EXPLORING
REVENUE MANAGEMENT
& PRODUCER PRICING
MECHANISM WITHIN GHANA’S
COCOA SECTOR
EXECUTIVE SUMMARY

Cocoa plays a pivotal role in the economic development of Ghana. It provides employment across the cocoa value chain, serves as an export revenue earner, helps in providing liquidity to the Bank of Ghana for managing the stability of the currency, contributes to gross domestic product and helps reduce poverty. In spite of these benefits, the sector is bedevilled with challenges such as high yield gap, disease and pest infestation, producer incentivization vis-à-vis government deficit and dissatisfaction from cocoa farmers.

The performance of the sector has been assessed with scholars recording different results, albeit progressive. Some evidence suggests a remarkable performance of the sector, while others bemoan the lack of transparency, inefficiencies in the distribution of subsidized inputs. In some instances, scholars have argued that the regulator is challenged in attaining its most important objective of stabilizing producer prices at levels that ensure an adequate return on farmers' land, labour and capital. It appears to a number of stakeholders that, these objectives have not been met completely through time.

There however is still limited empirical evidence on the producer pricing mechanism and the revenue management of COCOBOD. In light of this backdrop, this study aims to explore the revenue management and producer pricing mechanism within Ghana's cocoa sector.

Specifically, the study used a mixed method comprising of variance analysis, econometric analysis, financial statements analysis, survey analysis and interviews to address the research purpose. There are four key objectives of the study:

a. to probe into the current cocoa pricing mechanism;
b. to examine the nexus between cocoa prices and cocoa production in Ghana;
c. to explore the perspectives of stakeholders in the cocoa sector; and
d. to examine the revenue and expenditure management of COCOBOD.
The results suggest that the total revenue received by the sector (i.e. the Gross Free on Board (FOB)) driven by two main factors – value of the currency (GHS), terminal prices of Cocoa and output, primarily driven by developments which the country has little influence over. The regulator of the sector - COCOBOD, has through time guaranteed a minimum of 70 percent of net FOB to farmers. This criterion has been exceeded in recent times, with some years registering nearly 80 percent of net FOB to farmers. This has happened over a period, as projections for industry related costs such as investments in Hi-Tech and CODAPEC, have increased with significant variances from targets. These undergird some of the questions that observers of the industry have had for years; whether the farmers are receiving a fair compensation. Again, the results suggest that, changes in the terminal price of cocoa does not drive domestic production, contrary to some conventional thoughts. The farmgate prices paid by government is rather the price that drives output of Cocoa in Ghana. It follows therefore that directly policies towards increasing the lot of farmers could have positive effects on the output of Cocoa in the country. The results also indicate that, a greater portion of the income of cocoa farmers is attributable to the sale of Cocoa, with varying minimal amounts from the production and sale of other crops. This suggests that there are issues requiring further strategies to support the diversification of income of farmers.

Additionally, results from the farmers’ survey revealed that, more 9 out of 10 farmers are dissatisfied with the current producer price, with a surprising 7 out of 10 not knowing the umbrella association COCOSHE. Again, 70 percent of the engaged farmers could not establish the immediate role of COCOBOD in serving their interest. It is equally important to note that, regardless of the sentiments expressed by the farmers regarding the protection of their interest by COCOBOD, they are equally of the view that, COCOBOD plays a significant role in the industry, and will want the regulator to continue in this capacity.

The analysis of COCOBOD’s financial data suggests that profitability, liquidity, efficiency or turnover and cash flow ratios have deteriorated over time, with marginal improvements in some areas in the 2017/18 financial year. The following are worth noting for further policy interrogation:

1. There is the need to increase efficiency in using industry costs to optimise the share received by stakeholders. This should be combined with an aim to ensure the farmers receive a fair share as a means to continue to stimulate production.
2. There is the need to increase the level of transparency on the price setting mechanism. COCOSHE should broaden its membership base to cover all farmers and the consultations on price setting should be clearer and targeted at reaching all farmers. COCOBOD should also enhance its support in communicating pricing decisions and associated rationale to farmers and other stakeholders beyond the PPRC.

3. Strategies are needed to support and enhance current farmer income diversification strategies. Closely linked to this strategy is the need to support youth in Cocoa production programmes to change the labour profile of the industry.

