.139918	.059835	.143	2.34	0.021	0.720572	1.39
2	(Constant)	1.116246	.277506		4.02	0.000		
	AGE OF BUSINESS	.1873177	.0768531	.150	2.44	0.016	1.99	0.50369
	STAGE IN COCOA CHAIN	.0864795	.0574339	.002	1.51	0.135	1.71	0.58362
	TRANSPARENCY	.3729541	0.064109	.514	5.82	0.000	2.64	0.37884
	COLLABORATION	3.213583	1.786822	.032	1.80	0.074	4.12	0.24247
	SUPPLIER DEV'T	.1416423	0.044734	.214	3.17	0.002	3.78	0.26434
	RISK MANAGEMENT	.1036188	0.057278	.101	1.81	0.073	2.36	0.42399
3	(Constant)	1.499437	.3141197		4.77	0.000		
	AGE OF BUSINESS	.2066954	.0749937	.134	2.76	0.007	2.14	0.46756
	STAGE IN COCOA CHAIN	.0614978	.0559441	.034	1.10	0.274	1.85	0.54109
	TRANSPARENCY	0.3222964	0.083609	.375	3.85	0.000	3.88	0.25754
	COLLABORATION	4.796695	2.837924	.037	1.69	0.094	4.78	0.20933
	SUPPLIER DEV'T	0.1017688	0.047691	.189	2.13	0.035	5.11	0.19574
	RISK MANAGEMENT	0.0343242	0.062666	.051	0.55	0.585	1.15	0.86756
	SOCIAL	0.3015332	0.132832	.103	2.27	0.025	1.22	0.81955
	ECONOMIC	0.0693399	0.146671	.154	0.47	0.637	1.60	0.62651
	ENVIRONMENTAL	0.1081163	0.126012	.035	0.86	0.393	1.99	0.50369
4	(Constant)	1.827929	.3812		4.80	0.000		
	AGE OF BUSINESS	.1943765	.084633	.096	2.30	0.024	2.89	0.34621
	STAGE IN COCOA CHAIN	.0711599	.1050348	.048	0.68	0.502	2.04	0.48933
	TRANSPARENCY	0.308614	0.0838059	.360	3.68	0.000	3.17	0.31517
	COLLABORATION	5.036006	2.807749	.023	1.79	0.076	6.27	0.15955
	SUPPLIER DEV'T	0.094963	0.0483624	.199	1.96	0.053	3.72	0.26875
	RISK MANAGEMENT	0.007101	0.0626613	.024	0.11	0.91	1.84	0.54370
	SOCIAL	0.1535157	0.090168	.048	1.71	0.08	2.91	0.34393
	ECONOMIC	0.219935	0.2213747	.101	0.99	0.323	1.56	0.64044
	ENVIRONMENTAL	0.032954	0.1637131	.053	0.2	0.841	2.24	0.44580
	OVERALL SUSTAINABILITY	.315997	.1615333	.165	1.96	0.057	4.40	0.22715
	ECONOMIC_ENVIRONMENTAL	0.095454	0.1174475	.009	0.81	0.419	2.99	0.33493
	SOCIAL_ENVIRONMENTAL	0.686151	0.4211202	.004	1.63	0.107	2.35	0.42598
	SOCIAL_ECONOMIC	0.182854	0.3406453	.042	0.54	0.593	2.65	0.37698

Source: Author's Construct (2014)

The estimate for the overall sustainability was $B = 0.315997$; significant at $p < 0.10$. Meanwhile, the social initiatives results show that $B = 0.0961$, sig. = 0.533 whilst economic and environmental had $B = 0.2199$ sig. = 0.323 and $B = 0.0329$, sig. = 0.841 respectively. Likewise, all the integrated initiatives also achieved insignificant results confirming the assertion that engaging in a triune initiative yield best results. The results on the standardized coefficients show how the degree of effect or important the variables are to explaining the variations in competitive advantage. Focusing on model 4, which details the full model (all the variables), it is seen among the factors that have a large effect on competitive advantage include transparency (0.360) and supplier development (0.199). These are then followed by such important factors as overall sustainability (0.165) and then social initiatives (0.048).

This result supports the hypothesis that engaging in overall sustainability provokes more competitive advantage than a single sustainability strand. It is also revealed that social initiatives have significant effect on competitive advantage though its impact may be small compared to engaging in overall sustainability activities. Concerning the standardized coefficients of economic dimension (0.101) and environmental (0.053), it is shown on the same model - model 4, that though their effects may be large, their effects are not significant.

The next section of this study which is the second procedure of the analysis is to conduct analysis of the moderating effect on the linkage between sustainability dimensions and competitive advantage. This is relevant to test the hypothesis and examine how valid the conceptual framework is.

6.3.3 MODERATING EFFECTS

The second part of the regression analysis entails an examination of the moderating effects of transparency, collaboration, supplier development and risk management on the linkage between sustainability dimensions and competitive advantage. Analysis is conducted utilising various models (5 different models) to examine the variance explained in competitive advantage; and hence provided results for the examination of the hypothesized constructs. The first four forms (1-4) comprised finding the individual analysis of the moderators with the last model - model 5, comprising a combined analysis of all the moderators put together. The advantage with this procedure was to examine how consistent results are. The first model, model 1, was used to test the moderating effect of transparency on the relationship between the sustainability dimensions and competitive advantage. In model 2, the study attempted to estimate the incremental variance explained with such a factor like collaboration included in the model. Its interaction effect with sustainability which details the moderating effect was then examined. Model 3 was then formulated to consider how the development of suppliers moderates the linkage between sustainability and competitive advantage. This therefore led to the examination of interaction effect of risk management and sustainability on competitive advantage; which was also computed in model 4. The fifth and last model, model 5, endeavoured to put all the moderators together to estimate the incremental variance explained. It was performed for the purposes of checking how consistent the results are while examining the best way to conduct analysis using the information criterion statistics.

Preliminary tests were performed for all the models to examine how robust each model was in explaining total variations in competitive advantage. Results indicate

that all the models were largely robust for analysis. The Mean VIFs for all the models were within acceptable range, below the statistical value of 10; indicative of the fact that all the variables are not collinear to each other.

Table 6.8: Model Fitness					
Statistics	Model 1	Model 2	Model 3	Model 4	Model 5
△R squared	.043	0.011	0.033	0.027	0.024
R squared	.807	.798	.800	.803	.894
Adjusted R squared	.772	.761	.763	.768	.821
F statistic	23.093 (sig. = 0.000)	21.983 (sig. = 0.0003)	21.858 (sig. = 0.000)	22.594 (sig. = 0.000)	12.15 (sig. = .000)
AIC	149.5544	87.29134	144.3669	150.1763	140.7977
BIC	204.6789	129.06	199.2844	205.3007	250.6328
Breuch-Pagan/ Cook Weisberg	5.20 (sig. =.738)	2.24 (sig. =.325)	6.90 (sig. =.599)	9.87 (sig. =.782)	8.11 (sig. =.119)
Mean VIF	4.99	5.31	5.79	6.53	4.23

Source: Author's Construct (2014)

Breuch – Pagan statistics were also not significant for each of the models. Hence the null hypothesis which states that heteroscedasticity is not present in the model was accepted. The F-statistics for all the models were also statistically significant confirming the general robustness of all the models. The hierarchical regression results of estimating all the five equations (5) are summarized in Table 6.9 below.

Table 6.9: Regression Results					
Variables	Model 1	Model 2	Model 3	Model 4	Model 5
(Constant)	2.462*** (.356)	2.551*** (.329)	2.483*** (.314)	2.498*** (.323)	3.733*** (.073)
Age of Firm	.126 (.082)	.103 (.065)	.090 (.066)	.140** (.068)	0.263*** (.10)
Stage in chain	.023 (.045)	.027 (.044)	.002 (.047)	.030 (.045)	0.066 (.066)
Transparency	.456*** (.108)	.263*** (.066)	.220*** (.072)	.273*** (.068)	.924*** (.214)
Risk Management	.013 (.068)	.004 (.058)	.004 (.058)	-.057 (.074)	3.201 (3.951)
Collaboration	.168 ***(.060)	.853 ***(.627)	.152 ***(.056)	.593 ***(.154)	0.158* (.083)
Supplier Devt	.049 (.086)	.170*** (.062)	.249** (.097)	.162 *** (.060)	0.371 *** (.155)
Social	.352* (.212)	.277** (.139)	.607*** (.312)	.273 ***(.043)	0.898* (.559)
Economic	.031 (.266)	.223*** (.028)	.112 (.262)	.057 (.225)	0.206 (.385)
Environment	.044 (.158)	.045 (.169)	.095 (.165)	.052 (.168)	0.011 (.227)
Overall Sust.	.829*** (.017)	.473*** (.268)	1.515** (.725)	.630*** (.503)	6.72** (2.889)
Social_Economic	1.939* (1.102)	.141 (.970)	.645 (1.001)	1.419 (.327)	3.871 (6.254)
Social_Env't	1.754 (2.77)	.144 (.263)	.094 (.278)	.121 (.638)	2.605 (3.251)
Economic_Env't	.046 (.245)	.082 (.561)	.016 (.985)	1.565** (.878)	1.468*** (.1068)
Social_trans	.034* (.018)				0.292* (.175)
Economic_trans	.238*** (.024)				0.359 ***(.176)
Environment_trans	.523 ***(.016)				0.198*** (.005)
Overall sust_trans	.452 * (.347)				0.269 (.266)
Econ_env't_trans	.312 (.485)				0.302 (.232)
Social_econ_trans	.314* (.186)				0.636*** (.028)
social_env't_trans	.805*** (.553)				0.469 ***(.116)
Env't_collaboration		.023 (.191)			0.111 (.214)
Econ_collab		.007 (.019)			0.129 (.196)
Soc_collab		.016 (.017)			0.084 (.156)
Overall sust_collab		.113 *** (.047)			0.220 *** (.109)
Social_econ_coll		.016 (.192)			0.229 (.869)
Econ_Env't_coll		.023 (.109)			0.417 (.292)
Social_Env't_coll		.878 ** (.470)			1.056* (.643)
Social_supp Devt			.021 (.016)		0.472 (.152)
Econ_supp Devt			.135 **(.024)		0.164*** (.052)
Env't_supplier Devt			.030 (.020)		0.319 (.213)
Overall sust_sdev			.281** (.131)		0.219** (.111)
Econ_Env't_sdev			.003 (.174)		.139 (.508)
Soc_Econ_sdev			.141 (.941)		0.183 (.639)
Soc_Env_sdev			.441** (.256)		0.507*** (.235)
Env't_Risk				.027 (.017)	0.224** (.121)
Econ_Risk				.143** (.079)	0.122 (.219)
Social_Risk				.627*** (.318)	0.370*** (.187)
Overall Sust_risk				.363*** (.100)	0.381* (.205)
Soc_Econ_Risk				.324 (.287)	1.219 (1.310)
Econ_Env't_risk				.135 (.139)	0.148 (.210)
Soc_Env't_Risk				.079 (1.281)	0.345 (.323)

Source: Author (2014)

NOTE: * 10% significant level

** 5% significant level

*** 1% significant level

Model 1, introduces the interaction between transparency and sustainability dimensions to examine the moderating role of transparency on the relationship between sustainability and competitive advantage. Results indicate that the interaction between social initiatives and transparency (Social_Trans) is positive and significantly related to competitive advantage ($B = .034, p < 0.10$). Likewise it is found that economic initiatives and transparency interactions (Economic_trans) are also positive and significantly related to competitive advantage ($B = .238, p < 0.05$). Again, it was revealed that interactions between transparency and environmental initiatives (Environment_trans, $B = .523, p < 0.05$) on one side, and transparency and overall sustainability (Overall sust._trans, $B = .452, p < 0.10$) on the other side were all positive and significant. Further, the results show that all the transparency interactions together explain 4.3% of the variations in competitive advantage, with $p < 5\%$. This lends support to the hypothesis that transparent activities within the cocoa chain positively moderate the effectiveness of sustainability initiatives in mining overall competitive advantage.

In model 2, the interaction effects of collaboration and sustainability dimensions are examined. It is observed that though collaboration positively moderates the relationship between sustainability and competitive advantage, most of the interactions were not significant except for interactions between collaboration and overall sustainability (Overall sust_coll; $B = .113, p < 0.05$). Results show that all the collaboration interactions account for 1.1% of the total explained variations in competitive advantage, $p < 5\%$. This lends support to the supposition that collaboration moderates the positive influence of sustainability dimensions on

competitive advantage. The results of the moderating effects are shown on the table above.

In model 3, the interaction effect of supplier development and the sustainability dimensions were introduced. Results show that supplier development has a strong moderating effect on the relationship between sustainability and competitive advantage with total explained variance of 3.3% ($p < 0.05$). As shown on the table above, all the interaction effects were positive with interactions between supplier development and economic initiative (Econ_sdev, $B = .135$, $p < 0.005$) and overall sustainability and supplier development interactions (Overall sust_sdev, $B = .281$, $p < 0.05$) having significant moderating effects. This means that supplier development positively and significantly moderates the impact of economic initiatives and overall sustainability activities on competitive advantage. The results of the combined model (Model 5) further implied that the coefficients of the interaction variables that were significant in the partial models (Models 1 to 4) largely retain their magnitudes and levels of significance, adding more credence to the robustness of the statistical model.

6.4 HYPOTHESES TESTING

As shown, the quantitative analysis of the work was done in three main strands in order to statistically test the study hypotheses based on the conceptual framework constructed. The first part of the work involved a descriptive analysis of the data to issue out patterns of relationships existing between the observed variables. The second part of the analysis which was done in two sections detailed the correlation analysis of the variables to examine the direction of relationships. The third part of the analysis comprised the regression results to check the moderating effects of the

drivers of supply chain management whilst also estimating the impact of sustainability dimensions on overall competitive advantage. As stated earlier, various models were used to check the consistency and reliability of the regression results.

6.4.1 HYPOTHESES ON CROSS EFFECTS

In all, 16 hypotheses were raised based on the conceptual framework. Some interesting observations were made after all the analyses were conducted. Foremost, it is revealed that sustainability dimensions have a strong integrating or cross effects. Correlation results showed that social and environmental dimensions were positively and significantly related ($R = .705$; $p < 0.05$) supporting **hypothesis 1** which states that there is a positive cross effect between social and environmental dimensions of sustainability. This suggests that social initiatives aside its direct social impact carry environmental effects that augment environmental efforts undertaken to improve environmental performance of the supply chain; likewise, environmental initiatives aside their direct environmental impact transmit social effects that augment social efforts undertaken to improve social performance of the supply chain.

The same conclusion was drawn between social and economic dimensions. Correlation coefficient between social and economic dimensions was very high and significant ($R = .751$, $p < 0.05$). This demonstrates that social initiatives aside its direct social impact carry economic impacts that augments economic efforts undertaken to improve financial performance of the supply chain and vice versa; supporting **hypothesis 2** which states that there is a positive cross effect between social and economic dimensions of sustainability. On economic and environmental dimensions, again, correlation coefficient was not only positive but significantly high

($R = 0.773$, $p < 0.05$); illustrating that each dimension accounts for 77.3% of explained variance in the other. With this result, **hypothesis 3** is also supported which presents that there is a positive cross effect between environmental and economic dimensions of sustainability. Hence, environmental initiatives aside their direct environmental impact carry economic bearing that augments economic efforts undertaken to improve financial performance of the supply chain. The reverse also holds.

6.4.2 HYPOTHESES ON RELATIONSHIP COMPETITIVE ADVANTAGE

Focusing on the impact of the dimensions to competitive advantage, the series of results confirmed the importance of sustainability dimensions to reaping vital competitive gains to players. For instance, in the descriptive analysis, it is shown that players that engage higher efforts in sustainability dimensions of social, environmental and economic (actors) reaped higher gains in all the seven (7) variants of competitive advantage than those which did not inject much efforts in sustainable initiatives (non-actors). This observation was confirmed in the first correlation analysis which considered the individual variants of competitive advantage. It is explicitly revealed that there is a significant positive relationship between production efficiency and economic dimension. Correlation coefficient estimated was high and significant ($R = .512$, $p < 0.01$); supporting **hypothesis 6a** which states that economic dimension is positively related to competitive advantage of production efficiency. **Hypothesis 6b** which suggests that social dimension is positively related to competitive advantage of production efficiency is also supported with the result on social dimension ($R = .577$; $p < 0.01$). Meanwhile, **hypothesis 6c** which suggests that environmental dimension is positively related to competitive advantage of production efficiency is also supported with the result on environmental dimension ($R = .474$; $p <$

0.01). With these hypotheses supported it is clear that all the sustainability dimensions command higher production efficiency to players in the cocoa chain. **Hypothesis 6**, which contends that all the dimensions of sustainability correlates positively with production efficiency therefore holds.

On whether engaging in sustainability initiatives connotes improved innovation capacity, it was exposed that the correlation coefficient was high and significant for economic dimension ($R = .587, p < 0.01$); supporting **hypothesis 7a**, which states that economic dimension is positively related to competitive advantage of innovation capacity. The same result was obtained for social dimension with a high and significant correlation coefficient between social dimension and innovation capacity ($R = .534; p < 0.01$); supporting **Hypothesis 7b** which suggests that social dimension is positively related to competitive advantage of innovation capacity. Meanwhile, **hypothesis 7c** which suggests that environmental dimension is positively related to competitive advantage of innovation capacity is also supported. Correlation results show that environmental dimension is positively and significantly related to innovation capacity ($R = .526; p < 0.01$). With these hypotheses supported, it is clear that all the sustainability dimensions command higher innovation capacity to players in the cocoa chain. **Hypothesis 7**, which contends that all the dimensions of sustainability correlate positively with innovation capacity, therefore holds.

Similarly, it was uncovered that there is a positive relationship between economic dimension and company's reputation. The correlation coefficient was high and significant ($R = .591, p < 0.01$); supporting **hypothesis 8a** which states that economic dimension is positively related to competitive advantage of reputation. Again,

correlation coefficient between social dimension and reputation was found to be positively high and significant ($R = .487$; $p < 0.01$) supporting **hypothesis 8b** which suggests that social dimension is positively related to competitive advantage of reputation. **Hypothesis 8c** is also supported which suggests that environmental dimension is positively related to competitive advantage of reputation. A significantly high and positive correlation result ($R = .541$; $p < 0.01$) confirms this conclusion. With these hypotheses supported, it is clear that engaging in sustainability dimensions builds the reputation of players in the cocoa chain. **Hypothesis 8**, which asserts that pursuing sustainable practices builds the reputation of actors in the chain therefore holds.

Concerning operational performance, one main hypothesis with three surrogate hypotheses were evoked; hypothesis 9, 9a, 9b and 9c. **Hypothesis 9a** which states that economic dimension is positively related to competitive advantage of operational performance is favourably supported. The correlation coefficient between economic dimension and operational performance ($R = .398$; $p < 0.01$) estimated was positive and significant. The same result was obtained for social dimension with a high and significant correlation coefficient between social dimension and operational performance ($R = .426$; $p < 0.01$); supporting **Hypothesis 9b** which suggests that social dimension is positively related to competitive advantage of operational performance. **Hypothesis 9c** which suggests that environmental dimension is positively related to competitive advantage of operational performance is also supported. Correlation results show that environmental dimension is positively and significantly related to operational performance ($R = .443$; $p < 0.01$). With these hypotheses supported, it is clear that all the sustainability dimensions result in

improved operational performance in the cocoa chain. **Hypothesis 9**, which argues that pursuing sustainable practices improves the operational performance of actors within the chain, is therefore supported.

Furthermore, on strategic capability, it was revealed that economic dimension positively impinges on strategic capability with the correlation coefficient $R = .395$, $p < 0.01$. This supports **hypothesis 10a** which states that economic dimension is positively related to competitive advantage of strategic capability. **Hypothesis 10b** which suggests that social dimension is positively related to competitive advantage of strategic capability is also supported with the result on social dimension ($R = .305$; $p < 0.01$). Concerning the estimated relationship between environmental dimension and operational performance, it is observed that the correlation coefficient ($R = .278$; $p < 0.01$) was positive and significant at less than 1%. This therefore supports the claim in **hypothesis 10c** which suggests that environmental dimension is positively related to competitive advantage of operational performance. It can therefore be concluded that pursuing sustainable practices improves the strategic capabilities of actors within the chain as stated in **hypothesis 10**.

Equally, it was discovered that a positive relationship exists between economic dimension and resource pool. The estimated correlation coefficient was moderately high and significant ($R = .430$, $p < 0.01$); reinforcing **hypothesis 11a** which states that economic dimension is positively related to competitive advantage of resource pool. Again, correlation coefficient between social dimension and resource pool was found to be positively high and significant ($R = .506$; $p < 0.01$) corroborating **hypothesis 11b** which suggests that social dimension is positively related to competitive

advantage of resource pool. **Hypothesis 11c** is also supported, which suggests that environmental dimension is positively related to competitive advantage of resource pool. A significantly high and positive correlation result ($R = .571$; $p < 0.01$) confirms this conclusion. With these hypotheses supported, it is clear that engaging in sustainability dimensions builds the reputation of players in the cocoa chain. **Hypothesis 11**, which asserts that pursuing sustainable practices makes focal organizations more attractive to pool resources, therefore holds.

Turning on market share, results also showed again that engaging in all the dimensions of sustainability draws significant advantages to players in terms of share of the market they control. The correlation results showed that though moderate, economic dimension has a positive linkage with market share, with a correlation coefficient of $R = .338$, $p < 0.01$; supporting hypothesis 12a which states that economic dimension is positively related to competitive advantage of market share. Similarly, the correlation coefficient stipulating the degree of association between social dimensions of sustainability and market share was also positive and significant ($R = .313$; $p < 0.01$). Hence, confirming the conjecture that when the social impact of players within a supply chain; the cocoa chain for that matter, increases, it invariably results in increased market share for players. Thus hypothesis 12b was supported which insisted that social dimension is positively related to competitive advantage of market share. Last but not least, results confirmed hypothesis 12c, which also suggests that environmental dimension is positively related to competitive advantage of market share. A significantly high and positive correlation result ($R = .552$; $p < 0.01$) confirmed this conclusion. Based on the above results, it will not be invalid to conclude that a voluntary participation in sustainability dimensions will draw

increased market share for players. Hypothesis 12, which asserts that pursuing sustainable practices makes focal units obtain greater control of the market than those which do not, is therefore supported.

6.4.2 HYPOTHESIS ON ASSOCIATED IMPACT

Detecting the importance of sustainability dimensions in extracting vital variants of competitive advantage to players in the cocoa chain, the study set out to examine the sort of impact engaging in sustainability practices has on overall competitive advantage. To comprehend this, both the correlation (correlation table 2) and regression analysis (regression analysis table 1) were conducted. Centering on the economic dimension of sustainability, correlation coefficient shows a positive and significant ($R = .800$; $p < 0.01$) relationship between economic initiatives and overall competitive advantage. The combined regression results from the first regression analysis (model 4) confirm that indeed economic initiatives have a positive impact on overall competitive advantage. The estimated beta coefficient though not significant was positive ($B = 0.22$; $t = 0.90$; $p < 0.323$).

As a result, it is concluded that the economic dimension commits a positive impact on overall competitive advantage. **Hypothesis 5a** is consequently supported which states that economic dimension has a positive effect on competitive advantage. Results also support **hypothesis 5b** which states that social dimension has a positive effect on competitive advantage. First, correlation results for social initiatives and overall competitive advantage were high and significant ($R = .674$; $p < 0.01$). Additionally, the combined regression results from the first regression analysis (model 4) corroborate that indeed social initiatives have a positive effect on overall competitive

advantage. The associated beta coefficient ($B = 0.154$; $t = 1.71$; $p < 0.10$) was both positive and significant.