4. The reported erratic supply of inputs, smuggling and fake inputs need redress, as it has implications for the optimal results expected from productivity enhancement programmes.

5. The efficiency in the operations of the regulator needs to improve, and strategies outlined by the institution’s management for 2017/2018 need to be followed to the letter.
ACKNOWLEDGEMENTS

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The views expressed are those of the Research Team and does not necessarily reflect those of the Royal Embassy of the Netherlands in Ghana that funded the study.
# TABLE OF CONTENTS

EXECUTIVE SUMMARY ........................................................................................................... i

ACKNOWLEDGEMENTS ........................................................................................................... iv

LIST OF TABLES ...................................................................................................................... ix

LIST OF FIGURES .................................................................................................................... x

CHAPTER ONE ........................................................................................................................... 1

1.1 Background of the Study .................................................................................................... 1

1.2 Problem Statement and Rationale for the Study ................................................................. 3

1.3 Aims and Objectives .......................................................................................................... 6

1.4 Scope of the Study ............................................................................................................ 7

CHAPTER TWO .......................................................................................................................... 9

THE COCOA MARKETING SYSTEM IN GHANA .................................................................... 9

2.1 Introduction ....................................................................................................................... 9

2.2 Cocoa Marketing Systems ................................................................................................. 9

2.3 Historical Review of the Management of Ghana’s Cocoa Sector ........................................ 11

2.4 The Colonial Period 1898 to 1956 .................................................................................... 12

2.5 Post-Colonial Period 1957 to 1990 .................................................................................. 13

2.6 The Current Management Structure of COCOBOD ....................................................... 15

CHAPTER THREE ...................................................................................................................... 18

METHODOLOGY AND METHODS ......................................................................................... 18

3.1 Introduction ....................................................................................................................... 18

3.2 Desk Study ....................................................................................................................... 18

3.3 Stakeholder Mapping ....................................................................................................... 18

3.4 Research Design ............................................................................................................. 19

3.5 Types and Sources of Data .............................................................................................. 20

3.5.1 Data on Cocoa Price .................................................................................................. 20

3.5.2 Econometric Data, Modelling and Estimation Techniques ...................................... 20
6.3.1 Demographic Information of Respondents ................................................................. 63
6.3.2 General Information on Cocoa Farms ................................................................. 68
6.3.3 Analysis of Cocoa Farm Inputs ............................................................................. 71
6.3.4 Pricing, Sales and Cocoa Farm Revenue .............................................................. 72
6.4 Perspectives of Licence Buying Companies (LBCs) .................................................. 80
6.4.1 LBCs Perspectives on the Price Determination Process ........................................ 80
6.4.2 LBCs Representation on the PPRC ..................................................................... 81
6.4.3 Liberalization of Ghana’s Cocoa Marketing System ............................................. 81
6.4.4 LBCs Competitive Strategies ............................................................................. 81
6.4.5 LBCs Perspectives on the Cocoa Weighing Scales Manipulation ...................... 82
6.4.6 Challenges ......................................................................................................... 82
6.5 Perspectives of Input Providers ............................................................................... 83
6.5.1 Producer Price Mechanism .............................................................................. 84
6.5.2 COCOBOD’s Subsidized Programmes .............................................................. 84
6.5.3 The Way Forward ............................................................................................. 85
6.6 Perspectives of Experts in the Cocoa Sector ............................................................. 85
6.6.1 Producer Price Mechanism .............................................................................. 85
6.6.2 Management of the Cocoa Sector ................................................................... 87
6.6.3 Liberalization of the Sector .............................................................................. 87

CHAPTER SEVEN ............................................................................................................. 88
REVENUE AND EXPENDITURE MANAGEMENT ANALYSIS ........................................... 88
7.1 Introduction ............................................................................................................. 88
7.2 Preliminary Insights into COCOBOD’s Financials ................................................... 88
7.3 Corporate Finance of COCOBOD ....................................................................... 91
7.4 Profitability of COCOBOD .................................................................................. 93
7.5 Liquidity of COCOBOD ....................................................................................... 98
7.6 Solvency of COCOBOD ....................................................................................... 100
7.7 Turnover of COCOBOD ....................................................................................... 104
7.8 Cash Flow of COCOBOD .................................................................................... 106
7.9 Trend Analysis of Assets ................................................................. 108
7.10 Strategic Choices ........................................................................... 110
7.11 Summary ....................................................................................... 113
CHAPTER EIGHT ...................................................................................... 114
CONCLUSIONS AND RECOMMENDATIONS ........................................... 114
8.1 Introduction .................................................................................... 114
8.2 Summary of Findings and Recommendations .................................... 114
  8.2.1 Cocoa Producer Pricing and Production ......................................... 114
  8.2.2 Cocoa Farmers, LBCs and Input Providers ...................................... 116
  8.2.3 The Management of COCOBOD .................................................. 118
8.3 Limitations ....................................................................................... 120
REFERENCES .......................................................................................... 121
LIST OF TABLES

Table 1. Characteristics of Cocoa Marketing and Pricing Systems .......................................................... 10
Table 2. Advantages and Disadvantages of Cocoa Marketing Systems ......................................................... 11
Table 3. Key Stakeholders Within Ghana’s Cocoa Sector ............................................................................. 19
Table 4. Description of Data and Sources .................................................................................................... 22
Table 5. Sample Frame .................................................................................................................................. 22
Table 6. Proportional Distribution of the Sample Size .................................................................................. 23
Table 7. Ratios and their Description ........................................................................................................... 26
Table 8. Turnover and Cash Flow Ratios and their Description ..................................................................... 27
Table 9. Price Evolution ............................................................................................................................... 29
Table 10. Sample PPRC Free on Board (FOB) Sharing Structure ................................................................. 31
Table 11. Net F.O.B. Sharing Structure for 2016/2017 ............................................................................... 32
Table 13 Projected and Actual Cocoa Production for 2007/08 to 2016/17 Crop Seasons .......................... 35
Table 14 Actual and Projected Expenditure on CODEPEC and Cocoa Hi-Tech Fertilizer Application ........................................................................................................................................... 36
Table 15. Variance Analysis of the PPRC Sharing Structure for 2016/17 Crop Year ............................... 37
Table 16. Descriptive Statistics ..................................................................................................................... 47
Table 17. Unit Root or Stationarity Tests at Level ........................................................................................ 47
Table 18. Unit Root or Stationarity Tests at First Difference ...................................................................... 48
Table 19. Bounds Test 1 ............................................................................................................................. 49
Table 20. Bounds Test 2 ............................................................................................................................. 50
Table 21. Cocoa Production and World Price of Cocoa ............................................................................. 51
Table 22. Serial Correlation and Heteroskedasticity Tests 1 ..................................................................... 52
Table 23. Cocoa Production and Producer Price of Cocoa ....................................................................... 54
Table 24. Serial Correlation and Heteroskedasticity Tests for Equation 2 ............................................... 54
Table 25. Granger Causality A ................................................................................................................... 56
Table 26. Granger Causality B ................................................................................................................... 57
Table 27. Regional Distribution of Responses ............................................................................................ 63
Table 28. Primary and Secondary Occupations of Cocoa Farmers .......................................................... 67
Table 29. Descriptive Statistics on Farm Sizes ............................................................................. 69
Table 30. Cost of Some Factors of Production ............................................................................ 72
Table 31. Cost of Some Cocoa Farming Activities ...................................................................... 72
Table 32. Bags of Cocoa Harvested and Earnings ...................................................................... 72
Table 33. Financial Statement Summaries for 2011-2017 .......................................................... 89