Pertaining to the environmental dimension of sustainability, correlation coefficient shows a positive and significant ($R = .697$; $p < 0.01$) relationship between environmental initiatives and overall competitive advantage. The combined regression results from the first regression analysis (model 4) confirm that environmental initiatives have a positive impact on overall competitive advantage. The estimated beta coefficient though not significant was positive ($B = 0.033$; $t = 0.2$; $p < 0.841$). As a result, it is concluded that the environmental dimension perpetuates a positive effect on overall competitive advantage; hence **Hypothesis 5c** which states that environmental dimension has a positive effect on competitive advantage, is supported. The results have therefore consistently proven that exploiting sustainability practices in the operations of units pays off; supporting **hypothesis 5** which insists that engaging in sustainable supply chain initiatives leads to higher competitive advantage to firms.

6.4.3 HYPOTHESIS ON BEST DIMENSIONS

The next dimension of the analysis was to examine if focusing on one strand will result in same improvement in sustainable outcome as focusing on all strands of sustainability. This examination was all the more necessary with the established overlapping or cross effect between the sustainability dimensions. To conduct these operations, paired sustainability dimensions (social and economic; social and environmental; and economic and environmental) and tripod sustainability (overall sustainability) variables were generated and consequently introduced in the analysis.

The purpose was to investigate how they impact on competitive advantage in comparison with the single strands. Firstly, correlation coefficients show that both the paired sustainability dimensions and overall sustainability are positively related with overall competitive advantage. This showed the relative importance of all the sustainability dimensions and objectives to a competitive cocoa chain. Further, the combined regression analysis from the first regression analysis (model 4) reveals that all the sustainability objectives; single, paired and tripod, have associated positive effects on competitive advantage. However it is shown that only the single strand social initiative ($B = 0.154$; $t = 1.71$; $p < 0.10$) and overall sustainability ($B = 0.316$; $t = 1.96$; $p < 0.10$) were found to have a significantly positive impact.

Again, the standardized coefficients show that among the sustainability dimensions, overall sustainability has the strongest impact on overall competitive advantage ($B = 0.165$), followed by economic practices ($B = 0.101$) even so the effect of economic practices was insignificant. The strong impact was rather observed for social initiatives with a significant standardized coefficients ($B = 0.048$); the rest of the sustainability objectives were positive but insignificant as well as having very weak effect on overall competitive advantage. These results point to the fact that engaging in the tripod objective (overall sustainability) brings best results than any form or combination of goals. Indeed, a case could be made for the fact that a unit could practice social initiatives in the cocoa chain and this will result in high performances in all dimensions with high significant progress in competitive advantage; yet results show that even so such an engagement does not compare to the kind of results a unit that engages in the tripod goal reaps. This therefore supports the assertion in **hypothesis 4**, which maintains that a tripod goal (engaging in all three dimensions of

sustainability at a goal) has a stronger impact on competitive advantage than focusing on a single strand.

Interestingly, it is shown by the standardized coefficients that engaging in single strand sustainability dimensions reap more yield than exploiting a paired or integrated sustainability objective. This is supported with the correlation results between the single strands and the paired sustainability goals. The reason for this interesting pattern can be derived from the analysis of the initial correlation analysis. Here, it was demonstrated that though all the sustainability dimensions are strongly correlated with each other, their integrated or paired dimensions does not affect all but only the individual dimensions which were factored into the integration. For instance, results on the paired dimension of social and economic initiatives were positively and significantly related to only social and economic but not environmental. Likewise, the integrated social and environmental dimension was positively and significantly related to only social and environmental but not economic. The same pattern was observed for economic and environmental integrated dimension.

6.4.4 HYPOTHESES ON MODERATING EFFECTS

The next batch of the hypotheses testing was to test the moderating effect suppositions made in **hypotheses 13-16**. Concerning transparency, results are consistently clear from the combined regression (model 4) of regression 1 that transparency has a strong positive impact on competitive advantage ($B = 0.309$, $p < 0.001$). This result is then confirmed in the moderating regression analysis. All the 5 models showed that transparency has a strong positive impact on competitive advantage. The combined regression of the moderating regression analysis (model 5)

indicated a significant parameter of $B = 0.924$, $p < 0.001$. Hence, **hypothesis 13** was supported, indicating that transparency has a positive impact on competitive advantage. Examining the moderating effect of transparency, it is shown on the moderating effect regression analysis table that transparency interactions with all the sustainability dimensions generally explain 4.3% of the variations in competitive advantage, with $p < 5\%$. This shows that transparency has a strong positive moderating effect on the linkage between sustainability and competitive advantage. Specifically, the results indicate that the interaction between social initiatives and transparency, economic initiatives and transparency, transparency and environmental initiatives and transparency and overall sustainability were all positive and significant. This lends support to **hypothesis 13a** which states that transparency positively moderates the direct linkage between sustainability dimensions and overall competitive advantage.

For risk management, it was exhibited, first, by the combined regression (model 4) of regression 1 that risk management positively impacts on overall competitive advantage, though its effect is weak ($B = 0.007$, $p > 0.10$). Even for the moderating effect regression table, it was presented that risk management though has a positive impact, its effect on variations in competitive advantage was not statistically different from zero. The positive impact however supports the claim in **hypothesis 14** that risk management positively impact on overall competitive advantage. It was therefore of interest to the study to find out whether risk management moderates the direct impact of sustainability on overall competitive advantage. An examination of the results showed that there is strong moderating effect of risk management on the effect sustainability dimensions have on competitive advantage. Results showed that

together, risk management interactions generally explained 2.7% of the variations in competitive advantage, with $p < 5\%$. Specifically, it was illustrated that risk management significantly moderates the social, economic and overall sustainability impacts on overall competitive advantage; supporting hypothesis 14a which states that risk management positively moderates the direct linkage between sustainability dimensions and overall competitive advantage.

Concerning supplier development and vendor rating, results are consistently clear from the combined regression (model 4) of regression 1 that supplier development connotes a significant positive impact on competitive advantage ($B = 0.095$, $p < 0.10$). This result is then confirmed in the moderating regression analysis. All the 5 models showed that supplier development has a strong positive impact on competitive advantage. Particularly, the combined regression of the moderating regression analysis (model 5) indicated a significant parameter of $B = 0.371$, $p < 0.001$. Hence **hypothesis 15** was supported, indicating that supplier development has a positive impact on competitive advantage. It is further shown on the moderating effect regression analysis table that all the supplier development interactions generally explained 3.3% of the variations in competitive advantage, with $p < 5\%$. This confirmed that supplier development has a strong positive moderating effect on the linkage between sustainability and competitive advantage. Specifically, the results indicated that supplier development significantly moderates the effects of economic initiatives ($B = .135$, $p < 0.005$) and overall sustainability ($B = .281$, $p < 0.05$) on overall competitive advantage. **Hypothesis 15a** is therefore supported, which states that supplier development positively moderates the direct linkage between sustainability dimensions and overall competitive advantage.

With reference to collaboration, it was revealed from the combined regression (model 4) of regression 1 that collaboration also has a strong positive impact on competitive advantage ($B = 5.036, p < 0.001$). Again, this result was confirmed in the moderating regression analysis where all the 5 models showed a strong positive impact of collaboration on competitive advantage. The combined regression of the moderating regression analysis (model 5) indicated a significant parameter of $B = 0.158, p < 0.10$. Hence, **hypothesis 16** was supported indicating that supply chain collaboration positively impact on overall competitive advantage. Probing further the moderating effect of collaboration, it was exposed on the moderating effect regression analysis table that all the collaboration interactions generally explained 1.1% of the variations in competitive advantage, with $p < 5\%$. This shows that collaboration has a strong positive moderating effect on the linkage between sustainability and competitive advantage. A significant moderating effect was found for overall sustainability ($B = 0.113; p < 0.05$). This lends support to **hypothesis 16a** which states that collaboration positively moderates the direct linkage between sustainability dimensions and overall competitive advantage.

In summary, all the sixteen (16) hypotheses evoked based on the theoretical framework and theory were supported.

CHAPTER SEVEN

QUANTITATIVE DATA DISCUSSION

7.0 INTRODUCTION

The current chapter presents a discussion of the results from the quantitative data analysis. The discussion is presented in five major parts. The **first** part presents a discussion of the SCM Phases; *purchasing, internal operations, warehousing and outbound* transportation that are prioritized by the players in the cocoa supply chain and as they relate to the three major pillars of sustainability; *social, economic and environment*. This part also discusses the observed variations among the major players in the implementation of their sustainable strategies.

The **second** part is on a discussion of the possible cross effects that exist among the three major dimensions of sustainability. The **third** part presents a discussion of how engagement in sustainable practices drives performance of the chain players. The **forth** part examines whether focusing on one strand of sustainability would result in the same improvement in sustainable outcome as focusing on all strands of sustainability. The **fifth** and last part of this chapter, assesses whether supply chain improvement programmes play any moderating role in the linkage between sustainable supply chain practices and the performance of players in the cocoa chain.

7.1 SUPPLY CHAIN PHASES EMPHASIZED BY PLAYERS

The data analysis in the previous chapter reveals an interesting summary of the characteristics of the observed variables, especially concerning the relevant phases of supply chain management that players within the cocoa supply chain concentrate on

in terms of activities towards sustainability. It was generally observed that high variation exists in terms of the aspects that players emphasized to arrive at a sustainable supply chain.

7.1.1 KEY ASPECTS OF THE SOCIAL DIMENSION

Evidence from the study indicates that in the upstream, farmers are engaged in tackling mainly the internal operations of social sustainability. The study also revealed the poor nature of the warehousing, transportation and strategic sourcing functions, suggesting that working conditions and capacity building of cocoa workers at the farm level are very poor. Even for the internal operations which had the highest score, it was only slightly higher than the average score and thus indicative of a weak performance. The study revealed that generally, the performance of the farmers was weak on social efforts and were thus the worst performers as compared to the other actors within the chain. This is in spite of the view that, sustainable supply chain requires that the social capital be managed well if an organisation looks forward to long-term profitability. This is not surprising to note, in the sense that interviews with the farmers revealed that most of them did not attach much importance to the social needs of their employees. It was also uncovered that most of these farmers were small holders and with no permanent workforce. There were only a few instances where the farmers employed casual labourers for clearing their lands. For such labourers, they were paid wages on daily basis, implying that the fulfilment of other important social needs were not of relevance to the farmers. For the farmers, the internal operations, which is the cultivation period was the most important, hence, a relatively higher efforts in its management.

Most of these farmers also rely extensively on friends to help in other supply chain activities. For example, the interview conducted with the farmers revealed that, most farmers transported the cocoa themselves from the farmland to their warehouses in their homes, usually with the help of their families and friends without any standard payment structure for rewarding their labour. Cocoa farmers operated on subsistent basis with no formal workers and with no clear social policies for any labour employed. At the strategic sourcing phase of their supply chain, the interviews revealed that, the most determinant of the purchase decision was availability of the cocoa pods, especially from the Agric Division of the COCOBOD. They scarcely cared about the social responsibility of the division which they considered to be out of their business. Not only that, the power was highly concentrated at the supplier end to an extent that considering the supplier's responsibility towards its employee welfare in the purchase decision would seem somewhat irrational to these farmers.

In the middle stream of the chain however, players gave prime attention to social issues for all the aspects of the supply chain. In terms of emphasis placed on social aspects of the supply chain by PCs, it was uncovered that much focus is extensively placed on selecting suppliers who commit more efforts in the social needs of their employees, followed by warehousing, internal operations and transportation activities respectively in order of priority. This result is quite impressive and an indication of a good sustainable practice. There is however more room for improvement.

For the LBCs, in terms of social sustainability, the findings show that equal importance is placed on strategic sourcing, warehousing and transportation. However their efforts towards working conditions were found to be among the least within the

cocoa chain. Results show that, LBCs scored an average of 1.9 out of 7; which was the lowest score in terms of scores of socially responsible internal operations among the practitioners. This implies that, LBCs need to put in more efforts towards strengthening their efforts in their social performance within their internal operations. At the very downstream section of the chain, it was revealed that emphasis is placed on internal operations by the CMC; followed by the selection of suppliers. Transportation and warehousing were found to be the least emphasized. In order to spur current productivity level, the CMC must increase their efforts in all supply chain phases.

Generally, in terms of emphasis on strategic sourcing, PCs were first, LBCs second, the CMC placed third and farmers had the weakest score. On socially responsible internal operations, results show that again, PCs placed much emphasis on this factor, followed by the Government. The LBCs had the least score. This suggests that socially responsible internal operations are not of relevant importance to the average LBC. However they placed much importance to warehousing. This was equal to the standard placed on the same factor by PCs. Farmers had the least score within the chain. This therefore suggests that working conditions and capacity building of workers in terms of storage of cocoa at the farm level is very poor. On the transportation aspects of social activities, it was shown that the LBCs had a higher score; followed by PCs. Again, farmers had the lowest within the chain.

The above results clearly show that the commitment level of the cocoa players towards sustainable social initiatives is lower than average, and thus, calls for quick and stringent measures. What makes it particularly crucial is the fact that social efforts

at the very beginning of the chain are weak. This calls for strategic realignment to improve the performance at the farmer stage, otherwise, all efforts at the downstream would be fruitless in the long-run.

7.1.2 KEY ASPECTS OF THE ENVIRONMENTAL DIMENSION

Observation shows that generally, emphasis on the environmental dimension is low among practitioners within the cocoa chain. The least performance was found among farmers whilst the LBCs and PCs performed relatively better respectively. This is indicative of the fact that very little attention is given to green practices within the cocoa chain. It is shown however that activities increase downstream with much concentration at the middle tiers of the chain.

At the upstream section of the chain, findings indicate that farmers performed fairly poor. High emphasis on the other hand was placed on warehousing, followed by strategic sourcing. At the middle of the chain, it is revealed that the PCs placed much emphasis on warehousing, followed closely by internal operations. Though low, transportation and strategic sourcing were also very close. In the case of LBCs, results showed that much effort was geared towards eco-friendly internal operations. The score of 5.86 was found to be the highest within the entire chain. At the downstream, the CMC placed much premium on warehousing, followed closely by internal operations.

Generally in terms of strategic sourcing, LBCs and PCs obtained the highest scores. Much difference was not found between farmers and the CMC as they both assumed a low score. For internal operations, it was generally found that again, farmers

performed poorly; their score was the lowest along the chain. LBCs and PCs however placed highest emphases on this factor. In terms of eco-friendly warehousing, PCs recorded the higher score followed by the CMC. This was to be expected since the PCs were largely responsible and indeed mainly bore all the costs of bad cocoa beans at the middle stream of the supply chain. They are unable to transfer such losses to their mother organisations (LBCs), hence it is expected that they will place much premium on how the cocoa beans are kept and bagged for transfer downstream the chain. The same risks are faced by the CMC; due to strict international standards and the objective to maintain international reputation of premium quality cocoa.

Concerning transportation, it was revealed that PCs had the highest score. Then again, the performance of the farmers being weak does strongly question the sustainability of the cocoa chain. It is argued that the farm level has the strongest environmental impact, especially at the internal operations, and so such a performance points to the fact that the yield that the country aspires to attain in the future may be very difficult to attain, if not impossible. This is to be expected, especially so that farmers complain of poor livelihood; the pressure to meet basic needs would strongly under-prioritize sustainable environmental practices. Stakeholders thus need to increase their efforts in educating these farmers on green practices towards a sustainable cocoa production.

7.1.3 KEY ASPECTS OF THE ECONOMIC DIMENSION

Observation shows that generally, emphasis on the economic dimension was moderately high among practitioners within the chain. The least performance was found to be farmers whilst PCs and LBCs performed relatively better. This is indicative of the fact that much attention is given to reaping economic benefits among

the chain players. Indeed, the economic pillar of sustainability is the most focused in most industrialized markets. It is shown however that activities increase downstream with much concentration at the middle tiers of the chain. At the upstream section of the chain, findings indicate that at the farm level, farmers are focused more on the selection of suppliers and warehousing. The score on supplier selection by farmers suggest that they are primarily occupied by finding supplies that are less costly and whose products are noted for producing good outputs and yield.

At the middle stream, results exhibit that PCs place high emphasis on warehousing, internal operations and the selection of suppliers; with the greatest effort geared towards internal operations. This focus is similar to LBCs' performance relative to internal operations. However, LBCs placed much emphasis on internal operations than supplier selection, opposite to the PCs who placed more emphasis on supplier selection. At the downstream level, internal operations and transportation had much focus. The CMC did not place as much attention on supplier selection and warehousing.

On the economic dimension of sustainability, it was generally observed that PCs and farmers placed more attention to the strategic sourcing phase. At the internal operations level, PCs and LBCs scored the highest while farmers had the weak performance. In the case of warehousing, again PCs and LBCs were the highest performers and farmers recorded the lowest score. On transportation activities the CMC placed much emphasis while farmers recorded a very low score. While the commitment of players towards sustainable economic practices was the highest among all three pillars of sustainability, the general performance is still below average

and thus unsatisfactory. To boost productivity, actors must strengthen their efforts in all dimensions of sustainability.

7.1.4 PATTERN OF SUSTAINABILITY PRACTICES AMONG ACTORS

The analysis reveals some interesting patterns and variations concerning sustainable activities among players in the cocoa chain. It is observed that for most parts farmers do not engage widely in sustainable supply chain practices. They are highly involved in economic initiatives than environmental and social initiatives with much emphasis on selection of economically viable suppliers. Indeed one cannot find any clear differences in their environmental and social initiatives. Following the farmers' performance is the CMC; their efforts are invested in internal operations specifically those that border on social and economic. Though efforts are spread evenly across achieving high scores for each dimension of sustainability, the CMC performs relatively high in social and economically responsive internal operations. The best performers in the cocoa chain in terms of emphasis on sustainable practices are observed to be PCs followed by LBCs. Key efforts from the PCs are spread evenly and intensively on all the dimensions of sustainability. However it is shown that for most parts, PCs place high emphasis on socially sustainable activities with high scores in all the aspects of social sustainability practices. The most crucial social aspect focused upon is the social criteria of supplier selection followed by warehousing activities. It is also shown that emphasis is placed on economic initiatives for PCs. Except for the transportation activities PCs gave equal attention to all the aspects of the economic dimension. The LBCs on the other hand placed equal emphasis on both social and economic initiatives with greater emphasis on warehousing in both

instances. Indeed higher concentration is shown for economically responsible internal operations.

On more general terms, results show that social initiatives within the cocoa chain is of key attention to players, followed by economic dimension. Environmental initiatives were least focused. Again results confirm that least concentrated aspects are the transportation and strategic sourcing phases of the supply chain. Indeed sustainable transportation of cocoa is a major drawback within the cocoa chain.

7.2 RELATIONSHIP AMONG SUSTAINABILITY DIMENSIONS

The study also sought to find out if there exists, any cross effect among the three major dimensions of sustainability; economic, social and environment. Of the three hypotheses tested, all three were substantiated. From the results of the regression analysis, it is clear that sustainability dimensions have a strong integrating or cross effects. This suggests three major implications. First, it is informative to find that social initiatives aside their direct social impacts equally carry environmental effects that augment environmental efforts undertaken to improve environmental performance of the supply chain; likewise, environmental initiatives aside their direct environmental impacts transmit social effects that augment social efforts undertaken to improve social performance of the supply chain.

This confirms the argument made by Mefford, (2011) who demonstrates that environmental programmes do not only directly affect the environmental performance of the focal firm but also foster some social gains that promote good business operations. Indeed, it is logical for chain players to reap social benefits as they

improve their processes to reduce waste and hazards with the direct objective of improving their environmental performance. A clear example in the cocoa chain is this: a transporter who employs cleaner fuels in transporting cocoa improves its environmental performance (conservation of resources), and at the same time improves its social responsibility by not emitting hazardous waste to the community. Equally so, socially responsible practices such as community development and employee welfare would also require eradicating third party effects associated with the daily functions of the organization such as using environmentally friendly equipment, reducing wastage and wanton destruction of resources in the community or recycling of materials. All these efforts have positive impacts on the environment and these are obtained out of social initiatives.

The same conclusion was drawn between social and economic dimensions. This demonstrates that social initiatives aside their direct social impacts carry economic impacts that augment economic efforts undertaken to improve financial performance of the supply chain and vice versa. While many social activists would claim that it is irrelevant whether social efforts increase or decrease shareholder value because the firm has a moral obligation to benefit society (Clarkson 1995; Donaldson and Preston 1995; Pierlott 2004; Scherer and Smid 2000), there are still many authors like Carter and Rogers (2008) who argue that the social dimension of SSCM must be undertaken with a clear and explicit recognition of the economic goals of the firm. Thus they suggest that it is economically rational for a firm to commit resources to social initiatives only when that firm can perceive that such efforts would result in sustainable gains. This argument would seem an important consideration to profit oriented firms especially in capitalist countries. Obviously, the common question

likely to crop up is whether social efforts result in economic benefits? The result however disproves the perspective undertaken by some scholars that social initiatives are costly undertakings, in the sense that most of these authors place too much emphasis on cost to an extent that, they seem to neglect the possible economic benefits from social efforts. Of course, while the argument of these authors would seem somewhat true in the sense that engagement in social initiatives drives cost, their over-emphasis on cost usually neglects the enormous economic gains that can offset a great deal of such costs and even with a potential surplus. This argument is confirmed by Mefford (2011) who purports the possibility of reaping greater profitability and higher stock valuation due to socially responsible business practices. There are other empirical results which confirm this argument. For instance, in their study on understanding how sustainability drives profitability, Kaufmann and Carter (2010) demonstrate that firms with highest profitability show consistently higher efforts in social sustainability.

On economic and environmental dimensions, again, correlation coefficient was not only positive but significantly high illustrating that there is a positive cross effect between environmental and economic dimensions of sustainability. Hence, environmental initiatives aside their direct environmental impact carry economic bearing that augments economic efforts undertaken to improve financial performance of the supply chain. The reverse also holds. This result is equally very informative, primarily in light of the debate that boggles the attention of policy makers as to whether environmental behaviours are profit-compatible or not and so this thinking usually questions whether it pays to be green (Carter and Rogers, 2008). Indeed, acknowledging this simple fact as Hoffman and Bazerman (2005) argue, makes it

easier to convince corporations to adopt environmental initiatives that are mutually beneficial. It can thus be deduced that, players in the cocoa chain who invest in environmental initiatives stand a very high chance of reaping economic gains. This is especially relevant as current trends in the cocoa industry necessitates that players go through certification and verification as a purchase requirement, thus implying that environmental consciousness in the cocoa chain especially at the farm level can potentially drive sales at the global front, which consequently may result into increased profitability.

7.3 THE TRIPOD AND SINGLE STRAND EFFECT

The next dimension of the analysis was to examine if focusing on one strand of sustainability will result in same improvement in sustainable outcome as focusing on all strands of sustainability. This examination was all the more necessary with the established overlapping or cross effect between the sustainability dimensions as discussed above. The logic here is that, if one strand of sustainability will give the same effect as all strands, it will be economically rational to concentrate on just one aspect. Firstly, correlation coefficients showed that both the paired sustainability dimensions and overall sustainability are positively related with overall competitive advantage. This showed the relative importance of all the sustainability dimensions and objectives to a competitive cocoa chain. Further, the combined regression analysis from the first regression analysis revealed that all the sustainability objectives, single, paired and tripod have associated positive effects on competitive advantage. However it is shown that only the single strand social initiative and overall sustainability were found to have a significantly positive impact. Again, the standardized coefficients show that among the sustainability dimensions, overall

sustainability has the strongest impact on overall competitive advantage, followed by economic practices; even so the effect of economic practices was insignificant. The strong impact was rather observed for social initiatives with a significant standardized coefficients; the rest of the sustainability objectives were positive but insignificant as well as having very weak effect on overall competitive advantage.

These results point to the fact that engaging in the tripod objective (overall sustainability) brings best results than any form or combination of goals. Indeed, a case could be made for the fact that a unit could practice social initiatives in the cocoa chain and this will result in high performances in all dimensions with high significant progress in competitive advantage; yet results show that even so such an engagement does not compare to the kind of results a unit that engages in the tripod goal reaps. This therefore supports the assertion in **hypothesis 4**, which maintains that a tripod goal (engaging in all three dimensions of sustainability at a goal) has a stronger impact on competitive advantage than focusing on a single strand.

This result confirms arguments made by advocates of the triple bottom line (Carter and Rogers, 2008; Carter and Jennings, 2009). These authors argue that the highest level of economic performance will occur at the intersection of environmental, social, and economic performance and so Carter and Rogers (2008) conceptualize this assertion in a model to depict that there could only be either good or better economic gains at the intersection between any two successive strands of sustainability; meaning that the best results only lies at the intersection of the three major pillars of sustainability. “Thus, firms which attempt to simultaneously maximize performance of all three dimensions of the triple bottom line will outperform organizations that

attempt to only maximize economic performance, or companies that attempt to achieve high levels of social and environmental performances without explicit consideration of economic performance” (Carter and Rogers, 2008).

Interestingly, it is shown by the standardized coefficients that engaging in single strand sustainability dimensions reap more yield than exploiting a paired or integrated sustainability objective. This is supported by the correlation results between the single strands and the paired sustainability goals. The reason for this interesting pattern can be derived from the analysis of the initial correlation results. Here it was demonstrated that though all the sustainability dimensions are strongly correlated with each other, their integrated or paired dimensions do not affect all but only the individual dimensions which were factored into the integration. For instance results on the paired dimension of social and economic initiatives, was positively and significantly related to only social and economic but not environmental. Likewise the integrated social and environmental dimension was positively and significantly related to only social and environmental but not economic. The same pattern was observed for economic and environmental integrated dimension.

7.4 SUSTAINABLE SCM INITIATIVES AND PERFORMANCE

The study also sought to establish the relationships that exist between engagement in sustainable practices and the performance of actors in the cocoa chain. Focusing on the impact of the dimensions to competitive advantage, the series of results confirmed the importance of the sustainability dimensions in reaping vital competitive gains to players within the cocoa chain. For instance, in the descriptive analysis, it is shown that players that engage higher efforts in sustainability dimensions of social,

environmental and economic (actors) reaped higher gains in all the seven variants of competitive advantage than those which did not inject much efforts in sustainable initiatives (non-actors). This observation was confirmed in the first correlation analysis which considered the individual variants of competitive advantage.

7.4.1 PRODUCTION EFFICIENCY

On production efficiency, the analysis explicitly revealed that there is a significant positive relationship between production efficiency and economic dimension. Correlation coefficient estimated was high and significant; supporting hypothesis 6a which states that economic dimension is positively related to production efficiency. Hypothesis 6b which suggests that social dimension is positively related to production efficiency is also supported. Likewise, hypothesis 6c which suggests that environmental dimension is positively related to production efficiency is supported. Thus with these hypotheses supported, it is clear that all the sustainability dimensions command higher production efficiency to players in the cocoa chain. Hence Hypothesis 6, which contends that all the dimensions of sustainability correlate positively with production efficiency, therefore holds.

Kaufmann and Carter (2010) define production efficiency as all processes that result in the attainment of minimal inefficiency (less waste). This definition by these authors presupposes that, an operation or facility is efficient if its output is higher in relation to its inputs, conversely, lesser inputs used to generate higher output. Production efficiency thus connotes the ratio of input and outputs. This indeed presents a competitive advantage to firms in the sense that, employing lesser resources helps to reduce operational cost, hence, increased profitability at a given level of price.

Alternatively, lesser inputs imply excess capacity that can be exploited for higher productivity gains for increased sales and revenue. This is an important consideration especially in the cocoa chain where waste can easily result into reduction in the cocoa yield.

7.4.2 INNOVATION CAPACITY

On whether engaging in sustainability initiatives connotes improved innovation capacity, it was exposed that the correlation coefficient was high and significant for economic dimension; supporting hypothesis 7a which states that economic dimension is positively related to competitive advantage of innovation capacity. The same result was obtained for social dimension with a high and significant correlation coefficient between social dimension and innovation capacity; supporting Hypothesis 7b which suggests that social dimension is positively related to competitive advantage of innovation capacity. Also, hypothesis 7c which suggests that environmental dimension is positively related to competitive advantage of innovation capacity is also supported. Correlation results show that environmental dimension is positively and significantly related to innovation capacity. With these hypotheses supported, it is clear that all the sustainability dimensions command higher innovation capacity to players in the cocoa chain. Hence, Hypothesis 7, which contends that all the dimensions of sustainability correlate positively with innovation capacity, therefore holds.

This suggests that, firms that engage strongly in sustainable initiatives stand to improve their innovation and creativity as their employees are motivated to commit to learning new skills in the industry. Through this learning, they can try new processes

and work methods in order to achieve the strategic business objectives of the organization and in this vain Goh (2003) notes that many organizations have embarked on continuous learning as a strategy to stay competitive.

7.4.3 COMPANY REPUTATION

Similarly, it was uncovered that there is a positive relationship between economic dimension and the reputation of the firm. The correlation coefficient was high and significant; supporting hypothesis 8a which states that economic dimension is positively related to competitive advantage of reputation. Again, correlation coefficient between social dimension and reputation was found to be positively high and significant supporting hypothesis 8b which suggests that social dimension is positively related to competitive advantage of reputation. Hypothesis 8c is also supported which suggests that environmental dimension is positively related to competitive advantage of reputation. A significantly high and positive correlation results confirms this conclusion. With these hypotheses supported it is clear that engaging in sustainability dimensions builds the reputation of players in the cocoa chain. Hypothesis 8, which asserts that pursuing sustainable practices builds the reputation of actors in the chain, therefore holds.

Indeed, experts declare that reputation is a stakeholder's expectation of value against an organization's peers and competitors. Each stakeholder has different expectations of value. By promising and meeting expectations over time, the organization builds trust with its stakeholders and according to Kaufmann and Carter (2010), this reputation sets them on the edge above their competitors within even the same supply chain. In the same vein, when the company is noted for undertaking unethical,

environmentally dangerous and economically unacceptable ventures or policies, its reputation is soiled and this does not only drive away customers and investors from its line of operations and hence less profits, but it equally plunges the organization into myriads of reputational risks and legal risks. This is despite its quality products or pricing strategy. The issue of reputational risks is especially important to international traders in the cocoa chain, to an extent that customers downstream continuously seek that cocoa players go through certification and verification as a pre-requisite for purchases. A major issue of concern as regards the issue of reputational risk is child and forced labour, and so future purchases of cocoa can be threatened if cocoa farmers for example do not avoid such a practice.

7.4.4 OPERATIONAL PERFORMANCE

Concerning operational performance, one main hypothesis with three surrogate hypotheses were evoked; hypothesis 9, 9a, 9b and 9c. Hypothesis 9a which states that economic dimension is positively related to competitive advantage of operational performance is favourably supported. The correlation coefficient between economic dimension and operational performance estimated was positive and significant. The same result was obtained for social dimension with a high and significant correlation coefficient between social dimension and operational performance; supporting Hypothesis 9b which suggests that social dimension is positively related to competitive advantage of operational performance. Then also hypothesis 9c which suggests that environmental dimension is positively related to competitive advantage of operational performance is also supported. Correlation results show that environmental dimension is positively and significantly related to operational performance. With these hypotheses supported it is clear that all the sustainability

dimensions result in improved operational performance in the cocoa chain. Hypothesis 9, which argues that pursuing sustainable practices improves the operational performance of actors within the chain, is therefore supported.

Indeed, Kaufmann and Carter (2010) states that strong governance, monitoring and auditing exercises obligated as a result of pursuing sustainable efforts over production processes, systems, and designs drive the organization or the entire supply chain to performing well operationally; both in quality and reliability. This comes as a result of the focal firm(s) improving internal alignment, being proactive in the market, and employee empowerment through informed and participatory workplace setup that ensures fair working conditions. Of course, if the players within the cocoa chain can be hopeful of a high response rate, a high level of product availability (minimal stock-out), fill rate, quality beans, etc. (which are all measures of operational performance), it will make sense that their engagement in sustainable efforts will increase.

For instance, improving the social performance of actors can improve their performance as they get motivated to produce more for increased product availability. Obviously, under the prevailing poor living standards of cocoa farmers and the high level of manual systems in transporting cocoa beans from the farm-land to their sheds, any quick response objective is forfeited. Not only that, lack of and insufficient production systems (economic indicator) will make it difficult to produce more for increased level of product availability. These principles and actions to improve on quality and reliability in a sustainable manner will thus eventually improve the operational performance of the organization and the entire supply chain of cocoa players.

7.4.5 STRATEGIC CAPABILITY

Furthermore, on strategic capability, it was revealed that economic dimension positively impinges on strategic capability with the correlation coefficient. This supports hypothesis 10a which states that economic dimension is positively related to competitive advantage of strategic capability. Hypothesis 10b which suggests that social dimension is positively related to competitive advantage of strategic capability is also supported with the result on social dimension. Concerning the estimated relationship between environmental dimensions and operational performance, it is observed that the correlation coefficient was positive and significant at less than 1%. This therefore supports the claim in hypothesis 10c which suggests that environmental dimension is positively related to competitive advantage of operational performance.

It can therefore be argued that pursuing sustainable practices improves the strategic capabilities of actors within the chain as stated in hypothesis 10. This is because implementing sustainability practices can itself be used as a strategy; and when the supply chain is monitored, audited, governed and actors pursue initiatives and practices with the critical level of commitment, the skill sets they derive will place them on an advantageous position above their competitors. This confirms Kaufmann and Carter (2010)'s argument that focal organizations can be expected to possess added strategic muscle in terms of management skills and innovation capabilities that allow them to survive and increase their value over time, due to their involvement in sustainable practices.

7.4.6 RESOURCE POOL

In terms of resource pool, it was also discovered that a positive relationship exists between economic dimension and resource pool. The estimated correlation coefficient was moderately high and significant; reinforcing hypothesis 11a which states that economic dimension is positively related to competitive advantage of resource pool. Again, correlation coefficient between social dimension and resource pool was found to be positively high and significant corroborating hypothesis 11b which suggests that social dimension is positively related to competitive advantage of resource pool. Hypothesis 11c is also supported which suggests that environmental dimension is positively related to competitive advantage of resource pool. A significantly high and positive correlation result confirms this conclusion. With these hypotheses supported, it is clear that engaging in sustainability dimensions builds the reputation of players in the cocoa chain. Hypothesis 11, which asserts that pursuing sustainable practices makes focal organizations more attractive to pool resources, therefore holds.

This is particularly informative, as Ghana is well known for its quality cocoa beans and so this high premium status is essential to ensure optimum acquisition of potential economic gains and to take advantage of niche markets. This implies that the quality of its cocoa must be exceptionally maintained and for this to be achieved, Williams (2009) contends that this will require the continual improvement in the relationship and interactions that exist among actors in Ghana's cocoa chain. Not only that as chain partners improve the social efforts such as attractive working conditions, employee satisfaction is boosted and this can help the company to retain personnel and even so, workers normally harbour pride in working for leaders of sustainability (Kaufmann and Carter, 2010). No wonder cocoa farmers find it less and less attractive

to remain in the business than before; cocoa cultivation is gradually losing its generational impact.

7.4.7 MARKET SHARE

Turning on market share, results also showed again that engaging in all the dimensions of sustainable supply chain draws significant advantages to players in terms of share of the market they control. The correlation results showed that though moderate, economic dimension has a positive linkage with market share with a correlation coefficient of $R = .338$, $p < 0.01$; supporting hypothesis 12a which states that economic dimension is positively related to competitive advantage of market share. Similarly, the correlation coefficient stipulating the degree of association between social dimensions of sustainability and market share was also positive and significant ($R = .313$; $p < 0.01$). Hence confirming the conjecture that when the social impact of players within a supply chain; the cocoa chain for that matter, increases, it invariably results in increased market share for players. Thus hypothesis 12b was supported which insisted that social dimension is positively related to competitive advantage of market share. Last but not least, results confirmed hypothesis 12c, which also suggests that environmental dimension is positively related to competitive advantage of market share. A significantly high and positive correlation result ($R = .552$; $p < 0.01$) confirmed this conclusion. Hypothesis 12, which asserts that pursuing sustainable practices makes focal units obtain greater control of the market than those which do not, is therefore supported.

The above result confirms the assertion made by Mefford (2011), who demonstrating the economic value of a sustainable supply chain argued that firms that engage high

efforts in sustainable practices stand to gain significantly from brand equity, which not only makes for loyal customers who purchase more of a company's products, but also allows higher prices to be charged with less discounting required to match competitors' prices. It will not be invalid to conclude that a voluntary participation in sustainability dimensions will draw increased market share for players in the cocoa chain. Indeed, with the increased interest in cocoa verification and certification, players will stand a high chance of sustaining and increasing their market share with increased efforts in sustainable practices. This is particularly relevant for farmers whose performance across all sustainability dimension was relatively poor, and for the farmer to be placed at the very initial stage of the chain requires that they put in stringent measures to improve their performance in order to sustain the entire chain's market position.

7.4.8 HYPOTHESIS ON ASSOCIATED IMPACT

Investigating the importance of sustainability dimensions in extracting vital variants of competitive advantage to players in the cocoa chain, the study sought to examine the sort of impact that engaging in sustainability practices has on overall competitive advantage. On economic dimensions of sustainability, correlation coefficient shows a positive and significant relationship between economic initiatives and overall competitive advantage. Hypothesis 5a is consequently supported which states that economic dimension has a positive effect on competitive advantage. Results also support hypothesis 5b which states that social dimension has a positive effect on competitive advantage. Pertaining to environmental dimension of sustainability, correlation coefficient shows a positive and significant relationship between environmental initiatives and overall competitive advantage. The combined regression

results from the first regression analysis (model 4) confirm that environmental initiatives have a positive impact on overall competitive advantage. As a result, it is concluded that environmental dimension perpetuates a positive effect on overall competitive advantage; hence Hypothesis 5c which states that environmental dimension has a positive effect on competitive advantage, is supported.

The results have therefore consistently proven that exploiting sustainability practices in the operations of units pays off; supporting hypothesis 5 which insists that engaging in sustainable supply chain initiatives lead to higher competitive advantage to firms. Closs *et al.* (2010) observe that practicing the tripod pillars of sustainability ultimately leads to improved profitability and efficiency over the long term. They examine that current business ethics require enterprises to assemble new, environmentally sustainable and socially friendly systems while enhancing shareholder value, implying that all three pillars of sustainability are essential to reaping long term benefits. Kaufmann and Carter (2010) also confer that focal firms that practice sustainable practices gain a competitive edge over those that do not and Closs *et al.* (2010) also estimate that sustainable enterprise strategies make businesses achieve long term viability. BSR (2010) also suggests that supply chain sustainability management is key to maintaining the integrity of a brand, ensuring business continuity and managing operational costs.

7.5 ROLE OF SUPPLY CHAIN IMPROVEMENT PROGRAMMES

The study also sought to find out whether supply chain improvement programmes had any impact on competitive advantage and also whether they play any moderating role

in the linkage between sustainable practices and performance of the players in the cocoa chain.

7.5.1 TRANSPARENCY

From the moderating regression analysis, hypothesis 13 was supported indicating that transparency has a positive impact on competitive advantage. Also examining the moderating effect of transparency, it is shown on the moderating effect regression analysis table that transparency has a strong positive moderating effect on the linkage between sustainability and competitive advantage. Specifically, the results indicate that the interaction between social initiatives and transparency, economic initiatives and transparency, transparency and environmental initiatives and transparency and overall sustainability were all positive and significant. This lends support to hypothesis 13a which states that transparency positively moderates the direct linkage between sustainability dimensions and overall competitive advantage.

It can therefore be deduced that, cocoa players stand to reap higher performance if they improve transparency in the cocoa chain. Indeed, this is re-echoed by Opara (2002) who maintains that the capacity for full trace-back and trace-forward at any stage in the supply chain is crucial to confronting falling consumer confidence and general public concern about the rising incidence of food-related deaths and illnesses. This is crucial in light of the ever-growing concern for sustainable practices in the cocoa chain as evidenced in the increased pressure from international buyers for cocoa players to capture traceability. The implication of this trend is that the cost of secrecy and covering wrongdoings can be very devastating to the progress of the

cocoa supply chain and thus transparency is essential to motivate focal firms to maintain standards and thereby ensuring performance.

7.5.2 RISK MANAGEMENT

For risk management, it was illustrated that risk management significantly moderates the social, economic and overall sustainability impacts on overall competitive advantage; supporting hypothesis 14a which states that risk management positively moderates the direct linkage between sustainability dimensions and overall competitive advantage. This confirms Mefford (2011), who highlights the importance of hedging against risks especially risks of legal suits from employees, consumers and the general public by incorporating sustainable supply chain practices. To the author, risk improvement can even improve the share price of an ethical firm. This is essentially important as the cocoa sector is known for its high risk exposure at almost every stage in the chain, and much of the waste that reduces cocoa yield emanate from such risks. While not every risk in the cocoa sector can be avoided, the ability of chain players to manage these risks can greatly reduce its impact on sustainable goals and this will require very great efforts in sustainable initiatives at all levels, especially at the farm level which is the point-of-origin. The argument here is that the performance at the point-of-origin of any supply chain strongly influences the performance of the entire chain. Thus, if no proper risk management system at the farm level exists, it will increase their vulnerability to a high risk impact which consequently will affect the performance of subsequent downstream players.

7.5.3 SUPPLIER DEVELOPMENT

Concerning supplier development, results are consistently clear from the combined regression (model 4) of regression 1 that supplier development connotes a significantly positive impact on competitive advantage. This result is then confirmed in the moderating regression analysis. All the 5 models showed that supplier development has a strong positive impact on competitive advantage. Hence hypothesis 15 was supported, indicating that supplier development has a positive impact on competitive advantage.

It is further shown on the moderating effect regression analysis table that all the supplier development interactions generally explained 3.3% of the variations in competitive advantage, with $p < 5\%$. This confirmed that supplier development has a strong positive moderating effect on the linkage between sustainability and competitive advantage. Specifically, the results indicated that supplier development significantly moderates the effects of economic initiatives and overall sustainability on overall competitive advantage. Hypothesis 15a is thus supported which states that supplier development positively moderates the direct linkage between sustainability dimensions and overall competitive advantage.

Indeed, Williams (2009) maintains that improving the economic viability of the cocoa chain will require the continual improvement in the relationship and interactions that exist among actors in Ghana's cocoa supply chain and if this interaction can be fostered it will require great efforts in developing suppliers in the chain. Current global economic barometer has called for the increased collaborative relationships and strategic ties between organizations and their suppliers to overcome the myriads of

challenges and risks arising from more volatile operating business environments. Supplier development has therefore become central in current strategic management issues; for the sole purpose of improving supplier capabilities in order to deliver better quality, timely and low cost products and services (Hales and Arumugam, 2012), bring in innovation to support clients' sourcing and procurement targets and sustainable development objectives (Gupts and Mangolis, 2011) while at the same time increasing profitability for all supply chain participants.

It goes beyond simple auditing of suppliers to check for compliance or whether they are delivering on-time or fulfilling quality goals. Companies need to consciously invest in developing their suppliers especially on best practices so as to gain collaborative goals. This is logical in the sense that only if supply chain players understand one another and with a common objective can they work with less conflicting goals. This is particularly important in the cocoa sector, especially as farmers, who are the major suppliers of cocoa and who begin the supply chain are predominantly illiterate. Players will thus need to develop these farmers to understand that though investment in sustainable practices are but without cost, yet such investment is essential to achieving long-term goals.

7.5.4 SUPPLY CHAIN COLLABORATION

With reference to collaboration, it was revealed from the combined regression (model 4) of regression 1 that collaboration also has a strong positive impact on competitive advantage. Again, this result was confirmed in the moderating regression analysis where all the 5 models showed a strong positive impact of collaboration on competitive advantage. The combined regression of the moderating regression

analysis (model 5) indicated a significant parameter of $B = 0.158$, $p < 0.10$). Hence hypothesis 16 was supported indicating that supply chain collaboration positively impacts on overall competitive advantage. Probing further the moderating effect of collaboration, it was exposed on the moderating effect regression analysis table that all the collaboration interactions generally explained 1.1% of the variations in competitive advantage, with $p < 5\%$. This shows that collaboration has a strong positive moderating effect on the linkage between sustainability and competitive advantage. A significant moderating effect was found for overall sustainability ($B = 0.113$; $p < 0.05$).

This lends support to hypothesis 16a which states that collaboration positively moderates the direct linkage between sustainability dimensions and overall competitive advantage. A fundamental principle in supply chain management is collaboration, in the sense that different players come together to form a supply chain. The objective of the supply chain is to fulfill the customer's order, and so for a supply chain to successfully achieve this objective, it will rationally require that all players within the chain interact and collaborate. In this vein Gupts and Mangolis (2011) posits that an effective collaboration between actors within the supply chain results in competitive advantage accruing to the focal firm; as it ensures not only the procreation of dynamic ideas but helps the existing organization to create immutable products and services to the market place. Hence an effective collaboration between actors: farmers, PCs, LBCs, CMC, etc. thus becomes essentially relevant for supply chain excellence in the cocoa sector.

7.6 CONCLUSION

In summary, the empirical evidence from this study suggests that there exist observed variations among players in the domestic chain of cocoa in Ghana in the implementation of sustainable initiatives. The study has also established that a cross effect exists among the three major dimensions of sustainability in the cocoa chain; a positive relationship between engagement in sustainable practices and the performance of players in the chain; engagement in the tripod at a goal offers the greatest differentiation to actors and then finally, supply chain improvement programmes play a moderating role in the linkage between sustainable practices and the performance of players in the chain. This study therefore makes a significant contribution to literature on sustainable supply chain management by providing empirical evidence of the positive impact of SSCM Initiatives and SCM Investments on the competitive performance of actors in the cocoa supply chain. It is thus argued that this contribution can support previous literature's findings and stimulate further empirical research on this topic.



CHAPTER EIGHT

QUALITATIVE DATA ANALYSIS AND DISCUSSION

8.0 INTRODUCTION

Among other research objectives, the study sought to map the flow process of the cocoa supply chain; by identifying the actors and their roles within the chain and also the risks within the chain that threaten sustainable goals. In so doing, a qualitative approach in the form of interviews and focus group discussions with some selected farmers, purchasing clerks, licensed buying companies and the Cocoa Marketing Company was used to gather data. The analysis and discussions are done in two major parts; the first part presents the flow process of cocoa within the domestic chain; highlighting the major actors and their roles and the second part discusses the risks that threaten sustainable goals in the cocoa chain.

8.1 THE FLOW PROCESS OF COCOA IN GHANA

Data gathered reveals that the flow of unprocessed cocoa beans in Ghana's domestic cocoa chain begins with farmers whose major role is to cultivate cocoa and supply the unprocessed cocoa beans to other downstream players within the chain. In this sense, cocoa farmers are the major players at the point-of-origin or the very upstream suppliers of cocoa in the supply chain of cocoa in Ghana. This implies that the performance of all other players in the chain is primarily dependent on these farmers especially in terms of both quality and quantity. While the very upstream of the chain is dominated by thousands of farmers, it is worthwhile noting that most of these farmers are small holder operators and a greater majority of these farmers lack the appropriate mechanized farming practices necessary for increased level of

productivity and so cocoa yield per farmer is relatively low compared to international operators. The major supplier of inputs to farmers for the cultivation of cocoa is COCOBOD, which primarily supplies farmers with seedlings and appropriate chemicals for the cultivation of cocoa. Cocoa farmers are predominantly concentrated at the Western, Eastern and Ashanti Regions of Ghana.