LIST OF FIGURES

Figure 1. Cocoa Beans Export by Destination 2015/2016 ............................................................. 1
Figure 2. Regional Cocoa Production in the 2016/2017 Crop Year ............................................. 2
Figure 3. COCOBOD’s Management Structure ......................................................................... 16
Figure 4. COCOBOD’s Subsidiaries ......................................................................................... 17
Figure 5. World Market Price Trends ........................................................................................ 29
Figure 6. Established Deviations Between ICCO and BOG Prices ............................................. 34
Figure 7. Selected Countries’ Producer Prices in USD as Percentage of ICCO Daily Prices .......... 40
Figure 8. The Relationship Between Cocoa Production in Ghana and World Market Price ...... 45
Figure 9. The Relationship Between Cocoa Production and Producer Price in Ghana ............. 45
Figure 10. Cumulative Sums (CUSUM) and Cumulative Sums (CUSUM) Squared Tests 1 ...... 53
Figure 11. Cumulative Sums (CUSUM) and Cumulative Sums (CUSUM) Squared Tests 2 ...... 55
Figure 12. Cocoa Value Chain in Ghana ..................................................................................... 60
Figure 13. Market Share of Processing Companies ................................................................... 61
Figure 14. Market Share of Licence Buying Companies .............................................................. 62
Figure 15. Responses Grouped by Districts ............................................................................... 64
Figure 16. Age Brackets of Cocoa Farmers ............................................................................... 65
Figure 18. Mode of Farm Acquisition among Farmers ................................................................. 69
Figure 19. Word Cloud of Most Important Food Crops in Terms of Revenue Creation ............ 70
Figure 20. Cocoa Farmer’s Patronage of Farm Inputs ................................................................. 71
Figure 21. Proportion of Cocoa Farmer’s Income from Cocoa Farm .......................................... 73
Figure 22. Cocoa Farmer’s Perception on Producer Prices .......................................................... 75
Figure 23. Cocoa Farmer’s Perception on LBCs and COCOBOD ............................................... 76
Figure 24. Financial Inclusion of Cocoa Farmers ....................................................................... 77
Figure 25. Welfare of Cocoa Farmers in Ghana

Figure 26. Profitability of COCOBOD (Focus on Profit Margins)

Figure 27. Profitability of COCOBOD (Focus on Return on Equity)

Figure 28. Profitability of COCOBOD (Focus on Return on Capital Employed)

Figure 29. Profitability of COCOBOD (Focus on Return on Asset)

Figure 30. Trends of Liquidity Ratios

Figure 31. Solvency of COCOBOD (Focus on Debt to Assets)

Figure 32. Solvency of COCOBOD (Focus on Interest Coverage)

Figure 33. Interest Charges and Profits of COCOBOD

Figure 34. Solvency of COCOBOD (Focus on Debt to Equity)

Figure 35. Solvency of COCOBOD (Focus on Debt to Capital)

Figure 36. Trends of Turnover Ratios

Figure 37. Cash Flow Analysis of COCOBOD 1

Figure 38. Cash Flow Analysis of COCOBOD 2

Figure 39. Trend Analysis of COCOBOD Assets
LIST OF ABBREVIATIONS

Adwumapa Buyers Limited  ABL
Armajaro (Gh) Limited  AGL
Cocoa Board  COCOBOD
Cocoa Health and Extension Division  CHED
Cocoa Marketing Company  CMC
Cocoa Merchants (Gh) Limited  CMGL
Cocoa Processing Company  CPC
Cocoa Research Institute of Ghana  CRIG
Cocoa Service Division  CSD
International Monetary Fund  IMF
Federated Commodities Limited  FCL
Ghana Cocoa Marketing Board  GCMB
Gross Domestic Product  GDP
Kuapa KoKoo Limited  KKL
Kumankoma Company Limited  KCL
Licensed Buying Companies  LBCs
Ministry of Finance and Economic Planning  MOFEP
Ministry of Food and Agriculture  MOFA
Nyonkopa Commodities Buyers Limited  NCBL
Olam (Gh) Limited  OLAM
Produce Buying Company  PBC
Producer Price Review Committee  PPRC
Purchasing Clerks  PCs
Quality Control Company  QCC
Royal Commodities Limited  RCL
Seed Production Division  SPD
Sika Aba Buyers Limited  SABL
Transroyal (Gh) Limited  TGL
Unicom Commodities Limited  UNICO
**1.1 Background of the Study**

Cocoa has played a tremendous role in Ghana's economic development since its introduction by Tetteh Quarshie in 1879. The importance of the crop reflects in the country's agriculture exports, employment, foreign exchange earnings, government revenues and poverty reduction (Anim-Kwapong & Frimpong, 2004). The crop generated about one-third of the country's export revenues, amounting to over USD 1.5 billion which represents about 25 to 30 percent of the total export earnings until the discovery and production of oil between 2007 and 2010. In 2014, the crop ranked the third-largest export product and generated USD 2.6 billion out of the total exports of USD 13.2 billion (GoodMan AMC LLC, 2017). It also contributes about 10 percent of Ghana's Gross Domestic Product (GDP) (Boadu, 2014). Europe and Asia are the main export destinations of Ghana's cocoa beans (See Figure 1 for export destinations).


**Figure 1. Cocoa Beans Export by Destination 2015/2016**

[Source: COCOBOD Annual Report 2015/2016]

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The sector is also a source of income for over a million Ghanaians which includes farmers and their families, employees of trading companies and input service providers. It employs over 800,000 farmers spread across the six cocoa growing regions\textsuperscript{2} in Ghana (see Figure 2).

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure2.png}
\caption{Regional Cocoa Production in the 2016/2017 Crop Year}
\footnotesize{[Source: Authors’ Construct with Insight from Annual Regional Purchases by COCOBOD]}
\end{figure}

The sector’s regulator Cocoa Board (COCOBOD) employs over 7000 people (COCOBOD Annual reports 2012-2014). Overall, the sector employs about 60 percent of the total labour force of the agricultural sector (GoodMan AMC LLC, 2017). Cocoa production has also been noted for its significant role in poverty reduction. The poverty rate among cocoa farmers has reduced from 60.1 percent in 1991/1992 to 23.9 percent in 2005/2006 (Breisinger, Diao, & Kolavalli, 2007).

\footnotesize{\textsuperscript{2}The report sticks to the old (10) regional demarcations in Ghana.}
Additionally, the system of selling cocoa in the futures market has over the years guaranteed liquidity for the government through the issuing of bonds that are secured by projected earnings from the sale of cocoa.³

Ghana is the second-largest producer of cocoa after Côte d'Ivoire with a market share of an estimated 20 percent (Bangmarigu & Qineti, 2018). The cocoa marketing system in Ghana which facilitates the maintenance of quality beans has earned Ghana the position of the world’s largest producer of quality cocoa beans.⁴ As a result, the beans are sold at a premium of 3 to 5 percent above the average world market price (Gilbert, 2009).

COCOBOD has managed to increase its revenues by 626⁵ percent from 2007/2008 to 2016/2017 crop years driven by world market price and exchange rate movements coupled with an average production of 800000 tonnes per year over the same period. The cost associated with generating this revenue has also increased by over 551⁶ percent over the same period implying that cost has consumed more than half of the total revenue generated.

1.2 Problem Statement and Rationale for the Study

The benefits derived from Ghana’s cocoa sector have led many scholars to describe it as a successful case study of cash crop trading in Africa. Williams (2009) in a study that attempted to explain the success behind a state-run marketing board given the abysmal chronicle associated with African Commodity marketing boards. He argues that, the country’s cocoa sector demonstrates a remarkable performance from 1999 to 2009 with high levels of production, equitable distribution of cocoa revenues, high-quality cocoa beans which exceeds international

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⁴ Characteristics that determine the quality of cocoa include content and quality of fat, consistency in the size of the beans, and their moisture content.
⁵ Calculated from COCOBOD’S annual report
⁶ Calculated from data from COCOBOD’S annual reports
standards, efficient handling of exports, consistent payment of international loans, and effective and uncorrupted internal marketing system.

This position has been contested in more recent times considering the developments in Ghana’s cocoa sector. In 2017, the World Bank for instance argued that the average cocoa yield gap\(^7\) in Ghana is one of the highest in the world, estimated at more than 100 percent, implying that the cultivated areas could produce twice as much cocoa as they do currently. Production has declined from a peak of 1 million tonnes in 2010/2011 to an average of 800,000 tonnes without rebounding for nearly a decade (World Bank, 2013, 2018). Again, over the years many farmer groups have consistently demanded a fairer price for their produce. In 2018, the farmers bemoaned that the decision of maintaining producer prices at GHS 7,600 (USD 1,583)\(^8\) per tonne for three consecutive years may force them out of business and consequently collapse the industry.\(^9\) Their dissatisfaction with the purchase price seems to corroborate the recent criticism levelled at COCOBOD by the World Bank in a study that reviewed public expenditure in Ghana, that the regulator has failed to achieve its most relevant goal of stabilizing producer prices at levels that ensure an adequate return on farmers’ land, labour and capital (World Bank, 2017a).