The next major stage of the flow process is the Licensed Buying Companies (LBCs) who have the legal authority from the government of Ghana to purchase cocoa from these farmers. However, due to the thousands of farmers and their dispersed nature across many cocoa growing villages, LBCs have commissioned Purchasing Clerks (PCs) at various designated sheds (called societies) at various vantage points in and around the cocoa growing villages who on behalf of these LBCs, buy cocoa in relatively smaller quantities from the cocoa farmers. PCs are also known by some few other LBCs as Commission Marketing Clerks (CMCs). PCs play a value adding role by consolidating smaller supplies from many sources for onward supply to the various districts of these LBCs. While the major role of PCs is to purchase, bulk and bag cocoa beans in 64kg bags for onward primary evacuation, some quality problems such as not-thoroughly dried (NTD) cocoa beans usually necessitate that PCs re-condition (example re-drying) the purchased cocoa beans before the final primary evacuation to the district depots of the LBCs.

After the purchasing of cocoa by PCs and all other necessary processing and bagging, the next major activity is what is commonly referred to as primary evacuation. LBCs have situated many smaller sheds at the societies that primarily serve the needs of the PCs. It is at the sheds that PCs bulk the smaller qualities from the farmers, after which

the relatively larger quantities are evacuated to the district depots of the LBCs. LBCs have depots in the district towns of the cocoa growing areas, headed by district managers primarily for the consolidation and grading of cocoa that are purchased by the PCs from the various societies. In this sense, an LBC may have about 40 sheds or 40 PCs operating under each depot.

Once cocoa arrives at the depot, various operations are made such as packing and reconditioning. Once a sizeable quantity of cocoa is recorded at the district depots, the depot keeper under the supervision of the district manager writes an application to the Quality Control Company (QCC), a subsidiary of COCOBOD for grading and sealing which legally permits the LBC to embark on the next flow process; secondary evacuation. Among the quality checks of the QCC include checking for moisture content, NTD, add-mixture, weight, beans size, among others. Once cocoa fails the test, the consequence may be entire rejection, but there are still others that may need reconditioning for re-grading. However, once the cocoa successfully passes through the quality test, the QCC affix seals on the bagged cocoa as a certification for onward secondary evacuation to the take-over point (at the port) and at this point, the Cocoa Marketing Company (also a subsidiary of COCOBOD) takes over.

The CMC purchases the cocoa from LBCs on behalf of COCOBOD for final shipment of the unprocessed cocoa to other downstream buyers, the majority of which are international buyers. While the Government remains the final buyer of cocoa within the domestic chain, it allows some LBCs to sell a small percentage of their purchases directly to other international buyers. This is what is referred to as traceable

cocoa. Within the country, there are some local processors who also buy cocoa from COCOBOD for processing of cocoa for the global market.

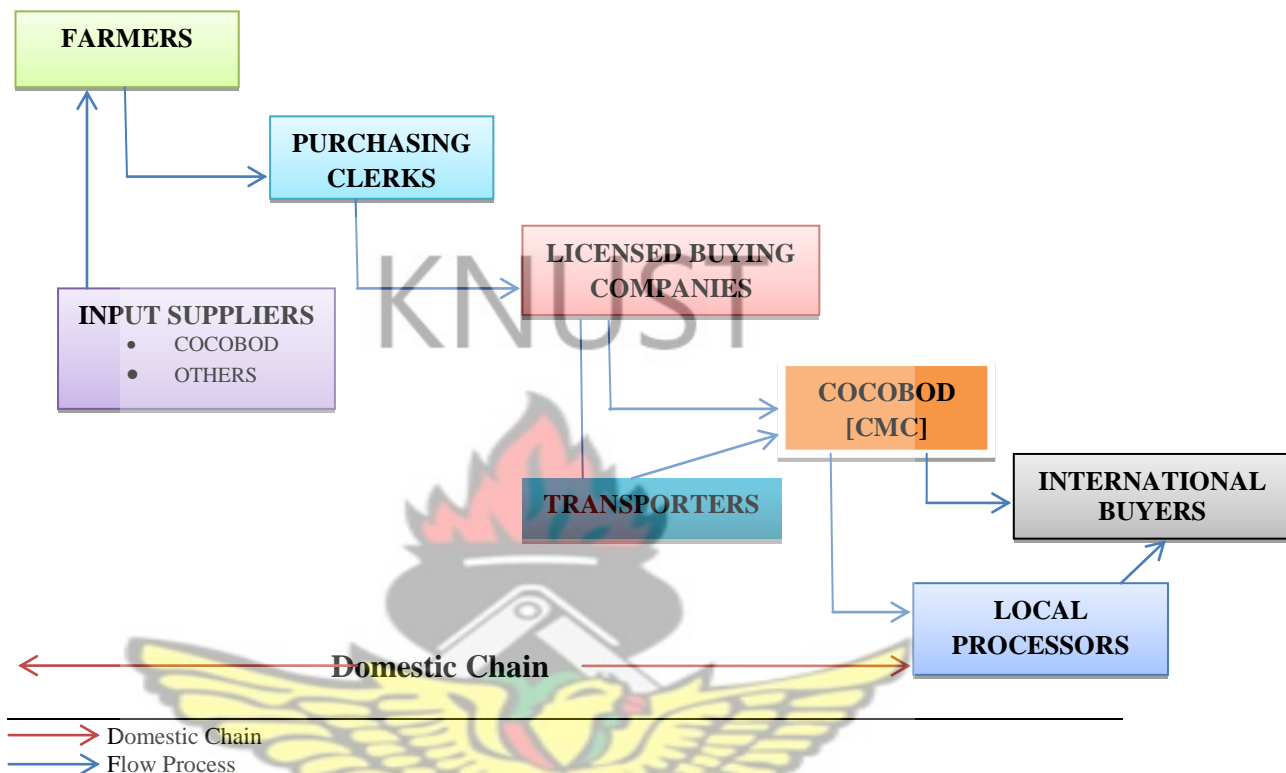


Fig. 8.1 The Flow Process of Cocoa in Ghana's Domestic Cocoa Chain
Source: Author's Construct (2014)

In conclusion, the flow of cocoa in the domestic cocoa chain starts from farmers to LBCs through PCs and finally to the COCOBOD. COCOBOD is thus the major downstream end consumer of unprocessed cocoa, who further trades the cocoa mainly at the international market and a few of its purchases to local processors of cocoa (see Fig. 8.1 above).

8.2 RISKS IN THE COCOA CHAIN

While current trends in the global market for cocoa and cocoa products suggest strong potential for further growth ahead (GoG, 2009), a number of risks threaten to derail

the subsector's recovery. In this study, data gathered reveals enormous risks in the cocoa chain. For the purpose of this study, the researcher focused on four key players in the chain namely: farmers, PCs, LBCs and the CMC. As the data were being gathered, attempt was made to find out how the various risks potentially threaten sustainable goals. The discussion thus, highlights all the risks that were identified at each stage and their impact on performance as it bothers on sustainability. In doing so, the study carefully sought to identify in each of the stages, the risks that are associated with the four major stages of the supply chain; *purchasing, internal operations, warehousing and out-bound transportation* for the purpose of identifying the specific supply chain stage at the various levels of the chain that has the most or least risks, so that appropriate recommendations could be made to curtail the situation.

8.2.1 FARM LEVEL RISKS

The revealed risks associated with farmers in the cocoa chain as they relate to the four major SCM phases; *purchasing, internal operations, warehousing and outbound transportation* are discussed as follows:

8.2.1.1 PURCHASING RISKS

The predominant purchasing risks that impact on sustainable goals of farmers in the cocoa chain include stock-out and spoilage.

Risk of Stock-out

While most farmers preferred to buy seedlings from the Agric Division of the COCOBOD due to benefits such as quality and cheaper prices, there were instances

that they resorted to the local source due to cases of stock-out at the Division. On this, a farmer in a focus group discussion remarked that:

I buy from the Agric Division. However, you can go to their sales point but meet a stock-out after incurring transport cost. This is why we sometimes buy from the local source. Additionally, the price from the Agric Division is relatively cheaper than the local ones.

But perhaps more telling was the response of a group of other farmers:

The price of a pod from the local source is not fixed, but relatively higher than the Agric Division. Then also, after the purchase from the local source, the maintenance of the pod to conform to the quality standard of COCOBOD costs relatively higher and due to poverty, funding the appropriate level of maintenance usually becomes impossible and so you will not be able to get as much beans from the pod as compared to that of the Division's, making COCOBOD a preferred source.

It seems also to be a seller's market since according to them, the demand is always higher than the supply to the point that longer queues usually result at the division. This sometimes necessitates some farmers to spend nights at the division before accessing the quantities demanded. The interplay of such demand and supply usually requires the division to adopt a rationing strategy for a fair distribution of the seedlings across the many buyers. Consequently, the result is shortage "gaming"; where some farmers join in the queues with their relatives in order to access the quantities they require. Alternatively, due to the high transportation cost of traveling with relatives, some farmers resort to free-lance buyers who cease the opportunity to buy cocoa and re-sell to these farmers at a relatively higher price. In this case, the cost burden sometimes reduces cultivable yield in the sense that, some farmers just cultivate the quantity they can afford at a time. As a farmer who had gone through such an experience puts it:

We know that every two weeks, stock is available. But you will go and meet a lot of farmers so you may not get it. Due to the high number, the sellers sometimes ration the products among the customers, i.e. about 3 pods per

person. Some farmers even sleep over; stay there for a week under the cocoa trees.

Affirming the above statement, other farmers also remarked that:

In order to get a higher quantity, we make other relatives join the queues due to the rationing but this attracts a higher transport cost. There are other boys whose business is to join the queue and buy for you for a higher charge. In my experience, I was charged GH ₵3.00 instead of the normal price of GH ₵ 0.20. I could not have had the quantity if I had bought it alone so I am happy to get additional quantities from these boys. Sometimes, the Agric Division creates artificial shortages and sells to some other people. There are instances we see pods loaded onto trucks and transported to other places where they pay relatively higher prices.

Risk of Spoilage

It was further revealed that, the risk that a pod that has been purchased is spoilt is high and usually only realized during the nursery process. A farmer from the Apemso village explains:

Sometimes, during nursery, you will realize that the pod you had is spoilt or of a relatively lower quality. On average about 10 out of 100 pods are spoilt.

What makes this worrying is that, once these pods have been paid for, the farmer cannot, in most cases, return them for replacement and that the only option is to find money for additional purchases which consequently prolongs their cycle time for cultivation, or at best make do with what is available, also implying a relatively reduced cultivable yield. It was also revealed that, most farmers find it difficult to travel for additional purchases due to the transport cost and so usually nurse only the quality seedlings available. During the purchasing period, there is no means of knowing the quality of the seedling. Farmers buy in good faith and plant on trial and error basis. One farmer from the Apenso Village commented that:

Most of the time, it is difficult for the farmer to determine whether the seedling is good or not. As for the Agric officers, they know the difference between the good and bad but sell all to farmers anyway. They just don't care, it is cheating. Sometimes, the officer selling the pod at the division has no

experience with the cocoa work, so even if the farmer tells him it is not good, he will argue with you, disagree and go ahead to sell it to the farmer anyway.

A young farmer asserted that:

Sometime ago, I was sent by my elder brother to buy cocoa pods from the division. I argued with them about the quality and they told me I will not be the one to teach them their job. I demonstrated the quality by telling my brother about the weight of the pod. Usually, the lighter ones are good but the heavier ones are usually bad. So I threw the challenge to him to break it to test it, and truly speaking the heavier one was spoilt. So the officers told me not to come there again to buy seedlings because I was spoiling their business.

Indeed, such behavior affirms the fact that COCOBOD has a high level of monopoly in the cocoa industry. Such power is easily exerted where there exist no or very little alternative sources of supply, and this appears to be the case in favour of the Agric Division. Farmers have very minimal negotiation power during their purchasing transactions due to such monopoly from the division. Not only that the higher level of demand relative to supply also means that customer service is obviously not a serious requirement for maintaining a source of demand by the division.

8.2.1.2 INTERNAL OPERATIONS RISKS

The predominant internal operational risks that impact on sustainable goals of farmers in the cocoa chain include environmental, pest infestations, shrinkage, theft and loss of land.

Environmental Risks

A major environmental risk that cocoa farmers face comes from the weather. According to them, the dry and drought seasons usually cause the cocoa plantation to wither. Though this is a natural consequence from the weather, there exist a lot of opportunities to combat the risk impact from the weather, but due to poverty, most of

these farmers are unable to buy the needed chemicals and other materials to reduce their vulnerability to such risk impact. As a farmer in a focus group discussion puts it:

Sometimes, the sun withers the plantation; around May and June. This usually affects the cocoa and reduces yield from 5 acres to 1. Every season has its risks but the solution lies in the chemicals. But because we do not have the money, we are unable to fight these risks

There are also cases of lost plantations that result from bush fire. Various cases of bush fire result from hunters who would hardly quench fires set for hunting and then the farmers themselves sometimes forget to quench the fire they set for cooking during farming. Bush fire also results sometimes from other farmers who share boundaries with them, especially after using the fire for clearing and preparing their lands for re-cultivation. On this, a group of farmers interviewed observed that:

We often experience bush fire from hunters, who usually will not quench the fire they lit for catching their rats. It can also result from us, thus the fire for cooking meals in the farm. Sometimes too, you will share a boundary with another farmer whose fire for clearing and preparing his land for a new cultivation can also burn your farm. He may not even know the fire has affected your farm. In some instances, the fire starts with the extinguished fire touching the tree which burns at night while we are asleep at home; we only get to see the devastating effects in the morning when the harm has already been caused.

Risk of Pest Infestations

Another major risk during the cultivation period is pest infestations which easily destroy cocoa plantation. Most commonly pest infestations include black pod, mirids/capsids and swollen shoot virus diseases (GoG, 2009). For black pod disease, several species infect pods and mirids usually damage cocoa trees by feeding on tree sap (GoG, 2009). Cocoa swollen characteristics may include the reddening of primary veins in flush leaves (GoG, 2009). According to the farmers interviewed, pest infestations have been one of the major challenges that usually limit full harvest/yield relative to cultivation due primarily to poverty that makes it difficult for them to

acquire sufficient farm inputs to control against such infestations and for maintaining cocoa plantations.

Risk of Spoilage/Shrinkage

Due to poverty, most of the farmers are unable to purchase adequate chemicals to fight the pest infestations and so apart from the obvious consequence of spoilage, most of the cocoa fruits shrink. On this, the leader of the farmers in a focus group discussion remarked:

Yes, if you don't spray and the pest attacks it, it can affect the tree and then the fruit. In that case, the leave becomes yellowish in colour. Our major challenge is that, we don't have the machine for spraying. For instance, because I do not have the machine, I have been three months late in spraying.

While the government remains the major support to these farmers for their farm input needs, most of these farmers complained that they sometimes do not get such support especially in recent times and sometimes too, there are delays on the part of the government. As such, to fight the risk of damage to cocoa plantations, it becomes necessary that the farmer purchased the needed chemicals and inputs by himself. For those farmers who serve as employees to cocoa owners, they, by the help of their employers, are able to afford fairly appreciable quantities of such inputs required for the cultivation of their cocoa. However, those who fully own the farmlands and are usually poor find it more challenging, as the government remains their major source of hope.

Risk of Theft

The traditional system of farming with no standard form of security still persists among cocoa farmers, especially at the farmlands. The idea of hedging the farmland against possible theft seems somewhat illogical to many farmers who see no

economic justification for such high investment, especially when they found it extremely difficult to meet their fundamental needs which are of a higher priority. Yet, this has been a major source of theft and smuggling at the farm land, a factor that reduces cocoa yield. Some farmers at the Apemso village remarked:

We experience theft frequently. We don't catch them. Women usually steal cocoa in this village. Some steal and add to their own harvest from their cultivation. We leave it in God's care. Once we sleep, we sleep. We cannot carry the cocoa home.

The many cases of cocoa smuggling occur at the farmlands especially at the harvesting periods where the cocoa pods are stocked at the farmlands for breaking. Due to the manual nature of transporting cocoa, farmers find it cost effective to break the pods at the farmlands to reduce the transport loads from the farmlands to the sheds at their homes for drying. Since cocoa is the major business at these cocoa growing villages, the harvest season attracts the attention of most thieves and smugglers of cocoa, who visit the farms at night to steal or smuggle cocoa. Other farmers also explained that due to poverty, some women especially, those with no one to depend on, who are unable to cultivate cocoa during the season, resort to pilfering of cocoa so as to make ends meet.

Risk of Land Loss

For those farmers who usually operate on family lands, there are incidences where some farmers have lost their whole plantations due to litigations over farmlands. During such periods, the litigation process can affect productivity due to obstructions. The lack of attention to the farming process sometimes affects the quality of cocoa as well. As a farmer who has been a witness to a number of such cases at the Ejisu Juaben traditional area puts it:

Landownership and boundary litigation adversely affect both yield and sustainability of cocoa production. The complainant/litigant can destroy your plantations. There was an instance where a 25 acre farm was destroyed resulting from this very reason.

What makes matters worse is that, for such families, the youth are practically discouraged from venturing into cocoa farming, pursuing other commercial activities in cities as most of them do not see the sustainability of any such efforts. Traditionally, cocoa cultivation has been a generational endeavor and that has sustained the cultivation of cocoa for the many years and so for these indigenous people to seek other career objectives does really question the sustainability of cocoa production. While it used to be the case that cocoa farmers encouraged their children to continue in their efforts, now, the poverty rate among cocoa farmers has made most of these farmers to encourage their wards to seek for greener pastures in the cities. Thus the youth at the cocoa villages practically show no or little interest in cocoa cultivation.

8.2.1.3 WAREHOUSING RISKS

Two major kinds of risks were revealed as they relate to the warehousing function, namely: environmental and theft.

Environmental Risks

Most farmers do not have any well-structured warehouse for storing cocoa. Most of them have built wooden sheds for drying the cocoa and the primary source for drying cocoa being sunlight. This means, the warehousing operations of these farmers are at the mercy of the weather and since most of their activities are done on subsistent basis, unpredictable rains easily affect the cocoa on these sheds especially when the farmers have left for their farms with their families. Then also, coupled with the fact

that the rainy season can make it very difficult for them to dry the beans, due to the poor storage structures, heavy rains sometimes flood the cocoa beans away. As an affected farmer in a focus group discussion puts it:

Because we do not have very good warehouse structures, when it rains the cocoa on the drying sheds sometimes get flooded off. During the rainy season, the rains make it difficult for drying. Sometimes, you leave it in the morning knowing the weather is good, but by the time you come back from the farm, the cocoa on the shed is wet and even spoilt, it can reduce the weight of the cocoa beans and some washed away by the rains. If you have no one to take care of the cocoa, you must do it yourself or may have to put the drying process on pause till you return from the farm or town.

This has been one of the major reasons why most farmers end up selling NTD cocoa beans to PCs, further complicating the supply process. This results into prolonged cycle times, especially at the LBC stage and by the time they are able to meet the quantity commensurate with any advanced loans, the interest rates have accumulated. This is a major cause of the poor performance of most LBCs, especially in terms of the lead-time requirement, yet due to the competition among LBDs in obtaining supply, most LBCs are left with no choice than to buy from the PCs.

Risk of Theft

Indeed, the cocoa supply chain is one risky zone and due to poverty, most players at the very upstream stage of the chain face a high level of vulnerability to these risks impact. Most cocoa farmers cultivate on subsistence basis (small holder farmers); individually and with their small nuclear families, to an extent that no formal structures exist for most of their operations, from the farmland to their dispatch points. The drying of cocoa and storage mostly take place at the houses of these farmers, who usually have no structured warehouses for storing the dried cocoa beans. Due to this, these farmers get exposed to all forms of theft. While they are able to control the incidence of theft during the day due to their constant presence at the

cocoa sheds, the case is different at night, during which time thieves and robbers attack them. Also due to the poor security system, animals like goats and sheep feed on the beans sometimes on the sheds during drying. A group of cocoa farmers remarked that:

Yes, on the shed people steal. During the day, we sit by it the whole period so we are able to control it. But at night, they slowly steal by cutting the thread beneath the sheds and then fetch the cocoa through the hole into the sack. In the morning you will realize the shed is covered but when lifted, the quantity is reduced because of theft. Our major challenge is that, we do not have money so we cannot build any fence or security system to protect our cocoa from robbers. The bottom line is poverty. We cannot even meet our immediate needs. Also, goats and sheep chew the cocoa and then chicken blow them off the shed.

8.2.1.4 TRANSPORTATION RISKS

The major risk associated with the transportation function is injury.

Risk of Injury

The predominant mode of transport at the farm level is foot, and though this poses a great deal of difficulty to these farmers, there is no much risk exposure since the travel distance from the farmers to the PCs is relatively short. However, there are some major risks they experience from the farmland to their houses where the cocoa beans are dried and stored. Due to poor and unclear roads, most farmers get exposed to various forms of injuries that are mostly caused by animal attacks and slippery grounds and weeds. During a focus group discussion, almost every farmer noted he had gone through many cases of such injuries. To this effect, some farmers made the following remarks:

The cocoa can pour down. We get injured on the way through slippery and animal (e.g. snakes) bites.

Our transport is predominantly on foot. We don't have trucks ferrying the produce because we cannot afford one. This makes it difficult and delays the

work. A vehicle would provide convenience. This also reduces productivity because we waste a lot of time in walking and carrying the cocoa. This manual system also makes us very tired and reduces our capacity to work for higher yields.

The results of such risks are spoilage and re-work. Not only that, this form of transport means that the cycle time of the drying process is prolonged. The average farmer would need to spend an entire day carrying cocoa loads that otherwise could be carried by a truck within an hour. Indeed, the labour intensive form of work at this stage of the chain reduces productivity level. It was surprising to realize from the interviews that, most of the farmers hardly include their labour as a component in their cost computations, and so comparing their profit levels with their total operating cost, there seems to be no economic justification for most of these cocoa farmers to engage in the cocoa trade, especially the small holders. Some noted that, but for profit gains they would not continue the cocoa production and that their major interest was the fact that it would be the source for making ends meet during their old age. That is a source of pension to these farmers.

8.2.2 PC LEVEL RISKS

At the PC level, the major risks faced by players are highly concentrated at the purchasing phase of their supply chain. This is to be expected, as this constitutes their main role in the cocoa chain.

8.2.2.1 PURCHASING RISKS

The predominant purchasing risks at the PC level include loss of cocoa weight due to NTD, theft and credit risks. These are discussed as follows:

Risk of Weight Loss

To maintain a source of supply due to competition, the major determinant of the purchase decision of these PCs is availability. Most farmers can barely wait for a long period of time after the drying process and so any delay on the part of a PC can easily cause a farmer to find other buyers for his produce. Indeed, this is especially in the interest of the benefiting PC whose primary interest lies in the many quantities of cocoa he can purchase from the farmer, since the PC's commission from the LBC varies proportionately with the quantity supplied. While this presents opportunities for the PCs to enjoy higher rates of commission from the LBCs, there is yet a major risk that the cocoa bought from the farmer might not have been thoroughly dried, further implying that, reconditioning such cocoa will usually result into loss of weight.

Explaining the consequence of NTD, a PC says:

Sometimes, after advancing a farmer with money upon request in order to maintain a source of supply, he ends up supplying you with NTD cocoa beans and upon refusal to accept such beans, the farmer who usually has more power during the purchasing season can sell the rejected cocoa beans to another PC. When this happens, it becomes very difficult to take your money back, whether partly or fully.

This seems to be the major risk issue that affects the PCs economically. From the interviews, the PCs noted that the farmer would hardly make up for this loss and this cost is usually borne solely by them. While some LBCs may on some occasions absorb the risk, any lost quantities are mostly deducted from subsequent purchases by the PC in question. Though this measure helps in reducing the cost burden on the LBC, their performances are still affected as they find it difficult to meet the quantity specified at a given cycle time.

Risk of Theft

In the cocoa villages and communities, PCs are generally perceived as rich and most of the community dwellers are fully aware that the District Managers of the LBCs usually pre-finance the purchasing activities of these PCs. Hence, on their return to the cocoa communities/societies from the district depots, most PCs get attacked by thieves and robbers. This is a rampant occurrence in most cocoa villages, and especially so that most of their transactions are on cash basis. Previously, cocoa farmers accepted payment through district banks, but this is no longer the case, as most farmers find banking procedures to be rather cumbersome and time wasting. The many incidences where PCs end up absconding monies can also be attributed to the robbery exposures at the cocoa communities; when a PC finds it difficult to pay such debt, the consequence is obvious. Of this in particular, a zonal manager commented:

Last year for instance, some of the PCs in my district (Tepa) collected their funds on Thursday. On their way back to their societies, they were attacked by armed robbers. One of the PCs was shot; one died and two others had gun shots in their arms. The armed robbers got away with money worth 80 bags of cocoa and from those PCs who were shot, about 150 bags worth of cocoa. Ooh, the PCs are subjected to a lot of attacks and as a result, one PC lost about GH ¢ 400.00. Although this was lost in an armed robbery, he needs to pay it back to the LBC. This is a big debt for the PC.

Credit Risk

Similar to the case of LBCs, the proliferation of PCs in the cocoa growing villages has created immense competition among these PCs to an extent that to maintain a source of supply from a farmer, the PC must sometimes make advance payments to farmers to pre-finance some farming activities. There are also instances that farmers make such requests for the purpose of financing some personal activities like funerals. Yet, during the harvest seasons, there are instances these farmers will not supply the commensurate quantities to the PCs, especially when they are unable to recoup the

monies invested in these personal activities. The logical thing for them to do in order to get some appreciable level of money for future expenditures is to find other cocoa buyers for their produce which would mean that, their debts with their creditors (PCs) must be cleared from future harvest seasons. While in some cases, the PCs are able to obtain these monies, there are instances where they lose them entirely and other times too, prolonged litigations over such payments end up reducing the value of the money. The usual consequence is that PCs continue to accept monies from other LBCs in return for supplying them with cocoa, and when they have recorded higher debts than they can pay for, they end up running away or absconding. One group of interviewees commented that:

The major challenge we PCs face in the cocoa industry stems from farmers who are not truthful to us. Farmers sometimes take monies from us the PCs to finance their operations such as paying labourers and other personal expenditures like funeral. Yet, during the harvest seasons, these farmers would hardly supply the full quantities of cocoa to defray any debts owed the PC who had been the source of his funding. Some farmers, due to greed would rather sell their cocoa to other PCs. When this happens, the PC may have to wait for another harvest season in order to recoup his money. Yet, if a PC refuses to give a loan to the farmer, the farmer who at the selling stage has relatively higher power due to the many competing PCs will easily switch to another PC who will be ready to pay.

8.2.2.2 INTERNAL OPERATIONS RISKS

The major internal operations at the PC level include: bulking, separation and reconditioning of cocoa beans. In almost all these operations, the major risk exposure stems from the environment.

Environmental Risks

During reconditioning for example, PCs rely primarily on the weather for re-drying NTDs and so, unexpected rain falls sometimes affect the cocoa beans resulting in

weight loss. None of the PCs interviewed reported the incidence of theft during these operations.

8.2.2.3 WAREHOUSING RISKS

The major risk issue here is pest infestations especially when cocoa beans have been stored for a considerable period of time. However, most of the PCs indicated that the incidence was not very frequent.

8.2.2.4 TRANSPORTATION RISKS

Apart from the bulking process which may sometimes require the PCs to transport the cocoa from the farmers' sheds to theirs, primary evacuation is a direct responsibility of the LBCs and so, the major risk issues are borne by the LBCs. The interviews with the PCs did not reveal any serious forms of risk during the bulking process.

8.2.3 LBC LEVEL RISKS

The interviews and focus group discussions with various LBCs have revealed that the LBC level is also exposed to enormous risks that result from economic, social and environmental factors. These are discussed according to the four major SCM phases; *purchasing, internal operations, warehousing and out-bound transportation.*

8.2.1.1 PURCHASING RISKS

Similar to the other upstream players in the chain, LBCs face various risks that range from economic, social and environmental in their purchasing activities.

Poor Quality Supply

There are instances that PCs intentionally supply LBCs with poor quality cocoa beans. In order to meet the quantity requirement, there are instances where some PCs mix the cocoa beans with other items like stones, poor quality cocoa beans, etc. to make up for the required quantity per bag. In this vein, any negligence on the part of the District Manager to check thoroughly can easily result in shortage cost. This seems to be a frequent risk that LBCs face in the sense that, during receipt of inventory into the depot warehouse, large numbers from different societies sometimes make it difficult to inspect every bag of cocoa for quality, and once there is a sampling test, there are cases that a district officer may lose sight of such bad practices. One of the LBC district managers explained that:

During the bagging of cocoa for instance, PCs sometimes put the poor quality cocoa beans and other materials like stones beneath and then put quality beans on top just to get the required weight per bag of cocoa. At times during the grading of cocoa by the QCC officers, such acts are exposed. In a recent case at the Tema Port, an LBC had a problem where in about five bags of cocoa, a PC had mixed up coconut with cocoa beans in sewed bags of cocoa.

Stock-Out Risks

The LBCs rely on the PCs to purchase and bulk cocoa from farmers at the society levels before onward transportation (primary evacuation) to the district depots of the LBCs. When a District Manager is advanced with money for purchasing cocoa, a lead-time of one week is required of him to return the cocoa for onward evacuation to the take-over point. Within this same time, the manager must collaborate with these PCs to purchase the cocoa from the farmers. Due to the rising competition among LBCs, the district managers take the risk to pre-finance the PCs to purchase cocoa from farmers. While this would seem somewhat inappropriate under the circumstance that PCs can easily run away with these monies, the District Managers are left with no

or little option as this practice provides the easiest means to maintain a source of supply. While this is an opportunity for a district manager to meet his quantity target, there is also the risk that a PC will not make the required quantity available at the lead time period. According to the managers:

Some of the PCs would claim that they have bought cocoa from farmers, yet upon visiting the PC for inspection, there are times that the quantities available at the PC sheds are far below what they (PC) promised to deliver. In some other instances, by the time the LBC official gets to the premises of the PC, no cocoa is available, in which case, some PCs would have sold the cocoa to other LBCs upon the slightest delay by the LBC.

Contractual Risks

As a way of improving the performance of PCs, some LBCs enter into contractual agreements with the PCs. At some LBCs, PCs are mandated to bring guarantors who will be mandated to pay any losses made by the PC upon refusal. In recent times, some LBCs' collateral requirement have gone beyond cocoa farms and building plans to an extent that these guarantors must be salary workers in formal organisations. According to the interviewees, it is easier for such workers to pay for any losses than those in the informal sector. Within the contract, the companies stipulate all standards required in the purchases to include the purchase of good quality cocoa, commission rate based on quantity bought, among others. The study revealed that while this system exists, its application is somewhat ineffective. The implication is that, though a contract exists, these LBCs face a contractual risk in the sense that in the incidence of a breach, the contract fails to provide enough remedies. Indeed, if a law fails to exact compliance or punish for breach, that law is only as good as a "slogan". A District Manager laments:

The contract is such that when the PCs are not able to meet the contract demands, the LBC will have to fall on the guarantors to assist, but because of some clauses, LBCs are not able to force the guarantor to pay whatever their

agent could not supply. The guarantor will only have to go and look for the PC who will be required to pay. But when the guarantor is unable to find the PC, nothing in the contract forces the guarantor to defray the debt at all cost.

Technical Risks

When the LBCs fall on PCs to purchase cocoa from the farmers, it goes beyond mere purchase to include the purchase of quality cocoa beans. This is especially relevant to players due to the premium Ghana enjoys at the international market for its known quality cocoa beans. The COCOBOD is particularly keen on the quality of the cocoa that it purchases from the LBCs and so there is every attempt by the CMC to reject any less quality cocoa beans. LBCs are equally keen on quality as it is one of the major determinants of their performance and success and so it becomes expedient that these PCs had the technical knowledge to purchase quality cocoa beans and other purchase requirements. However, some PCs lack the technical know-how relevant to purchase the best quality cocoa beans, yet, they are usually pre-financed before any poor performance is recorded. As an LBC zonal manager in charge of district depots explains:

The technical risk that LBCs face during the purchasing phase relates to quality. To get the required quality, it will necessitate the use of appropriate instruments and test materials to check for the moisture content and other quality requirements. However, most LBCs do not have such testing instruments and materials for the PCs to test right at the societies for the required quality. As such, these PCs usually employ manual testing procedures, and so most of the beans supplied to LBCs do not pass the quality tests made by the QCC officers.

The LBCs usually detect such incompetence only after the receipts of cocoa from the PCs. Sometimes too, the quantity is not up to standard because the PC was unable to read the scale measurement with precision. While this sometimes result from faulty scales, there are also other instances a PC simply cannot read the measurement on the

scale with precision, causing shortages at the LBC and consequently prolonged cycle times. As one district manager puts it:

Not that these PCs do not care about the required weight per bag of cocoa, but the primary issue is that most of these PCs lack the technical know-how to measure the weight of the cocoa with precision. Consequently, after the receipt of cocoa supplied by the PC, some of the bags may weigh above or below 64kg, which is COCOBOD's standard weight per bag of cocoa.

But perhaps, more telling was the response of an LBC district manager:

In relation to our (LBC) operations, one major technical risk we face with the PC relates to the skills they (PC) usually claim to have with regard to how to operate the scale for weighing cocoa during insourcing from cocoa farmers at the societies and all other cocoa trading activities. Yet, most of these PCs find it difficult to make the right adjustments to the scales to avoid possible quantity losses and some other PCs also lack proficiency in basic accounting and mathematics to an extent that computing the amount payable commensurate with the weight in kilos becomes a problem. In one of my (manager) experiences with a PC who landed into huge losses, the PC's suppliers (farmers) exploited him (PC) when these farmers realized the PC did not have much skill in the scaling and cost computation.

When this happens, the LBCs attract additional cost resulting from rejected cocoa beans by the QCC. For NTDs, reconditioning will usually mean that the quantity is reduced. While the LBCs sometimes charge this loss to the PC in question, there are other costs that they would have to bear themselves. On this, a district manager at the Ejisu Juaben explains:

When the cocoa does not pass through the QCC's quality test, the obvious consequence is additional cost. In the case of NTD, reconditioning the cocoa for retesting implies that the LBC must employ excess capacity in terms of labour. While the PCs are charged with some of such resulting costs due to quality failure, there are still others like labour that must solely be borne by the LBC.

Commercial Risks

Another serious risk that is frequently faced by LBCs is commercial risk. Because of competition, every LBC tries to do something to please its farmers through the PCs to sustain their loyalty. To this effect, LBCs periodically donate farm items and other

products to farmers to assist and motivate them to increase their yield. This is a trade secret that the LBCs would sometimes wish to use as a competitive weapon. However, because most PCs do not only operate with one LBC, such information is easily leaked to other LBCs. While they are obliged by the contract not to reveal any such secret about the company to any other person, most PCs would not pay heed to it due to the obvious loyalty they themselves enjoy from the farmers through such leakage. A group of LBC district managers lament:

Due to competition in the cocoa trade, one PC may be a supplier to more than one LBC at a given time period. As a result, these PCs easily leak an LBC's trade secrets to other LBCs for competitive motives. For instance, when a PC sees that LBC A has supplied cutlasses to his (LBC) upstream suppliers (farmers) as a strategy to maintain a source of supply, then the PC will leak such information to LBC B. Here, the PC's interest is that once the farmers benefit from such social initiatives, these farmers are motivated to increase their cocoa yield and consequently the PC also benefits from increased commission resulting from increased capacity to supply more bags of cocoa to the competing LBCs.

On this issue, the study sought to find out if COCOBOD had any policy that restricts a PC to provide an exclusive service to an LBC. While such policy could potentially reduce the incidence of losing trade secrets and shaping ethical behaviours in the chain, there was no such policy. According to some LBCs, it is the contract they enter with the PCs that stipulates that the PC is obliged not to leak out any company secret. As a district manager in charge of an LBC depot explains:

At the time that PCs are filling their guarantor's form, they (PCs) are instructed not to reveal any secret about the LBC in question to any other LBC, organization or person, whether in business with the LBC or not.

Another commercial risk that the LBCs also face is that, due to competition, to access supply from PCs will require that their activities are pre-financed. The commercial risk that easily results is that because a PC may have other buyers (LBCs), an LBC's money may be used to buy cocoa for another LBC for various reasons. Sometimes,

the one who arrives first gets access to the produce or alternatively, to meet a debt owed an LBC from previous transactions. According to a district manager:

When a PC supplies cocoa to more than one LBC, the PC may use the money advanced by LBC A to purchase cocoa for LBC B. In this wise, the competing LBCs must be tactful in their dealings with the PC, otherwise for example, the LBC that delays in picking up an order from the PC's shed at the society will fall a victim.

But perhaps more telling was the response of a district manager of a different LBC:

LBCs always face commercial risks with these PCs. This is the format the commercial risk takes; an LBC gives money to a PC for 50 bags of cocoa given a supply lead-time of one week. At the said time, the LBC's truck for transporting the cocoa from the society to the district depot breaks down and so the lead time increases with about three days. On the eleventh day, the LBC gets to the PC's shed and the PC explains that he (PC) has still not received any produce from the farmer. Meanwhile, the PC has taken the delay as an opportunity to supply such produce to another LBC and already enjoyed the resulting profit. The idea is that, the PC would hope to quickly make another supply available before the arrival of the LBC in question to enjoy double profits but the time gap usually will not permit it and the LBC must consequently bear the resulting cost from a long response time by the PC.

From the interviews, it was further revealed that commercial risk seems to be one of the most reoccurring risks as these PCs end up misusing the funds they receive from the LBCs. The resulting game from this is obvious; 'rob Peter to pay Paul' or at worse be at large. Inquiring from the interviewees if this was frequent, one of the district managers strongly states in affirmation:

Yes, commercial risk frequently occurs in the cocoa trade. Let the LBC make the slightest delay at picking supplies from the PC at the society and a competing LBC will quickly take a lead. Last year, I (district manager) lost 40 bags of cocoa through the same act. Indeed, through an investigation, there truly was a produce at the PC's shed at the time he (PC) had transferred such information to the district depot and made a request for the primary evacuation. But due to delay, our (LBC) truck got to the society and no produce was available; another LBC had already gone for them. When this happens, the PC does not give any rational excuse; what he (PC) will say is that, ooooh the other LBC has come for it. When you (LBC) ask him (PC), do you owe the other LBC? He (PC) will respond, yes. Where is my money, the LBC will ask? Then the PC will respond, ooooh I have given it to the farmers, which is a lie. These PCs, they are bad oooo. I (LBC) have even arrested a PC who is in police cells as we speak.

The interviewee also explained another commercial risk by saying that:

Another commercial risk also is that an LBC will be trading with a PC alright, not knowing the PC has a different business he (PC) is doing altogether which he (PC) will never disclose such information to the LBC. So the LBC may advance money to the PC to purchase cocoa for the LBC, but by the time the LBC gets to the PC's shed at the society to pick the produce, another LBC has already picked them, or perhaps no produce is available because the money is locked up in a different business of the PC. A common excuse given by most PCs is this, 'my father was sick, so I (PC) used the money to take care of him so give me (PC) time to recoup the money'.

Interestingly, as was revealed by the interviewees, most of these PCs think that the LBCs must understand and be patient with them. Indeed, this is reflective of a lack of business ethics that requires that chain partners separated personal issues from business transactions for sustainable gains. While meeting the social needs of PCs is in itself very important for a sustainable cocoa chain, socially sustainable initiatives are only merited on the grounds that such efforts will yield overall sustainable benefits.

Reputational Risk

Within the cocoa trade, the reputation of an LBC's supply chain is a very important determinant of the purchase decision of international buyers, especially for traceable cocoa. One key aspect of reputation is child labour, and particularly for traceable cocoa, international buyers require that LBCs go through certification and verification as a proof that its supply chain is devoid of practices that impact negatively on sustainable goals. Yet, child labour seems to still occur at the farmer stage of the chain, to an extent that those who practice it hardly find any social or economic justification for not employing their children for their farm operations. For those who understand the future implication but continue in its practice, most of them attribute such practices to poverty; arguing that the poverty makes it difficult for them to

employ the right labour for their farm operations. Not only that, inadequate access to agro-chemicals and other farm inputs by these farmers also result into the use of inappropriate farming methods. This threatens future purchases of cocoa especially in light of the recent speculation of future deregulation as regards the government being the sole buyer of cocoa in Ghana. A district manager asserts that:

For the child labour issue, it is a major concern to the external buyers. But when it comes to the farmers, they don't see it that way. He (farmer) says, he is the one who caters for his child's education and the child is on vacation. A farmer says for instance, how can I pay for my child's school fees when I must solely carry cocoa whilst my child stays at home? So you see, these farmers use their kids on the farm to do more than what the kids are expected to do.

Another district manager explains the consequence of the above by stating that:

For the LBC, if it is identified by the external buyer that child labour exists at the initial source of or along your chain, you have a big case.

Employee (PC) Turnover

Because of the rising competition among LBCs, there are instances that high performing PCs can be poached by other competitors. To make matters worse, once a PC is lost, it is likely for the LBC in question to lose the upstream suppliers (farmers) of that PC. Not only that, opportunistic PCs may misappropriate the monies given them for pre-financing their activities and consequently abscond. According to one district manager:

An LBC may have a very good PC that it will not want to lose. But by the time you realize, another competitor has poached him and you will lose the person, which can be a very big blow to the company. And then there are other PCs too who are bad, they don't operate well and by the time you realize they have also absconded. I have one person running away, last year one person run away, this year another person has run away. What I know is most of them misuse the money and when it gets to a certain point they realize they cannot fight this debt again, then the last resort is to run away because of the debt accumulated.

Performance Risks

While there are some performance risks issues with PCs as regards the purchase of quality cocoa beans, there are also those that relate to drivers during the primary evacuation of cocoa; from the societies to the depots. The interviews revealed that, because drivers are paid on salary basis which does not vary with the number of pick-ups, there are instances where these drivers play some sort of delay tactics so as to reduce the runs per period. To elaborate on this, the manager cites an example by stating that:

Sometimes when depot drivers are tasked to evacuate cocoa from the society to the district depot, they play some kind of delaying tactics. For instance, even when the driver has the capacity to embark on three runs per day, he may go only once and give flimsy excuses.

This was seen to be one of the primary reasons why District Managers are sometimes not able to meet the cycle time requirements and consequently their turnover. This is because the more the cocoa flows into the depot and are graded, then the District Manager is re-inbursed for subsequent purchases. Not only does this affect the District Manager's performance, it can cost the LBC as a whole, in the sense that, as soon as the LBC receives a loan for purchasing cocoa, whether from the government or private source, the interest rate counts immediately and so until the cocoa has been dispatched to the port and the company is given a Certificate of Taken Over (CTO), the interest continues to accumulate. Obviously, this is a drain on the profitability of the LBC and consequently the value of the supply chain. One interviewee stresses:

So until the cocoa comes from the bush to the port for the issuance of CTO, it means the interest on loans will be accumulating.

Environmental Risks

The major environmental risk that threatens sustainable purchasing goals is rainfall. While rainfall is a relevant catalyst for increasing the yield of cocoa, it equally poses a

great difficulty for LBCs to embark on effective primary evacuation. This is so because during the rainy season, coupled with the fact that drying, conditioning, bulking and loading of cocoa onto trucks at the society sheds become extremely difficult, due to poor transport infrastructure (mainly road) at the societies, most of the roads at the societies become inaccessible due to flood which makes primary evacuation difficult and sometimes simply impossible. This incidence prolongs the cycle times of the LBCs during the rainy seasons, and as noted already, the obvious consequences are reduced turnover and accumulation of interest rates on loans that reduce profitability. On this issue, a group of district managers interviewed observed that:

When it is raining every day, you cannot even carry the cocoa from the shed into the truck. Because by the time you finish, it is wet. So that is one aspect. Then the major aspect is the inaccessibility because of the flood and blocked roads. And not that alone, when it is raining so much too you can buy the cocoa but you cannot dry it, condition it, bulk it and to grade it. So you will buy it and it will be lying there until you get enough sunshine.

The time it will take to finally deliver the cocoa at the takeover centre in order to access the CTO will prolong beyond normal that the interest on acquired loans also will accumulate drastically. And from Management, you can see that, that aspect of the issue is really eroding our profit very much.

8.2.1.2 INTERNAL OPERATIONS RISKS

Primarily, the internal operations of the LBCs include reconditioning (such as drying), grading and sealing, etc. During these activities, there are some risks that LBCs face that range from economic, social and environmental factors.

Risk of Shrinkage

After quality test by the QCC at the district depots, if the cocoa is rejected various options exist for the LBC. On the basis of NTD, LBCs will usually need to recondition the cocoa beans for re-testing. Under such incidence, there is the risk that

after the re-conditioning process, the cocoa will shrink than before, implying a weight or quantity loss. Not only that, where there is add-mixture, the separation will also mean loss in quantity. This means that, what had previously been weighed as 64kg will be less and the LBC will need to top up to meet the requirement of QCC. In some cases, the cost may be shifted to the PC in question, but while this may reduce the company's cost burden in some sense, it equally has other implications that may potentially affect the company's performance. For instance, there is re-work due to sewing of sacks that attracts additional labour costs. Additionally, as per a given period of time, the company's fill-rate may reduce. Also, the associated costs of transport, material handling, inventory holding and other operational expenses may be difficult to fully charge to the PC, implying increased cost to the LBC. One district manager explains:

When the cocoa is rejected, on the basis of NTD, then definitely you will need to recondition them. There will be losses because it deals with weight. And then when you are also reconditioning add-mixture, it also leads to loss of weight. These are the two main risks that affect the weight. Other costs such as sewing of sacks don't necessarily reduce weight, even though sometimes you will incur some losses. For instance there will be the need to pay labourers to re-sew the cocoa bags, dry and pack the cocoa on pallets at the depot warehouses, etc. but for NTD and ad-mixture particularly, there will be reduction in weight and that is a serious loss to the company.

Employee Turnover

It was also revealed that there are also incidences of poaching of District Managers among the LBCs. The most common reason that respondents gave for employee turnover is remuneration. While most LBCs have essentially similar remuneration structures, there are other alternative sources of remuneration that sometimes make some LBCs relatively more attractive than others. For instance, in some cases, there are additional quantities of beans that farmers, by informal agreements add up to the bags sold to PCs as compensation to the transport and other expenditures borne by the

PC during the primary evacuation of cocoa to the district depots. And so after grading of cocoa at the district depot, the excess of cocoa beans are usually shared by both the PC in question and the District Manager. And this can be enough motivation for an employee to move to another LBC where the availability of such alternatives is relatively better. Additionally, some District Managers move to other LBCs due to the absence of promotion and recognition, especially after long service. One district manager gave examples of the rationale for employee turnover among LBCs:

When LBCs realize that you are a very functional manager in another LBC, then they find a way of luring you to work for them. I (manager) can use myself as an example. I used to work at OLARM with some other employees, now also managers of other LBCs such as Amajaro. Currently, because these managers knew my capability while we worked together at OLARM, most of them are now trying to pull me from my company into theirs. Quiet apart from this, an employee of an LBC might think that he is doing a good job at his present company and so deserves to be promoted but for so long a time has not received such consideration. That can also cause him to leave. Other employees also leave their companies because of a lack of recognition. For instance, an employee might be working very efficiently, but the management will pretend they have not seen such performance or perhaps, they may be passing comments as though such worker is dysfunctional.

Environmental Risks

For LBCs who use smaller depots, they normally do most of the internal operations outside the depot, and so changes in weather conditions can affect their activities. The usual consequence is a prolonged cycle time, especially in the case of NTDs where the drying process prolongs than normal. A district manager asserts:

So if your stock is outside, it means you can't work on it until the weather becomes favourable and it will affect the operations.