Laven, Buunk, and Ammerlaan (2016) while studying the determination of cocoa prices in five\(^{10}\) cocoa-producing countries including Ghana also indicate a lack of transparency in the Producer Price Review Committee’s (PPRC) price determination process. According to the study, the non-transparent process provides an avenue for farmers to be short-changed by the system. In addition, the internal marketing system has also been blamed for hindering price competition. As a result, Licence Buying Companies (LBCs) can only compete on volumes of cocoa bought. Consequently, some Purchasing Clerks (PCs) manipulate the cocoa weighing scales to underpay farmers (Laven, 2010).

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\(^7\) A yield gap refers to the difference between a crop's maximum potential yield and its real yield.

\(^8\) The dollar equivalent is derived from an exchange rate of 4.80 from Bank of Ghana used by the PPRC to determine the producer price at the given year.


[Accessed 20th March, 2019]

\(^{10}\) Cameroon, Nigeria, Ghana, Indonesia, Côte D’Ivoire
Again, the distribution process for subsidized fertilizers and disease controlling chemicals has frequently been criticised for its unreliability and alleged political interference. The “loose” nature of the distribution process is indicated to have provided an avenue for fertilizers and other inputs to be smuggled to neighbouring countries.11

The countless reports and speculations of possible misuse of the annual syndicated loans procured by COCOBOD for financing the purchase of Cocoa compound the inefficiency allegations against COCOBOD. A case in point is the utilization of the US$1.8 billion syndicated loans secured for the entire 2016/2017 crop year, which was exhausted by January 2017 after only 587,152 metric tonnes out of 969,510.69 (60.562 percent) metric tonnes of cocoa had been purchased.12 Additionally, there is evidence to suggest that the distribution and utilisation of cocoa revenue are characterized by some mismanagement. For instance, the 2017 and 2018 budgets and economic management policy of government showed that contracts awarded under the cocoa roads project exceed the budget for road contracts by over 200 percent, necessitating a value for money analysis on all projects. This situation led the Ministry of Finance and Economic Planning (MoFEP) to acknowledge in the 2018 fiscal strategy of government that, the entire cocoa roads project will be reassessed.

Finally, the financial performance of COCOBOD raises immediate concerns on the company’s incentives to sustainably contain costs associated with revenue generation. For instance, the company’s revenue increased by 12 percent between 2016 and 2017, as its losses further widened by nearly 100 percent for the same period (Ministry of Finance and Economic Planning (MOFEP), 2017).

Although several studies have analysed the underperformance of Ghana's cocoa sector and discovered issues such as disease and pest infestation as well as low production levels, the major issues of lack of transparency and accountability by COCOBOD and the lack of bargaining power


of farmers stand preeminent and recurrent. It is unfortunate that strategies to correct the underperformance of the sector have only largely focused on improving farming practices and production (Fountain & Heutz-Adams, 2018) while other equally important issues such as the transparency of the producer price determination process, and revenue management of COCOBOD remain unresolved and hardly monitored. Previous studies have shown that administered pricing system does not stimulate efficiency in a monopolistic marketing organization except it is properly scrutinised (Duncan & Jones, 1993).

To this end, there is a need for sound revenue management and a pricing policy that would foster efficiency in Ghana's cocoa sector and ensure farmers earn adequate returns on their investments, and produce (Kolavalli & Vigneri, 2011). This study seeks to bring evidence to the revenue management strategies by the Ghana COCOBOD, as well as the relationship between the producer price paid to cocoa farmers and cocoa production. This will facilitate the creation of a body of evidence to support reforms in the management of cocoa revenues.

### 1.3 Aims and Objectives

The broad aim of the study is to investigate the structure of the Cocoa industry, associated strategies for revenue management and crucially understand the price mechanism and revenue management of cocoa proceeds to obtain evidence to demand policy change where necessary, and to ensure that the livelihood of farmers is improved in a sustainable manner.