8.2.1.3 WAREHOUSING RISKS

It was also revealed from the interviews that, among the risks that LBCs face as they relate to their warehousing function include: spoilage, theft, pest infestations, among others

Risk of Spoilage

One of the most recurrent risks during the warehousing function at the LBCs is spoilage. During the beginning of the cocoa season, most of the LBCs receive supply of cocoa in greater quantities, usually above the rate at which it is graded and sealed by the QCC for secondary evacuation of cocoa to the takeover point. As a result, there are increased levels of stacking at the district depots. Due to the weight of the cocoa bags and the fact that the warehousing function is predominantly manual, the FIFO operation becomes difficult to implement, since the initially packed bags of cocoa fall below the heavy stow at the warehouse. As such, those that fall below the stow easily get spoilt or damaged, simply because they might not be thoroughly dried or the moisture content may have affected its quality. A district manager explains:

What happens is that, as the depot keepers are working on the newer consignments of cocoa for dispatch, there are times the busy period can cause an oversight in handling older consignments and checking for quality. By the time these employees have the chance to work on such older consignments which are stacked beneath the stock at the warehouse, most of them are already spoilt, simply because they might not have been thoroughly dried (NTD).

Risk of Theft

It was also revealed that, at the peak seasons of supply as increased levels of cocoa flow into and out of the depot, counting and other operational activities also get extremely difficult. Due to the busy nature of operations at the depots, most of the depot labourers also take advantage to steal the cocoa beans, especially when the district manager losses count. In the view of the district managers of the various LBCs:

Because of the stacking and how the cocoa will be flowing into the depot and evacuated from the depot, counting also becomes a problem so the depot labourers also take advantage to steal when the district manager is not on guard.

Risk of Pest Infestations

There is also the incidence of pest infestations at the warehouse that usually result from stock that have stayed at the warehouse for a considerable length of time. While most LBCs would wish that the cocoa beans are quickly evacuated to the takeover centre, there are some factors that make this difficult. Apart from the problem of NTD, there is also the challenge that results from the fact that the graders of the cocoa are third parties to these LBCs and so until the QCC has graded the cocoa and attached a seal onto the sack, the LBC has no legal right to have the cocoa evacuated or dispatched to the CMC or port. Due to this, LBCs must periodically fumigate or spray the warehouses with insecticides to reduce the impact of spoilage from pest infestations and this in its sense attracts additional inventory holding cost. In the view of a district manager:

The graders (QCC) are third parties to our (LBC) company and they work according to their own pace. And until cocoa has been graded by the QCC, we (LBC) have no legal authority to dispatch the cocoa to the takeover point. Additionally, because PCs usually supply cocoa with poor conditions such as NTD cocoa, it becomes necessary that such cocoa are re-conditioned to meet COCOBOD's quality standard. Such a process prolongs the period of internal operations at the depot for the final evacuation of the produce to the takeover point.

Environmental Risks

The nature of the depot warehouse is very important because, some of the depots are built and they have skylights. So if an LBC does not have a very good warehousing structure, humidity becomes high in the room and that affects the quality of the cocoa. And so after grading any delay in evacuation to the take-over centre can easily result into quality problems. As one district manager asserts:

And because of that, even the quality officers find it difficult to even come and work in such depots.

Thus depending on the nature and environment around the depot warehouse (e.g. big trees all around the depot), the humidity can potentially cause quality problems.

8.2.1.4 OUT-BOUND TRANSPORTATION RISKS

LBCs embark on two major forms of transportation; primary and secondary evacuation. Primary evacuation is the inbound transportation of cocoa from the societies (cocoa growing villages) to the district depots and the secondary evacuation, which is outbound transportation, deals with the movement of cocoa from the depots to the takeover point. The predominant risks that threaten sustainable goals during the secondary evacuation of cocoa include: robbery/theft, accidents and spoilage from rain fall, etc.

Risk of Smuggling/Robbery/theft/short-landed

The smuggling of cocoa was revealed as a common occurrence in the cocoa industry. Smuggling of cocoa is usually caused by armed robbers who attack transporters as they transport cocoa from the LBC depots to the take-over point; trucks are sometimes redirected from their intended destinations by armed robbers. There are also instances of theft by the truck operators that reduce the quantity en route, and in the cocoa trade, this is commonly referred to as short-landed. To throw more light on such occurrence, a district manager of an LBC narrated that:

There was a recent case of my company experiencing smuggling of cocoa during the transportation of cocoa from the district depot. These robbers sometimes have business with the CMC or other LBCs who sometimes conspire and plan such smuggling operations. Another one is that, I loaded a truck with 600 bags of cocoa, at the port only 550 bags of cocoa were unloaded from the truck.

Outsourcing Risk

While the use of third parties for the secondary evacuation of cocoa to the take-over point presents great opportunities to most LBCs in managing enormous risks like theft, such tradeoff also implies absorption of other risks. Typically amongst them is performance risk, a major consequence being prolonged cycle/lead time for LBCs. Performance risk in the sense that some third parties make performance promises that usually fall below their capacity levels with little or no expansion strategies within the short-term. Such gaps in capacity create undue inflexibility in meeting demand lead-time. Additionally, the frequent break-down of transporters' trucks resulting from poor truck conditions, also increases the lead time. Some LBC district managers complained that:

Sometimes these third parties will lie that their trucks can load higher than it really could; the obvious risks being vehicle breakdown and police interception. The third party can say for example that his axle weight check is ok and that he will sail through, but would fail on the way, sometimes, way before the takeover point.

To the LBC, the cost impact of performance risk moves beyond a low response rate. Equally relevant cost which is of much concern to these LBCs is the continuous accumulation of interest rate on acquired loans (including seed fund from the government), in the sense that until COCOBOD has received the cocoa and a certificate of taken-over (CTO) is issued, the LBC cannot make claims for any payment.

Risk of Accident

Due to inefficient transport systems such as poor transport infrastructure (trucks, roads, etc.) there are times that cocoa trucks get into accidents and break-downs. Under severe conditions, a great level of cocoa is lost. In less severe cases, the cycle

time is prolonged due to repair works and other times, robbers attack these break-down trucks.

Risk of Spoilage

There are instances where cocoa get spoilt en route the takeover point. Apart from the incidence of accidents, spoilage also results from rainfall due to poor tarpaulin covers on the trucks. While not all wet cocoa beans may have quality problems, the LBC must in most cases, bear additional costs of re-conditioning the cocoa. In the case of outsourcing arrangements however, most of these quantifiable costs are borne solely by the third party but the LBC still suffers from the cycle time effect. As a district manager puts it:

When cocoa beans being evacuated from the LBC district depots to the takeover point get wet due to rainfall, on arrival at the takeover point, such cocoa are sent to the shed of the LBC in question for re-conditioning. In that case, the LBC bears the re-conditioning and other associated costs, but where it employs a third-party, such costs may usually shift to that company.

It was also revealed from the interview that the risk of spoilage occurs frequently due to the inefficiencies in the outbound transportation function, especially at the port when there is an incidence of long queues and trucks have to wait to be offloaded. An LBC district manager remarked that:

Recently as a result of a choke at the port, it happened that over 4000 trucks of cocoa were caught up in delays in off-loading. When this happens, it means the truck can also be there for months without being off-loaded and if there is a rain fall, by the time the bags of cocoa are off-loaded from the truck, most of them would be spoilt.

8.2.4 CMC (COCOBOD) LEVEL RISKS

Interview and focus group discussions with some selected staff of the CMC revealed enormous economic, social and environmental risk factors at this stage of the cocoa

chain. These are discussed according to the four major SCM phases; *purchasing, internal operations, warehousing and out-bound transportation.*

8.2.4.1 PURCHASING/INSOURCING RISKS

LBCs are the first tier suppliers of cocoa to the CMC. Once cocoa arrives at the CMC depot, it must be received into inventory. During the receipt of such cocoa, the CMC predominantly faces the risks of shortages and add-mixture.

Shortages

As in the case of other chain players, the CMC also faces the risk of shortages. Though cocoa that are transported to the CMC depots usually have seals affixed to cocoa bags by the QCC, it is surprising to find that at some instances, some of the bagged cocoa beans weigh below the required quantity or scale per bag of cocoa. A major cause of this problem, as was revealed, results from the relatively lower personnel for the quality checks at the LBC depots. Thus, due to the thousands of buying centres, and the relatively fewer QCC personnel, it usually becomes practically difficult to test all cocoa bags for quality and weight. As a result, the best approach is sampling and this obviously does not provide a hundred percent error-free check. Consequently, some bags of cocoa do not carry the quantity of cocoa required for such seals. As an Area Manager explains:

There are many LBCs in the cocoa trade and the QCC is supposed to work on all of them but the QCC personnel are woefully inadequate. After examining the cocoa at the district depots for quality, it will be expected that the weighing equally goes on effectively. Sometimes however, the weights we (CMC) record show such tests are not properly done by the QCC.

Also in some cases, the slightest negligence on the part of the QCC staff results into some depot workers at the LBCs mixing up unexamined cocoa with examined ones

and such consignments are shipped to the CMC. Furthermore, due to some personal relationships between some staffs of the LBC and QCC, there are cases where the standards of the quality test are relaxed. Also getting to the end of the cocoa season, there are incidences where some LBCs are unable to meet the quantity required of them by the COCOBOD for which they have been advanced with money for the purchasing of cocoa, and so getting to the end of the season, some LBCs mix quality cocoa with foreign materials like stones to make up for the expected weight. While the CMC is able to trace the LBC in question to return such cocoa, the repercussion is that it prolongs the cycle time of the CMC in getting cocoa ready for subsequent export. This reduces Ghana's competitiveness on the international market. The manager explains:

You see, the challenges that we face, first is quantity. In Ghana, everybody is looking for a way to survive. You are supposed to bring cocoa to us let say 64kg, you will deliberately bring it at 63.95 or 6, now if you take the difference by 600 bags, it will be significant. But they will intentionally bring cocoa lesser than that. But here due to the weighing bridge, anything less will not be taken. Let's say .0001 will be rejected.

Add-Mixture

Over the period, Ghana has enjoyed a relatively high premium due to its quality cocoa beans. Yet, there are lots of quality issues that threaten the sustainability of this premium status. A major threat is the issue of add-mixture, where quality cocoa beans are sometimes mixed with poor quality cocoa beans and/or other foreign materials. While it is known in the industry that cocoa from Cote d'Ivoire is of a relatively lower quality, some PCs buy cocoa from such countries and mix them up with that of Ghana for profit motives. As the manager asserts:

Some PCs buy cocoa from neighbouring countries due to the fluctuations of the currency (foreign exchange) in countries around Ghana. So where these PCs see a rise in the prices of cocoa in a particular country, then they will

transport the cocoa there for trade. Especially, for farms on the border line, PCs easily go out and come into the country.

This presents a major challenge to stakeholders in the cocoa industry, especially in the wake of increased competition at the international market. Ghana's competitiveness at the international market has been highly dependent upon its known quality beans, and should the problem of add-mixture persists, its sustained reputation can be lost. The obvious consequence will be reduced market share. Although COCOBOD has been generally effective in maintaining strict quality standards within the industry, this trend if continued does really question if Ghana's reputation and supply patterns are sustainable. It will thus, essentially require the QCC to strengthen its quality standards for improved performance for competitive gains.

8.2.4.3 WAREHOUSING RISKS

The predominant warehousing risks at the CMC stage include spoilage, health and theft.

Spoilage Risk

Before the final evacuation of cocoa to the takeover point or to the local processors, the CMC stocks the cocoa for a period of time. During this time, there are cases of spoilage that result from a number of factors. Once cocoa arrives at the depot, they must go through quality checks after which they are stacked in the depots of 1000 tons of cocoa per depot shed. Because of the manual nature of the warehousing function; from offloading to the dispatch of cocoa from the shed to other downstream buyers, a number of accidents occur. In the cause of arranging the cocoa for example, some of the bags fall from the height and the beans from torn bags may fall below the

stock and if not picked quickly, such beans easily get damaged. This usually reduces the quantity requirements at the CMC.

Health Risks

To control for damages to cocoa beans resulting from pest infestations, the QCC periodically fumigates the cocoa at the sheds before onward evacuation of the cocoa for export or to the local processors/buyers of cocoa. The chemicals for the fumigation exercise are powerful and very harmful to human consumption. Staffs at the sheds inhale the chemicals which has associated long-term effects. Though the QCC staffs that perform the fumigation exercise wear protective coverings, other operating staffs at the depots do not, and as they inhale, get affected. Though the COCOBOD has made provision for periodic health checks, this appears to be more of controlling mechanism than a preventive one, and so only reacts to the risk than prevents it from happening entirely. On this, a group of operations employees interviewed complained that:

The chemicals we use to fumigate the cocoa bring a lot of health issues. Because the white thing that you saw is inertia gas and when you inhale you can even get paralyzed. So when they are doing the fumigation, they put on some nose mask to prevent the inhalation of that gas.

Far from that, we have fogging. It is an activity more or less in spraying form, but this one is in the form of a smoke. So there are basically two activities that QCC does to preserve the stock we get in the shed. That is how we do the preservation in order to ensure that they don't get infested. So the fogging activity, they have chemicals they spray and it comes in the form of a smoke. They do that on Mondays, Wednesdays and then Fridays. During the fumigation, you saw they placed some chemicals there, they were in white packages, that is what they use in fumigating. It is very powerful and very poisonous. Even in disposing them, we are instructed not to even expose them, because they can cause harm to the environment.

8.2.4.4 OUT-BOUND TRANSPORTATION RISKS

Predominantly, the major risks that the CMC faces in their outbound operations are over-supply of cocoa and smuggling or theft.

Over-Supply

As already stated above, the operations from receipt to dispatch at the CMC are predominantly manual and so, the slightest negligence by any supervisor of any operations can result into shortages or surpluses. During the evacuation of cocoa from the depots, there are instances where oversights result in labourers overloading the trucks. This was revealed as the major problem to the many recorded cases of shortages at the depots. For the inbound operations, due to the weighing bridge, it becomes extremely difficult to accept shortages into the depots and such cases are minimal. On this, a group of employees interviewed observed that:

Another risk factor is that during evacuation if you are a depot keeper and you do not take proper care, as to the counting, you may overload the truck, especially if it is not going to the local factories here. If it is going to the port, the hauler who is dispatching the cocoa may along the line, knowing very well that it is overloaded, will sell the surplus. At the end of the day when the audit people come and do the auditing of stock, your ledger will show that you have lost so much.

Sometimes, it may not be that there has been any theft, but during the process of evacuation, if you are not careful you may overload the truck. So at the end of the day if your books don't reconcile with the quantity available, you may not even be given the opportunity to pay, but sacked straightaway. So in that aspect, those of us within the depot level, when you are evacuating and you are left with the last aspect of the consignment to be loaded, you will see that a lot of calculation goes on. Sometimes, you can't even sleep, if you know you are emptying your shed tomorrow. It is not pleasant, so sometimes we want to even avoid taking over cocoa. That aspect of our job, you see that people are not interested.

Theft/Robbery/Smuggling

The cocoa industry is well noted as an area prone to smuggling. There have been numerous cases of robbery as cocoa is being evacuated for onward export. This is

worsened during cases of break-downs where trucks must be packed along the streets for repair works. As the head of the centre puts it:

Because it is generally known in Ghana that cocoa is cash, once cocoa is stacked on truck and being dispatched, everybody's eyes are on them and when it packs somewhere, robbers get to know about it quickly.

This is a major risk to cocoa haulers who act as third parties to the outbound operations, specifically the dispatch of cocoa. Where the outsourcing arrangement requires the third party to fully manage such function, the third party must fully bear the consequence of such risk. But even so, such risk transfer impacts on COCOBOD's competitiveness, especially in terms of its operational performance. Where there are shortages, Ghana's tradable cocoa reduces and if this persists, Ghana's market share at the international front will consequently reduce.

Indeed, Ghana's domestic cocoa chain is exposed to enormous risks, from the farmland to the take-over point. These risks range from economic, social and environmental. At the various stages in the chain, almost all the supply chain phases recorded various forms of risks. The most occurring risks across all these actors include: spoilage, theft, add-mixture, shortages, pest infestations and poor quality. Among the major actors in the domestic chain, LBCs bear much of these risks followed by the farmer, then the PC and finally the CMC. While the existence of risk in itself does not impact on the performance of a supply unless for the state of vulnerability, it is important to note that, it does really present a major threat to the sustainability of that chain. In other words, it is only when a supply chain is vulnerable that a threat can impact on its performance. This does require that, actors in the cocoa chain put in stringent measures to manage the risks that they face. While the challenges they face in managing such risks were not the focus of this paper, the

interviews revealed that actors face a lot of difficulties in managing those risks. This implies that, the chain players stand to improve on their competitiveness if these challenges are reduced.

8.3 DISCUSSION

This section presents a brief discussion of both the quantitative and qualitative findings taking into consideration the objectives of the study, literature review, and the conceptual/theoretical model developed for the conduct of the study. In this work, a mixed method approach was employed to assess the sustainability of the cocoa supply chain in a developing economy context, specifically Ghana. Firstly, a quantitative method was used to empirically investigate the direct influence that SSCM initiatives can have on the competitive performance of firms and the role played by four SCM Improvement Programmes. The second part employed a qualitative approach to empirically map the flow process of cocoa in the domestic chain and the risks peculiar to actors within the chain relative to four supply chain phases; purchasing, internal operations, warehousing and out-bound transportation.

Firstly, consistent with recent literature (Carter and Rogers, 2008; Mefford, 2011; Seuring and Muller, 2008; Golini et al., 2012), the study found empirical evidence that demonstrates that the three major dimensions of sustainability; economic, social and environment have strong integrating or cross effects. Correlation results showed that social and environmental dimensions were positively and significantly related supporting hypothesis 1 which states that there is a positive cross effect between social and environmental dimensions of sustainability which confirms Mefford (2011)'s argument that environmental programmes do not only directly affect the

environmental performance of the focal firm but foster some social gains that foster good business operations. Thus actors who invest in socially sustainable practices stand to improve their environmental performance and vice versa.

The same conclusion was drawn between social and economic dimensions. Correlation coefficient between social and economic dimension was very high and significant confirming what literature espouses that socially responsible business practices affect shareholder value and reduces financial risks (Mefford, 2011; Lee and Faff, 2006; Awaysheh and Klassen; 2010). Thus, aside their direct social impacts, social initiatives carry economic impacts that augment economic efforts undertaken to improve financial performance of the supply chain. The reverse is very true. On economic and environmental dimensions, again, correlation coefficient was not only positive but significantly high illustrating that there is a positive cross effect between environmental and economic dimensions of sustainability confirming literature. A typical argument in the literature posits that the application of environmental strategy to production processes leads to improvement from both environmental and economic point of view (Colicchia *et al.*, 2011). Hence, the study was able to expand former literature by studying the economic, social and environmental dimensions of sustainability relative to four supply chain phases; purchasing, internal operations, warehousing and out-bound transportation.

Then also, the study has established that a positive and significant relationship exist between engagement in sustainable practices and the competitive performance of players in the chain. Indeed a number of empirical works have confirmed the linkage between sustainability and competitive advantage (Kaufmann and Carter, 2010;

Rogers and Carter, 2008, Closs *et al.*, 2010; Vasileiou and Morris, 2006; Markley and Davis 2007; Hart 2007; Flint and Golicic, 2009; Mefford, 2011; Golini et al. 2012), suggesting that practicing the tripod pillars of sustainability ultimately leads to improved profitability and efficiency over the long term (Closs *et al.*, 2010).

On the general sustainability debate as to whether focusing on one strand of sustainability will result in same improvement in sustainable outcome as focusing on all strands of sustainability, the study revealed that among the sustainability dimensions, overall sustainability has the strongest impact on overall competitive advantage followed by economic practices even so the effect of economic practices was insignificant. The strong impact was rather observed for social initiatives; the rest of the sustainability objectives were positive but insignificant as well as having very weak effect on overall competitive advantage. These results point to the fact that engaging in the tripod objective (overall sustainability) brings best results than any form or combination of goals. Indeed, a case could be made for the fact that a unit could practice social initiatives in the cocoa chain and this will result in high performances in all dimensions with high significant progress in competitive advantage; yet results show that even so such an engagement does not compare to the kind of results a unit that engages in the tripod goal reaps.

This result disputes the argument made by Sloan (2010) that promotes prioritizing a single dimension of sustainability, though not the economic dimension and that of Kaufmann and Carter (2010) in which they deviate slightly from Sloan (2010) by illustrating that there could be no relationship between social and environmental performance. The results however confirms the views of other authors like Rogers

and Carter (2008) who somewhat insist that while it may be true that each dimension has an overlapping effect, it does not justify practicing only a single dimension as such a practice will only yield a second best result. According to them, true sustainability arises at the point where all three dimensions intersect and this requires multiple activities where an organization explicitly and comprehensively incorporates social, environmental, and economic goals in developing strategic vision and long-term strategic objectives. A number of empirical works also confer to the three dimensional focus of organization to derive long term economic outcomes (BSR, 2010; Goncz et al., 2007).

From the empirical evidence, cocoa players stand to achieve higher competitive gains by pursuing the triple bottom line approach. The argument raised is that there may, for instance, be purely social issues which may not reflect any environmental impact though the two are expected to be strongly positively related. A simple case for example may be initiatives to eradicate forced labour or working under hostile conditions. Meanwhile this particular scenario may be a very critical issue within the supply chain especially that of the cocoa chain. In this case focusing on one dimension will result in a second best outcome as deduced from Roger and Carter (2008).

Moreover, when the study specifically considered the sustainability performance of actors relative to competitors, it revealed a positive and significant moderation effect played by SCM Improvement Programmes on the direct relationship between SSCM Initiatives and Competitive Advantage. This result is consistent with previous contributions (Golini et al., 2012; Roberts, 2003; Bowne et al., 2001; Gold et al.,

2010; Jiang, 2009), suggesting that actors need to support SSCM Initiatives with specific investments aimed at: increasing visibility within the supply chain (Golini et al., 2012) such as actors engaging their stakeholders in their activities by proactively communicating their efforts, performance and goals (Roger and Carter 2008); identifying, analyzing, evaluating and either accepting or mitigating against uncertainty and potential losses, followed by the coordinated and efficient application of resources to monitor, minimize and control the likelihood or impact of detrimental occurrences whilst maximizing the attainment of opportunities within the supply chain (Roger and Carter 2008; Shrivastava, 1995); improving suppliers' performance, not browbeating them into charging less or simply auditing and rewarding them (Brown *et al.* (2001); enhancing collaborative relationships and strategic ties between actors and their suppliers (Hales and Arumugam, 2012; Golini et al., 2012).

Thus, this work adds empirical evidence to SSCM literature by confirming what was suggested by previous contributions (Golini et al., 2012; Zhu et al., 2007); that actors who wish to enhance the effectiveness of their SSCM Initiatives should rely on specific SCM Investments. This study's results are also in line with Vachon and Klassen (2008) cited in Golini et al. (2012) who argued that partnership approaches and collaborative programmes with suppliers have a positive impact on the performance of actors.

The study has also confirmed existing literature (Mohammed et al., 2011; World Bank Report, 2012) which illustrate that, the flow of cocoa in the domestic cocoa chain starts from farmers to LBCs, through PCs and finally to the COCOBOD. COCOBOD is the major downstream end consumer of unprocessed cocoa, who further trades the

cocoa mainly at the international market and a few of its purchases to local processors of cocoa. The study finally sought to identify the risks within each stage that impact on goals of sustainability and how interests can be optimised for maximum benefit to stakeholders. The empirical evidence suggests that Ghana's domestic cocoa chain has high risks exposure ranging from social, economic to environment confirming previous studies (Hainmueller *et al.*, 2011; World Bank Report, 2012). Most studies on risk assessment in the cocoa sector have focused extensively on the very upstream of the chain (farmers). Thus by highlighting the risks across the various actors in the chain, from farmland to the take-over point and then the peculiar risks to each actor relative to four key supply chain phases; purchasing, internal operations, warehousing and outbound-transportation, this study makes two significant contributions.

8.4 CONCLUSION

This study thus contributes to the literature on sustainable supply chain management by providing empirical evidence of the positive and significant impact of SSCM Initiatives and SCM Investments on the competitive performance of actors in the cocoa supply chain. It is thus argued that this contribution can support previous literature's findings and stimulate further empirical research on this topic. Sustainability variables were measured against only four supply chain phases; purchasing, internal operations, warehousing and out-bound transportation. Future works should thus include product design and commercialization and reverse logistics to improve the scope. Then also, attention here was paid only to the domestic supply chain, thus not considering what other downstream players beyond COCOBOD are doing. In the end, attention has been limited only to some specific actors within the

chain; future works could examine if SSCM Initiatives and SCM Investments are promoted by other downstream actors for a system-wide analysis.

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CHAPTER NINE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

9.0 INTRODUCTION

This chapter presents a summary of the findings from both the quantitative and qualitative analyses, conclusions drawn from such findings and appropriate recommendations for a sustainable cocoa supply chain for all stakeholders in Ghana.

9.1 SUMMARY OF FINDINGS

The findings of the study have been summarized in seven major parts; in line with the research objectives as follows:

9.1.1 THE FLOW PROCESS OF COCOA

The study reveals that the flow of unprocessed cocoa beans in Ghana's domestic cocoa chain begins with farmers whose primary role is to cultivate cocoa and supply the unprocessed cocoa beans to other downstream players within the chain. The major supplier of inputs to these farmers for the cultivation of cocoa is COCOBOD. Cocoa farmers are predominantly concentrated at the Western, Eastern and Ashanti Regions of Ghana. The next major actor of the flow process is the Licensed Buying Companies (LBCs) who have the legal authority from the government of Ghana to purchase cocoa from these farmers. However, due to the thousands of farmers and their dispersed nature across many cocoa growing villages, LBCs have commissioned Purchasing Clerks (PCs) at various designated sheds (called societies) at vantage cocoa growing villages who on behalf of these LBCs, buy cocoa from the farmers. PCs play a very vital value adding role by consolidating smaller supplies from many

sources for onward primary evacuation to the district depots of the LBCs. Once a sizeable quantity of cocoa is recorded at the district depots, the Quality Control Company (QCC) of the COCOBOD grades and seals the cocoa which legally permits the LBC to embark on the next flow process; secondary evacuation of cocoa to the take-over point and at this point, the Cocoa Marketing Company (also a subsidiary of COCOBOD) takes over. The CMC purchases the cocoa from LBCs on behalf of COCOBOD for final shipment of the unprocessed cocoa to other downstream buyers, the majority of which are international buyers, and a few being local processors. While the Government remains the final buyer of cocoa within the domestic chain, it allows some LBCs to sell a small percentage of their purchases directly to other international buyers.

9.1.2 TYPES OF RISKS WITHIN THE COCOA CHAIN

The study reveals that Ghana's domestic cocoa chain is exposed to enormous risks that are unique to each of the major players in the chain. At the purchasing phase, the predominant risks facing farmers include stock-out and spoilage risks. Within their internal operations, farmers are exposed to environmental risks, pest infestations, risks of spoilage, shrinkage, theft and loss of cocoa land due to issues of litigations of property rights. Those that usually affect the warehousing productivity are theft and environmental risks. While not many, the transportation function faces the risk of injury from animal attacks and slippery footpaths. In the case of the PCs, the predominant risks are highly concentrated at the purchasing phase of their SC and these risks include weight loss of cocoa beans, theft and credit (failure of farmers to supply cocoa relative to credit/advance payment provided by PCs) risks. Within the internal operations, PCs face environmental risks while pest infestations mostly affect

their warehousing function. Apart from the bulking process which may sometimes require PCs to transport cocoa beans from the sheds of farmers, the primary evacuation of cocoa is a direct responsibility of the LBCs and so, the major resulting risk issues are borne by the LBCs.

Equally so, the predominant risks faced by LBCs relate to their purchasing function and these include the risk of poor quality supply, stock-out risks, contractual risks, technical risks, commercial risks, reputational risk, risk of employee (PC) turnover, performance risks and environmental risks. Those that affect their internal operations are risk of shrinkage, employee turnover and environmental risks. Warehousing risks that mostly affect LBCs are risk of spoilage, theft, pest infestations and environmental risks and those that relate to their out-bound transportation include smuggling of cocoa to neighbouring countries, robbery and theft, short-landed (shortages) sometimes resulting from theft, risk of outsourcing, accident and spoilage. Finally as regards the CMC stage, two major risks affect their insourcing phase; shortages and add-mixture while spoilage and health risks affect their warehousing operations. Concerning their out-bound transportation, the major risks are over-supply, theft, robbery and smuggling of cocoa, usually to neighbouring countries.

9.1.3 PATTERNS OF SUSTAINABILITY AMONG ACTORS

It is observed that for most parts, farmers do not engage widely in sustainable supply chain practices. They are highly involved in economic initiatives than environmental and social initiatives with much emphasis on selection of economically viable suppliers. Following the farmers' performance is the CMC; efforts are invested in internal operations specifically those that border on social and economic

sustainability. Though their efforts in sustainable practices are spread evenly across achieving high scores for each dimension of sustainability, the CMC performs relatively higher in social and economically responsive internal operations than the other supply chain phases. The best performers in the cocoa chain in terms of emphasis on sustainable practices are observed to be PCs followed by LBCs. Key efforts from the PCs are spread evenly and intensively on all the dimensions of sustainability. However, it is shown that for most part, PCs place high emphasis on socially responsible activities with high scores in all the aspects of social sustainability practices. The most crucial social aspect focused upon is the social criteria of supplier selection, followed by warehousing activities.

It is also shown that emphasis is placed on economic initiatives for the PCs. Except for the transportation activities, the PCs gave equal attention to all the aspects of economic dimension. The LBCs on the other hand placed equal emphasis on both social and economic initiatives with greater emphasis on warehousing in both aspects. Indeed higher concentration is shown for economically responsible internal operations. On more general terms, results show that social initiatives within the cocoa chain is of key attention to players followed by economic dimension. Environmental initiatives were least focused upon. Again results confirm that the least concentrated aspects are the transportation and strategic sourcing phases of the supply chain. Indeed sustainable transportation of cocoa is a major drawback within the cocoa chain.

9.1.4 RELATIONSHIP AMONG SUSTAINABILITY DIMENSIONS

From the results of the regression analysis, it is clear that sustainability dimensions have a strong integrating or cross effects, which suggests three major implications. First, it is informative to find that social initiatives aside its direct social impact carry environmental effects that augment environmental efforts undertaken to improve environmental performance of the supply chain; likewise, environmental initiatives aside their direct environmental impact transmit social effects that augment social efforts undertaken to improve social performance of the supply chain. The same conclusion was drawn between social and economic dimensions. This demonstrates that social initiatives aside its direct social impact carry economic impacts that augment economic efforts undertaken to improve financial performance of the supply chain and vice versa. On economic and environmental dimensions, again, correlation coefficient was not only positive but significantly high illustrating that there is a positive cross effect between environmental and economic dimensions of sustainability. Hence, environmental initiatives aside their direct environmental impact carry economic bearing that augments economic efforts undertaken to improve financial performance of the supply chain. The reverse also holds.

9.1.5 SUSTAINABLE SCM INITIATIVES AND PERFORMANCE

Focusing on the impact of the dimensions of sustainability to competitive advantage, the series of results confirmed the importance of sustainability dimensions to reaping vital competitive gains to players within the cocoa chain. For instance, in the descriptive analysis, it is shown that players that engage higher efforts in sustainability dimensions of social, environmental and economic reaped higher gains in all the seven variants of competitive advantage; Production efficiency, Innovation

Capacity, Company Reputation, Operational Performance, Strategic Capability, Resource Pool and Market Share than those which did not inject much efforts in sustainable initiatives

9.1.6 THE TRIPOD AND SINGLE STRAND EFFECT

In examining if focusing on one strand of sustainability will result in same improvement in sustainable outcome as focusing on all strands of sustainability, firstly, correlation coefficients show that both the paired sustainability dimensions and overall sustainability are positively related with overall competitive advantage. This shows the relative importance of all the sustainability dimensions and objectives to a competitive cocoa chain. Further, the combined regression analysis reveals that all the sustainability objectives, single, paired and tripod, have associated positive effects on competitive advantage. However it is shown that only the single strand social initiative and overall sustainability were found to have a significantly positive impact. Again, the standardized coefficients show that among the sustainability dimensions, overall sustainability has the strongest impact on overall competitive advantage, followed by economic practices even so, the effect of economic practices was insignificant (i.e. economic practices do not cause a significant change in the overall competitive advantage). The strong impact was rather observed for social initiatives with a significant standardized coefficients; the rest of the sustainability objectives were positive but insignificant as well as having very weak effect on overall competitive advantage. These results point to the fact that engaging in the tripod objective (overall sustainability) brings best results than any form or combination of goals.

9.1.7 ROLE OF SUPPLY CHAIN IMPROVEMENT PROGRAMMES

In examining the moderating effect of transparency, it is shown on the moderating effect regression analysis table that transparency has a strong positive moderating effect on the linkage between sustainability and competitive advantage. For risk management it was illustrated that risk management significantly moderates the social, economic and overall sustainability impacts on overall competitive advantage; supporting hypothesis 14a which states that risk management positively moderates the direct linkage between sustainability dimensions and overall competitive advantage. Concerning supplier development, results showed that supplier development has a strong positive impact on competitive advantage and a strong positive moderating effect on the linkage between sustainability and competitive advantage. Hypothesis 15a is therefore supported, which states that supplier development positively moderates the direct linkage between sustainability dimensions and overall competitive advantage. Probing further, the moderating effect of collaboration, it was exposed on the moderating effect regression analysis table that all the collaboration interactions generally explained that collaboration has a strong positive moderating effect on the linkage between sustainability and competitive advantage. This lends support to hypothesis 16a which states that collaboration positively moderates the direct linkage between sustainability dimensions and overall competitive advantage.

9.2 CONCLUSIONS

The study has discussed how the domestic chain of cocoa in Ghana can be managed for its sustainability. Accordingly, it has argued that most studies have discussed sustainability issues affecting the cocoa supply chain but there is paucity of research on sustainability studies regarding other players in the supply chain, especially as they

relate to the supply chain phases. Most studies on sustainability in the cocoa chain have concentrated on cocoa cultivation, with little attention to other supply chain functions that impact on cocoa productivity. “Ideally, any assessment of sustainability must apply to the supply chain as a whole, rather than any one part of it. Otherwise, for example, the benefits of improvements in the environmental performance of farming systems could be lost if subsequent processing or distribution stages result in increased waste or environmental risk” (Vasileiou, and Morris, 2006). Hence, this study has attempted to illuminate our understanding of sustainable supply chain management as it relates specifically to cocoa in a developing economy context, using four key players in Ghana’s domestic cocoa chain; farmer, PC, LBC and the CMC (COCOBOD).

The study has explored the flow process of cocoa in the domestic chain of cocoa in Ghana; the risks within each stage that impact on goals of sustainability and how interests can be optimised for maximum benefit to stakeholders; the phases of the supply chain that are mostly emphasized by the players in the implementation of sustainable initiatives and if there exist any observed variations among them; if there exists, any cross effect among the three major dimensions of sustainability in the cocoa chain; the relationship that exists between engagement in sustainable practices and the performance of players in the chain; if focusing on one strand of sustainability will result in same improvement in sustainable outcome as focusing on all strands of sustainability; and whether supply chain improvement programmes play any moderating role in the linkage between sustainable practices and the performance of players in the chain.

Evidence emerging from the analysis has implications for the more general debate on the tripod or single strand effects of sustainability on competitive advantage of chain players. In particular, the findings of this study indicate that there is a positive cross effect between social and environmental dimensions of sustainability; a positive cross effect between social and economic dimensions of sustainability; and equally so, there is a positive cross effect between environmental and economic dimensions of sustainability. Then also, results point to the fact that engaging in the tripod objective (overall sustainability) brings best results than any form or combination of goals. It could thus be argued that, in this study, a tripod goal has a stronger impact on competitive advantage than focusing on a single strand. Chain partners should thus be aware that engagement in all 3 dimensions of sustainability at a goal offer even more potential for differentiation than just a single strand.

The study has further demonstrated the relevance of engaging in sustainable supply chain initiatives to achieving higher competitive advantage to chain players; all the dimensions of sustainability correlate positively with production efficiency; are positively related to innovation capacity; build the reputation of actors in the chain; improve operational performance, market share and strategic capabilities of chain players, make them more attractive to resources. To confirm this, evidence from the study shows that players that engaged higher efforts in sustainability dimensions of social, environmental and economic (actors) reaped higher gains in all the variants of competitive advantage than those which did not inject much efforts in sustainable initiatives (non-actors). Therefore, for higher competitive gains, higher efforts in sustainable initiatives are merited. The study has also confirmed the moderating effect of supply chain improvement programmes by indicating that transparency, risk

management, supplier development and supply chain collaboration not only have positive impacts on competitive advantage of actors in the cocoa chain, each also has a strong positive moderating effect on the linkage between sustainability and competitive advantage.

The study also explored the risks in the chain and the conclusion made is that the domestic cocoa chain is exposed to enormous risks at all levels of the chain. The argument made is that any negligence in managing the impact of such risks by actors could derail any competitive gains from sustainable efforts. While the analysis has demonstrated the importance of sustainable initiatives to reaping competitive gains to actors, the assessment of the sustainable efforts of players has rather been low. Amidst such risks, it becomes imperative for chain players to increase their risk management efforts, otherwise, the gains from the comparatively lower engagement in sustainable efforts will be lost.

In terms of methodological contribution, the study has demonstrated the value of quantitative inquiry in establishing the relationship that exists between engagement in sustainable practices and the performance of players in the chain; the cross effect among the three major dimensions of sustainability; the greater impact of the tripod goal of sustainability on competitive gains than a single strand, and the moderating role of supply chain improvement programmes in the linkage between sustainable practices and the performance of players in the chain. It has also shown the value of qualitative inquiry in mapping the flow process of cocoa in the domestic chain of cocoa in Ghana and in exploring the risks inherent in the chain by revealing the causes of such risks and their impacts on sustainable efforts of chain players.

However, for future research, it would be interesting to assess the frequency and impact of those risks through a quantitative inquiry to shape policy decisions.

Finally, in terms of limitations, the study focused only on four phases of supply chain, purchasing, internal operations, warehousing and out-bound transportation. Further research may thus, look at product design and commercialisation and reverse flows within the cocoa chain. While the researcher believes investigating into the sustainability of cocoa relative to product design and commercialization seems somewhat appropriate for downstream players beyond the domestic chain, it will be very interesting if further studies relate the issue with cocoa sustainability in light of the increased interest in cocoa verification and certification. Also, the research design was constrained by limited access to objective verifiable quantitative data, in part due to commercial confidentiality on the part of some players. Also, Apart from the challenge of bearing huge financial costs and limited time frame for the completion of the study, the researcher had to interpret the questions in the survey instrument to some respondents due to their lack of proficiency in reading which limited wider data coverage.

Additionally, there were some cases of data loss in the responses and some questionnaires were never returned. As a result, data collected had to be checked and re-tested through all other means possible to improve on its validity and reliability. Notwithstanding, the statistical results of these tests were very good, rendering such errors negligible. On the qualitative aspect of the study, the study is limited in the sense that it fails to provide in a more quantitative sense, the frequency and the level

of impact on performance of the risks identified. A quantitative approach in further studies is thus merited.

9.3 RECOMMENDATIONS

Based on the findings of the study, appropriate recommendations have been made towards a sustainable supply chain for cocoa. These have been presented in two parts as they relate to findings from both the quantitative and qualitative analyses.

9.3.1 QUANTITATIVE

Based on the results from the quantitative analysis, the following recommendations are made towards a sustainable supply chain for cocoa:

- **Increased Commitment to Sustainable Initiatives:** It is clearly seen from the analysis that farmers are generally weak performers on all the dimensions of sustainability. Except for economically sustainable strategic sourcing which was fairly beyond average, the performance of farmers across all three dimensions of sustainability is very poor. Farmers would therefore need to strengthen their efforts in all dimensions of sustainability; social, economic and environment in all the four major phases of supply chain; strategic sourcing, internal operations, warehousing and transportation. While their performance is relatively higher across all three dimensions of sustainability, PCs need to increase their environmental efforts as their environmental performances across all four SC phases: purchasing, internal operations, warehousing and transportation were found to be poor.

LBCs equally performed better but would still need to strengthen their commitment in economically sustainable strategic sourcing, warehousing, transportation and environmentally strategic sourcing. Their performance for socially sustainable internal operations was very weak and so would need to put in stringent measures for a higher performance. Except for economically sustainable internal operations, the performance of CMC was fairly good. Therefore, for higher competitive gains, CMC must improve on their commitment in all dimensions of sustainability for higher competitive gains.

- **Higher Commitment in Most Effective Measures of Sustainability:** It was revealed that the most profitable companies differentiate themselves especially through superior social and economic activities (e.g., safety criteria in supplier selection) and so players should be aware that social and economic efforts offer even more potential for differentiation than environmental ones (which are still important). The results also showed that as regards the economic sustainable strategic sourcing, there was no significant difference in the performance of both higher and lower competitive entities. Cocoa players should thus increase their engagement in economically sustainable transportation, warehousing and internal operations as they offer even more potential for differentiation than strategic sourcing, which is still important.

It was also revealed that higher competitive entities had lower efforts in socially sustainable internal operations, and so while its engagement is still important to reaping competitive gains, actors need to rather increase their efforts in socially sustainable transportation, strategic sourcing and warehousing as they offer even more potential for differentiation than internal

operations. Finally, actors should be aware that emphasis on transportation aspects is crucial to gaining competitive advantage in the cocoa chain. Indeed it is shown that though high performers concentrated relatively more on sustainable transportation systems, efforts have been low. The same conclusion can be drawn for strategic sourcing as scores for each dimension is low. Actors must thus invest more resources in these functions for an improved performance.

Actors should also be aware that engaging in the tripod objective (overall sustainability) brings best results than any form or combination of goals and this is especially relevant for cocoa farmers whose performance across all three dimensions of sustainability was shown to be very weak. In other words, for actors to reap higher competitive gains relative to industry players, it will require investment in all three dimensions of sustainability at a goal; economic, social and environment and not just in one or two, all things being equal.

- **Supply Chain Improvement Programmes:** The study has also demonstrated that transparency, supplier development, supplier collaboration and risk management moderate the linkage between sustainable practices and competitive gains of actors. Therefore, it is essentially important for actors to engage their stakeholders in their activities through constant reporting and receiving of feedback for improved transparency and as Roger and Carter (2008) put it, transparency helps build trust and confidence within the supply chain and consequently helps bolster reputation and legitimacy.

To efficiently manage the impact of risks, actors must engage in a continuous process of identifying, analyzing, evaluating, and either accepting or mitigating against uncertainty and potential losses; followed by the coordinated and efficient application of resources to monitor, minimize, and control the likelihood or impact of detrimental occurrences whilst maximizing the attainment of opportunities within the supply chain. Also to ensure for strategic supplier capabilities, actors must provide suppliers with what they need to be successful in the supply chain and for successful collaboration, actors must continue to build mutual trust and share information that can benefit all the members.

9.3.2 QUALITATIVE

Based on the results from the qualitative analysis, the following recommendations are made towards a sustainable supply chain for cocoa:

- **Supply Chain Collaboration:** actors within the chain must collaborate with each other by sharing information and planning jointly on each other's needs which is built on mutual trust and understanding. In this vein, it will require that every actor includes at least, its direct (tier 1) suppliers and customers in its planning and goal-setting activities and then interact frequently to set reliability, responsiveness and other supply chain standards. To strengthen the relationship necessary for this collaboration, it will require chain partners to periodically evaluate the importance of such relationships. This can be a potential measure to mitigate the risks of stock-out, performance, technical, contractual and poor quality supply of cocoa within the cocoa chain.

- **Supplier Monitoring/Development:** for common understanding and objectives, it will require that players continuously invest resources in the monitoring and development of their suppliers through coaching and other appropriate platforms, especially regarding ways to improve their economic, social and environmental gains within the cocoa chain. This is essentially relevant to deal with the risks that result from supplier incompetence. There is empirical evidence that points to the fact that supplier development most clearly relates to higher supplier management skills and better strategic capabilities of suppliers (Kaufmann and Carter, 2010).
- **Farmer Associations:** One of the major problems that farmers especially face during their purchasing activities is negotiation power, to an extent that the perception of product returns seems somewhat an impossible move by most farmers. While the economic effect of shortage naturally weakens the consumer's demand power, the case is further worsens on the basis of an individual buyer. To reduce the bad effect that results into such risks as poor quality supply, farmers can form strong associations who will have a common voice to negotiate on group basis. Once such associations are formalized and legalized by COCOBOD, it can potentially result into stronger power for farmers to negotiate effectively for improved services.
- **Efficient Transportation System:** To mitigate the risks associated with the transportation of cocoa such as smuggling, theft, short-landed, etc. LBCs could strengthen their monitoring systems with the use of tachographs to check drivers' behaviour in transit during both primary and secondary

evacuations. Periodic training could be organized for these drivers to improve on their skills and competence in fighting various risks and also for the adherence to the right conduct.

- **Mechanized Farming Practices:** To fight against injuries and pest infestations especially, farmers must consciously employ efficient and effective farming methods such as the use of transportation trucks for cocoa carriage, the application of more efficient spraying techniques and improved agronomic practices such as tree height reduction, opening of canopy, better pruning, etc.
- **Cashless Transactions:** Purchasing Clerks can fight against the risk of robbery attacks by reducing their cash transactions with farmers. Though most farmers indicate a strong preference for cash transactions, PCs can build strong relationships with their suppliers to win their empathy.
- **Contract Management:** An effective contract management with suppliers and carriers/third parties can potentially mitigate various supply risks such as performance, technical, commercial and contractual risks. By periodically reviewing contracts to reflect changes and jointly reviewing contracts on mutual understanding, chain partners can save themselves a great deal of risks. Not only that, contracts must be well enforced to deal with bad conducts that usually result from familiarity, but with enough circumspection to maintain the right relationship for long-term gains.
- **Efficient Warehousing Systems:** to fight against pest infestations, theft, shrinkage, etc. there is the need for players to improve on their warehousing

systems. This is especially relevant at the farm and PC levels. This should include appropriate security systems, adequate ventilation to help reduce potential mold build up, sufficient lighting systems, and emphasis on the importance of the application of materials that are environmentally friendly.

- **Cocoa Verification and Certification:** to fight reputational risks, the government, through LBCs can insist on verification and certification as a purchase requirement. The standards can be benchmarked against new labels such as organic, ISO 14000, Fairtrade, Rainforest Alliance and UTZ CERTIFIED in cocoa production with strong concerns on environment and ethical issues. Within their scope the different certification schemes vary in their main focus or strategy for achieving a more sustainable cocoa production with some of them focusing on the creation of sustainable trade relations (e.g. Fairtrade) and others with a greater focus on increasing farmer productivity as a way to strengthen farmers (e.g. UTZ Certified). The most common certification schemes are Fair Trade, UTZ, and Rainforest Alliance with the first two schemes enjoying the largest market share of certified cocoa beans in the global market.
- **Quality Control:** Players can reduce the risk of poor quality supply if stringent quality control measures are adhered to in their purchasing activities.
- **Effective Inventory Control:** Effective control of inventory especially at the district depots of the LBCs is essential to reducing the risks of spoilage and mold build up at the depots.

- **Good Maintenance Culture:** LBCs should improve on their vehicle maintenance, especially preventive maintenance to reduce the incidence of vehicle breakdowns and accidents.

9.3.3 RECOMMENDATIONS FOR FURTHER STUDIES

The following are recommended for further studies:

- **System-wide Analysis:** “Ideally, any assessment of sustainability must apply to the supply chain as a whole, rather than any one part of it. Otherwise, for example, the benefits of improvements in the environmental performance of farming systems could be lost if subsequent processing or distribution stages result in increased waste or environmental risk’ (Vasileiou, and Morris, 2006). However, due to the extensive nature of the value chain, this research concentrated mainly on the domestic value chain; from the farm gates to the domestic brokers of raw cocoa beans. Therefore for a system wide analysis, subsequent studies will need to explore the sustainability issues peculiar to other downstream actors beyond Ghana’s domestic cocoa chain.
- **Risk Analysis:** While identifying risks in the cocoa chain is relevant for managing the sustainability of the cocoa chain, managers are better off in designing appropriate risk mitigating measures with explicit knowledge of the frequency and impacts of those risks. It is therefore recommended that further studies adopted a quantitative approach in order to analyze the risks that have been explored in this study to identify their occurrence and impact quantitatively for specifically tailored managerial measures.

- **Product Design and Reverse Logistics:** the study focused only on four phases of supply chain: purchasing, internal operations, warehousing and out-bound transportation. Further research may thus look at the role of product design and commercialisation and reverse flows within the cocoa chain and how interest can be optimized for maximum benefits to stakeholders.
- **Verification and Certification:** In the light of increased interest in cocoa verification and certification, further studies may be conducted to explore the preparedness of Ghanaian actors towards the relevant supply chain costs of certified cocoa beans towards a sustainable cocoa chain.

In the context of increased interest in the sustainability of food supply chains, this study sought to measure the degree to which actors within the domestic chain of cocoa in Ghana are functioning in terms of initiatives to reach sustainability. This study thus contributes to the literature on SSCM by providing empirical evidence of the impact of SSCM Initiatives and SCM Investments on the competitive performance of actors in the cocoa supply chain. The study has demonstrated that SSCM relates positively with the competitive performance of actors and that SCM Investments moderate the linkage between SSCM and the performance of actors. Furthermore the study has uncovered enormous risks inherent within the domestic chain of cocoa in Ghana, particularly as they relate to four supply chain phases for which existing literature is limited; the literature has given only a generalized perspective, especially pertaining to farmers, with little attention to other down-stream players. Thus by adopting a system-wide analysis and categorizing risks relative to the phases in supply chain, this study has made a significant contribution.

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APPENDIX B

INTERVIEW GUIDE

[Farmers, PCs, LBCs and the CMC]

PART A: SUPPLY NETWORK

1. Could you please describe your organization's supply network i.e. from the point-of-origin to the point-of-consumption?
2. What specific role(s) does your organization play in the cocoa supply chain?
3. Who are your primary/major customers?
4. Who are your primary/major suppliers?
5. Do you have other customers who are not primary? What are their major roles?
6. Do you have other suppliers other than the main ones you have described? What major roles do they play in the cocoa chain?

PART B: RELEVANCE OF SUSTAINABLE PRACTICES

7. In your own view do you think sustainable practices are relevant in the cocoa chain and why?
8. Which of the three major pillars (economic, social, environment) of sustainability is more relevant to your operations? Could you please explain why?
9. Which of these pillars do you see as most and least relevant to the entire chain and why?

PART C: RISKS IDENTIFICATION

10. Is the management of risk relevant to recouping sustainable efforts?
11. Which of the pillars of sustainability does your operations experience the most risks?

Economic Risks

12. What economic factors (internal and external) pose as risks to your organization as they relate to the following phases in your supply chain?
 - a) In-sourcing (supplier selection),
 - b) Internal operations,
 - c) Warehousing
 - d) Out-bound transportation
13. Which of these risks are the most prevalent to the various phases above?
14. How do these risks impact on sustainable goals?
15. Which of them have the highest impact on your operations?

Social Risks

16. What social factors (internal and external) pose as risks to your organization as they relate to the following phases in your supply chain?
 - a) In-sourcing (supplier selection),
 - b) Internal operations,
 - c) Warehousing
 - d) Out-bound transportation
17. Which of these risks are the most prevalent to the various phases above?
18. How do these risks impact on sustainable goals?
19. Which of them have the highest impact on your operations?

Environmental Risks

20. What environmental factors (internal and external) pose as risks to your organization as they relate to the following phases in your supply chain?
 - a) In-sourcing (supplier selection),
 - b) Internal operations,
 - c) Warehousing

d) Out-bound transportation

21. Which of these risks are the most prevalent to the various phases above?

22. How do these risks impact on sustainable goals?

23. Which of them have the highest impact on your operations?

Measures

24. What measures have you put in place to deal with these risks?

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APPENDIX A

SURVEY QUESTIONNAIRE

Introduction: My name is Dorcas Nuerter, a doctoral student of the Kwame Nkrumah University of Science and Technology in the Department of Information Systems and Decision Sciences in the KNUST School of Business. This survey instrument has been designed to enable me carry out a research on the topic: ***Managing the Sustainability of the Supply Chain for Cocoa: the Case of Ghana.*** The purpose of the research is to provide an understanding of how sustainable efforts pay-off in the domestic value chain of cocoa in Ghana and to identify the risks, threats and challenges within the chain that impact on goals of sustainability. Your responses to this questionnaire will be very much appreciated and any information provided will be treated as highly confidential. Thank you for your time.

Instruction: Please, kindly write in ink in the box which corresponds to the statement, which in your opinion is the most appropriate answer to the related question or provide further explanation where necessary. For other questions that follow, kindly select by checking (✓) all that apply.

PART A: DEMOGRAPHICS

1. Name of Company :		2. Gender:		<input type="checkbox"/> Male	<input type="checkbox"/> Female
3. Title/Job Position in Company:		4. Nationality:		<input type="checkbox"/> Ghanaian	<input type="checkbox"/> Foreigner
5. State run Enterprise	<input type="checkbox"/> Yes	<input type="checkbox"/> No			
6. Number of Employees:	<input type="checkbox"/> <6	<input type="checkbox"/> 6-12	<input type="checkbox"/> 30-59	<input type="checkbox"/> 60-99	<input type="checkbox"/> 100+
7. Company's stage in the cocoa chain	<input type="checkbox"/> Input Supplier	<input type="checkbox"/> Farmer	<input type="checkbox"/> Purchasing Clerk	<input type="checkbox"/> LBC	<input type="checkbox"/> Processor <input type="checkbox"/> CMC
8. How long has your company existed?	<input type="checkbox"/> <2	<input type="checkbox"/> 2-5	<input type="checkbox"/> 5-10	<input type="checkbox"/> 10-15	<input type="checkbox"/> 16+
9. Location of Company?	<input type="checkbox"/> Western Region	<input type="checkbox"/> Ashanti Region	<input type="checkbox"/> Brong-Ahafo Region	<input type="checkbox"/> Other(s) (please specify)	
10. Indicate your district where applicable:					
11. Ownership of Company	<input type="checkbox"/> Solely Ghanaian Owned	<input type="checkbox"/> Foreign Owned	<input type="checkbox"/> Joint Ventureship	<input type="checkbox"/> Other(s) (please specify)	
12. Revenue of Company in Ghana Cedis	<input type="checkbox"/> <10,000	<input type="checkbox"/> 10,000-40,000	<input type="checkbox"/> 40,000-80,000	<input type="checkbox"/> 80,000-120,000	
	<input type="checkbox"/> 120,000-160,000	<input type="checkbox"/> 160,000-200,000	<input type="checkbox"/> 200,000-500,000	<input type="checkbox"/> 500,000+	
13. Legal form of Entity	<input type="checkbox"/> Not Registered	<input type="checkbox"/> Sole Proprietorship	<input type="checkbox"/> Limited Liability	<input type="checkbox"/> Public Limited Liability	
	<input type="checkbox"/> Partnership	<input type="checkbox"/> Other(s) (please specify)			
14. Who is your supplier in the chain?	<input type="checkbox"/> Input Supplier	<input type="checkbox"/> Farmer	<input type="checkbox"/> Purchasing Clerk	<input type="checkbox"/> LBC	<input type="checkbox"/> Processor <input type="checkbox"/> CMC
15. To whom do you sell/supply your pdt?	<input type="checkbox"/> Farmer	<input type="checkbox"/> Purchasing Clerk	<input type="checkbox"/> LBC	<input type="checkbox"/> Processor	<input type="checkbox"/> CMC <input type="checkbox"/> Other(s) (pls specify)

PART B: ECONOMIC DIMENSION OF A SUSTAINABLE COCOA CHAIN

Please indicate your opinion for each of the following statements below by placing a checkmark (✓) in the right column under the 5 point Likert Scale where:

1= Strongly Disagree 2= Disagree 3= Slightly Disagree 4= Neither Disagree Nor Agree 5= Slightly Agree 6= Agree 7= Strongly Agree

Inbound Supply Chain: [Strategic Sourcing] In selecting suppliers, our company ensures that			1	2	3	4	5	6	7
Quality Systems	16.	Quality cocoa beans/seed (hybrid variety)/inputs is key in selecting suppliers							
	17.	Suppliers have a very high commitment to total quality regulation by Cocobod							
	18.	Suppliers' parts per million defect performance is high							
Cost Structure	19.	Supplier has the ability to supply equally good quality cocoa beans/seeds at a relatively reduced price							
	20.	Supplier has good cost control/reduction efforts with good costs performance relative to industry							
Delivery Performance	21.	The supplier has high performance to promise							
	22.	The supplier has a relatively reduced lead-time							
	23.	Supplier has the ability to supply the right amount/quantity specified							

Mgt. Capability	24.	Supplier organization has well qualified managers/staff/workers							
Internal Operations In managing our internal operations, our company			1	2	3	4	5	6	7
25.	Ensures there is continuous improvement in the efficient and effective use of resources								
26.	Ensures cleaner production processes								
27.	Adheres to the best cocoa quality standards applicable to our operations (Cocoa pods are screened to obtain quality seeds for nursery, a 2 week cocoa bean fermentation & its subsequent drying))								
28.	Ensures that lean production (total waste avoidance) is the core of all internal operations								
29.	Ensures that there are control systems in place to ensure process suitability/stability								
30.	Has formal quality management systems for process/operations control								
Warehousing/Storage			1	2	3	4	5	6	7
31.	Our warehouse(s) have adequate ventilation and spacing between stacks of cocoa to help reduce potential mold build up.								
32.	Our warehouse(s) have sufficient lighting system.								
33.	We store bagged cocoa beans on pallets and stabilize cocoa stacks against sliding or collapse.								
34.	We ensure that stored bags of cocoa are kept free of dirt, dead insects, cocoons, webbing, etc.								
35.	We ensure the warehouse is used to store cocoa beans only to avoid cross contamination								
36.	We frequently clean/ disinfect/ fumigate the warehouse								
37.	We make full use of available warehouse height for cartons, pallets and racking and share excess space with other users								
38.	We optimize efficiency of picking methodology in the warehouse								
39.	We implement bar coding, RFID, or MRP technology to track inventory precisely								
40.	We implement automated storage and mechanical handling systems powered by alternative energy.								
41.	We reduce the number of stock-keeping units through vendor consolidation or standardization.								
Out-Bound Supply Chain (Transportation) In managing our out-bound supply chain operations, our company			1	2	3	4	5	6	7
42.	We ensure cleaner fuels are used to transport the cocoa beans to the districts and depot sheds								
43.	We choose fuel-efficient modes of transport/carrier for shipping cocoa								
44.	We use load planning tools to optimize loads and avoid break-downs during shipment								
45.	We use route planning tools to minimize transport distances.								
46.	We use schedule planning tools to schedule deliveries to avoid peak traffic periods.								
47.	We use automated systems e.g. tachographs to monitor driver movements								
48.	We choose the right type of carriage for maintaining the quality of cocoa beans/seed								

PART C: ENVIRONMENTAL DIMENSION OF A SUSTAINABLE COCOA CHAIN

Please indicate your opinion for each of the following statements below by placing a checkmark (✓) in the right column under the 5 point Likert Scale where:
1= Strongly Disagree 2= Disagree 3= Slightly Disagree 4= Neither Disagree Nor Agree 5= Slightly Agree 6= Agree 7= Strongly Agree

Inbound Supply Chain <i>In selecting suppliers,</i>			1	2	3	4	5	6	7
49.	We consciously select Eco-labelled cocoa beans/seedlings								
50.	We ensures for the verification of supplier compliance with environmental legislation								
51.	We consciously seeks suppliers that are leaders in efficient and clean operations								
52.	We prioritize suppliers that provide re-usable or recyclable packaging								
53.	We ensure that potential suppliers themselves source from environmentally friendly sub-suppliers								

54.	We consciously seek suppliers that outperform their competitors regarding emission or waste levels									
Internal Operations			In managing our internal supply chain operations, our company	1	2	3	4	5	6	7
❖ Conservation:	55.	WE utilizes green power (e.g. electric) and cogeneration plants								
	❖ Energy	56.	We ensures for energy efficiency improvement in operations							
❖ Water	57.	We increase water system efficiency								
	58.	We ensure for waste water treatment								
Usage Reduction	59.	We ensure for waste reduction, reuse and recycling of materials (e.g. cocoa pod for soap)								
	60.	We ensure for the treatment and recycle of hazardous wastes								
System s	61.	We have an ecological mgt. system to ensure for sustainable practices & regulatory compliance								
Warehousing:			In managing our warehousing operations, our company	1	2	3	4	5	6	7
62.	Adopts techniques to measure and reduce energy consumption from lights, heating, ventilation, and air conditioning.									
63.	Adopts techniques to improve energy efficiency of loading processes.									
64.	Implements energy efficient materials handling equipment.									
65.	Ensures the discrepant operational offices/depot warehouses are regularly sanitized to avoid cocoa beans from infections									
66.	Adheres to the regulated environmental practices outlined by COCOBOD									
67.	Emphasizes the importance of the application of materials that are environmentally friendly									
Out-Bound Supply Chain [Transportation]			In managing our out-bound transportation, our company	1	2	3	4	5	6	7
68.	has good vehicle maintenance and disposal systems									
69.	organizes periodic workshops on driver skill improvement									
70.	Ensures the combined use of road and rail and sea transportation and inland navigation									
71.	makes every effort to increase shipment consolidation to ensure for travel distance optimization									
72.	employs advanced systems to load/schedule shipments to increase the degree of vehicle utilization									
73.	uses reusable or, at minimum, recycled shipping containers and plastic pallets in place of wooden pallets									
74.	uses energy-efficient trucks for the transportation of its cocoa beans									
75.	uses alternative fuels (e.g. cleaner fuels) to transport the cocoa beans to the districts and depot sheds									

PART D: SOCIAL DIMENSION OF A SUSTAINABLE COCOA CHAIN									
<i>Please indicate your opinion for each of the following statements below by placing a checkmark (✓) in the right column under the 5 point Likert Scale where:</i>									
<i>1= Strongly Disagree 2= Disagree 3= Slightly Disagree 4= Neither Disagree Nor Agree 5= Slightly Agree 6= Agree 7= Strongly Agree</i>									
Inbound Supply Chain <i>In selecting, suppliers, our company ensures that</i>			1	2	3	4	5	6	7
Safety Aspects	76.	workplace safety at suppliers' locations meets international standards							
Pay	77.	staff of suppliers are paid a salary that is clearly above the minimum wage							
Working Cond.	78.	adequate working conditions at supplier site is ranked as a key selection criterion							
Child labour	79.	Supplier does not, in any case, employ children aged under 18 years							
Forced labour	80.	Supplier does not use forced/compulsory labour, i.e. no work is performed under threat/compulsion							
Internal Operations Management <i>In managing our internal supply chain operations, our company</i>			1	2	3	4	5	6	7
Child labour	81.	does not, in any case, employ children aged under 18 years							
Forced labour	82.	does not use forced/compulsory labour, i.e. no work/service is performed under threat/compulsion							
Pay	83.	ensures that no wage is lower than the applicable legal minimum and that employees receive a decent wage relative to country and which meets employee satisfaction							

Discrimination	84.	refuses to engage in any discriminatory practices such as any distinction, exclusion or preference limiting equality of opportunity or treatment based on sex, gender, religion, age, nationality, etc.							
Freedom of Association	85.	Recognises & respects employees' freedom of association, right to collective bargaining. & right to freely choose their representatives with no discrimination							
Health & Safety	86.	Ensures that the workplace & its environ do not endanger the physical integrity/health of employees.							
	87.	provides employees with drinking water, clean toilets in adequate numbers, adequate ventilation, emergency exits, proper lighting and access to medical treatment and canteens and housing							
Working Hours	88.	ensures that applicable legal restrictions on working hours are complied with							
	89.	Ensures that overtime is on a voluntary basis.							
Community Devt	90.	donates to local charity organizations and contribution to community development (e.g. healthcare)							
Warehousing In managing our warehousing operations.....			1	2	3	4	5	6	7
91.	We select site and situate building to minimize traffic and noise impacts on community								
92.	We train warehouse workers on safe handling and storage of hazardous materials								
93.	We inspect tanks or containers used to store hazardous materials and correct deficiencies								
94.	We segregate containers used to store hazardous materials								
95.	We schedule regular removal and proper disposal of hazardous waste								
96.	We optimize safety and efficiency of warehouse layout								
97.	We ensure all floors/racks are labeled to guide movement for safety precaution								
Out-Bound Supply Chain: [Transportation] In our company.....			1	2	3	4	5	6	7
98.	We understand and comply with applicable transportation safety regulations								
99.	We have developed and implemented a dangerous goods transportation security plan								
100.	We train employees on safe handling and transportation of hazardous materials								
101.	We use load planning software to guard against inappropriate co-loading of hazardous materials								
102.	We inspect containers used to transport hazardous materials and correct deficiencies								
103.	We organize periodic in-house transport safety programmes/workshops for all our transport officers								

PART E: SUPPLY CHAIN MANAGEMENT IMPROVEMENT PROGRAMMES

Please indicate your opinion for each of the following statements below by placing a checkmark (✓) in the right column under the 5 point Likert Scale where:
1= Strongly Disagree 2= Disagree 3= Slightly Disagree 4= Neither Disagree Nor Agree 5= Slightly Agree 6= Agree 7= Strongly Agree

Transparency <i>we and our supply chain partners share/exchange</i>			1	2	3	4	5	6	7
104.	Future plans (e.g. long-term production and details of upcoming product or service related changes)								
105.	Feedback related to each other's performance vis-à-vis expectations								
106.	Information on changing needs (e.g. tones of cocoa, supply lead-time, etc)								
107.	Business knowledge of core biz processes & internal operating parameters (e.g. inventory levels, production volumes)								
108.	Precisely specified info about output requirements that are clearly understood by both/all								
109.	Accurate/factual information (e.g. availability of inputs by supply, quality of cocoa)								
110.	Adequate information (e.g. changes in cocoa prices)								
111.	Reliable information (quality & quantity of cocoa beans, availability of supply)								
112.	Timely info related to market demand trends & forecasts (e.g. changes in cocoa prices, availability of input supply, etc)								

Risk Management		1	2	3	4	5	6	7
113.	Our company periodically assesses, analyses and evaluate its supply chain risks that impact on goals of sustainability							
114.	<i>Risk Reduction:</i> for risks that seem difficult to avoid , there are stringent measures to reduce its impact on performance.							
115.	<i>Risk Avoidance:</i> we have measures to avoid those risks whose impact on performance seem more costly to rectify							
116.	<i>Risk Transfer:</i> where necessary, we implement measures (e.g. insurance, hedging, outsourcing) to transfer risks to other primary or supporting members of the chain who have built strategic capability to absorb such risks.							
117.	<i>Risk sharing:</i> there are joint risk sharing programmes with our chain partners (e.g. joint facility ownership)							
118.	<i>Risk financing:</i> we belong to associations with the prime objective of financing members in case of casualties (e.g pest infestations, pecuniary losses, etc.							
Supply Chain Collaboration		1	2	3	4	5	6	7
119.	We regularly solve problems jointly with our suppliers/customers							
120.	We include our key suppliers/customers in our planning and goal-setting activities							
121.	We frequently interact with suppliers/customers to set reliability, responsiveness and other Supply Chain standards							
122.	We periodically evaluate the importance of our relationship with our suppliers/customers							
123.	We facilitate suppliers/customers' ability to seek assistance from us							
124.	There is a high level of collaboration with our direct suppliers and customers and among internal chain members							
Supplier Development		1	2	3	4	5	6	7
125.	We have helped our suppliers to improve their product quality (e.g. through extension services, best technology)							
126.	We have continuous improvement programmes that include our key suppliers							
127.	We encourage our suppliers to continuously improve safety standards at their production sites							
128.	We share best practices regarding safe handling and shipping of products with our suppliers							
129.	We commit resources to coach our suppliers on how to develop and improve safety standards							
130.	We regularly monitor whether our suppliers still meet our social, environmental and economic expectations							
131.	We have a policy to phase out suppliers that no longer meet our social expectations							
132.	We regularly evaluate suppliers whether they keep up with the latest social, environmental and economic standards							

PART F: SUPPLY CHAIN PERFORMANCE [COMPETITIVE ADVANTAGE]								
Please indicate your opinion for each of the following statements below by placing a checkmark (✓) in the right column under the 5 point Likert Scale where: 1= Strongly Disagree 2= Disagree 3= Slightly Disagree 4= Neither Disagree Nor Agree 5= Slightly Agree 6= Agree 7= Strongly Agree								
Production Efficiency		1	2	3	4	5	6	7
133.	We produce at less/lower cost relative to competitors/industry							
134.	We mostly record the most minimum waste/defect resulting from internal and external operations							
135.	Our process stability is excellent							
136.	We have excellent utilization of resources such as machines, equipment and labour							
137.	We have a steady growth in output and profits							
138.	We are always able to meet our targets for the year							

Innovation Capacity		1	2	3	4	5	6	7
139.	Training and research is a major part of our work							
140.	There are always new things to learn within our trade							
141.	Our management practices, skills and processes have developed over the years							
142.	We are replacing manual and traditional processes with more scientific and sustainable practices							
143.	We are always gaining more knowledge to improve our work							
144.	Our cocoa is always the best because we keep improving on how we process them for the market							
Company Reputation		1	2	3	4	5	6	7
145.	We are noted for quality cocoa beans/product by trading partners and other stakeholders							
146.	Our reputation is our asset and key to our success							
147.	We are noted for our social responsibility to our clients and the community							
148.	Our workers are highly committed because of our responsibility towards them							
149.	Our products and processes are noted for being environmentally friendly							
150.	Our reputation has never fallen in the market							
Operational Performance		1	2	3	4	5	6	7
151.	We are particularly noted for high product availability i.e. the ability to make available supply relative to demand							
152.	Our response rate is high i.e. the ability to respond quickly to customer demand relative to time							
153.	We have excellent fill-rate i.e. the ability to supply product volume relative to customer demand							
154.	Our parts per million defect performance is excellent i.e. ability to supply a given amount of products with low defects							
155.	We provide reliable/consistent services to our customers							
Strategic Capabilities		1	2	3	4	5	6	7
156.	Our management skills has improved because of the commitment to sustainable practices							
157.	Pursuing sustainability is our main strategy							
158.	Our investment in sustainable resources has given us less cost							
159.	Pursuing sustainability has given us more market share							
160.	Pursuing sustainability is our main strategy							
Resource Pool		1	2	3	4	5	6	7
161.	Our staff retention rate is the best primarily because they are always satisfied on the job							
162.	Our company attracts high applicants who are highly qualified and skilled							
163.	Suppliers want to deal with us first before others							
164.	Investors want to associate with us because of our financial performance							
165.	People are always ready to work with/for us							
Market Share		1	2	3	4	5	6	7
166.	Our company has a higher market share relative to competitors within the same stage in the cocoa chain							
167.	Our market share continues to grow relative to competitors within the same stage in the cocoa chain							
168.	We have a relatively higher level of loyal customers in our market							
169.	There is always higher preference for our cocoa beans/seeds due to its quality							

Thank You for Being a Part of this Study