The specific objectives are:

1. To probe into the current cocoa pricing mechanism;
2. To examine the nexus between cocoa prices (world price and producer price) and cocoa production in Ghana;
3. To explore the perspectives of stakeholders in the cocoa sector on the producer price mechanisms and revenue management;
4. To examine the revenue and expenditure management strategies of COCOBOD.
1.4 Scope of the Study

This study mainly focuses on the price-setting mechanism and its impact on the profitability and welfare of cocoa farmers. It further examines how cocoa prices stimulate an increase in cocoa production in Ghana. It also analyses the financial activities of COCOBOD to ascertain their level of profitability, efficiency, solvency and true value addition to the value chain. Crucially the financial activities of COCOBOD and its implication for farmers are considered in this scope. The study limits itself to the period; 2007/2008 to 2016/2017 crop season to have the most current understanding of the trends and relationships between key variables relating to the management of cocoa revenues within COCOBOD.

Historic dataset covering the period 1949 to 2017 is utilised in establishing the nexus between cocoa prices (both world price and producer price) and cocoa production. This time series gives enough data points for establishing strong statistical evidence. The study also explores the perspectives of farmers, LBCs, input providers and some experts.
1.5 Organisation of the Study

The study is structured in seven sections. The first section includes the **background, problem statement, and objective of the study**. The second section explores **existing studies conducted about the industry from a global to a local perspective, highlighting how these developments impact on the subject of revenue generation and management for the sector**, taking cognizance of differences in market structures for the commodity across the globe. The third section explores **the methodology dedicated to addressing the five objectives of the study**. The fourth section explores **cocoa pricing mechanism in Ghana from the historic point of view and the contemporary point of view and presents an econometric analysis of the nexus between cocoa prices and cocoa production in Ghana**. The fifth section provides **an analysis of the cocoa value chain, presenting the perspectives of the various players in the cocoa sector. The views are centred around the revenue management, price-setting mechanism and how it affects income levels and welfare**.

The penultimate section provides **an analysis of the revenue and expenditure management of COCOBOD**. The last section draws **conclusion on the study and provides recommendations**.
2.1 Introduction

This chapter provides a historical review of the cocoa marketing system in Ghana covering the pre-colonial, colonial, and post-colonial era. In addition, a description of the current management structure of COCOBOD is provided.

2.2 Cocoa Marketing Systems

The end of colonialism in many West African countries between 1945 to 1960 was not accompanied by the dismantling of its institutions and companies that fostered the exploitation of citizens. This is evident in the maintenance of the cocoa marketing boards [in the case of Ghana], that exercised a monopoly over the internal and external marketing of the cash crop by the post-independence governments (Gilbert, 2009). However, by the 1980s the Bretton Woods institutions and the European Union influenced the post-independence governments to liberalize their cocoa marketing systems due to low levels of commodity prices, high debt levels of the marketing boards and non-transparent marketing arrangements (Gilbert, 2009; Kolavalli, Vigneri, Maamah, & Poku, 2012). Consequently, Nigeria’s cocoa marketing system was liberalized in 1986, Cameroon between 1991 and 1994, Côte d’Ivoire between 1998 to 2002 and Ghana partially liberalized its cocoa marketing system in 1992/1993. These major liberalizations gave birth to the three current cocoa marketing systems; Marketing Boards, Stabilization Fund System and Free Market System (Akiyama, Baffes, Larson, & Varangis, 2001). Each of these systems are distinct by unique characteristics (see Table 1), advantages and disadvantages (see Table 2).

The marketing boards are public bodies that regulate the purchase of agricultural commodities (in this case Cocoa). They practically, politically and administratively raise, maintain or stabilize producer prices or income of producers. The government administratively sets the producer price for an entire marketing season through the board and controls the entire supply chain of the crop (Barreti & Mutambatsere, 2008). Ghana uses the marketing board system.
A stabilization fund is similar to the marketing board in the way prices are administratively determined for an entire crop year. The government regulates the internal market and exports. It is a strategy to amass reserves when prices are high to support producer prices during low prices. It is therefore expected to provide some form of insulation for producers during low world market price. What differentiates the stabilization fund from the marketing board is that it does not handle the crop, and the fund is not directly administered by the government. However, there are licensed agents responsible for handling, while the government determines the producer price (Akiyama et al., 2001).

The free market system consists of several private agents and market forces determine the prices. There is minimal government involvement in the marketing of the crop, however, the government may intervene in cases of market failure (Williams, 2009). Examples of countries that practice this system are Brazil, Côte d’Ivoire, Malaysia and Indonesia.

Table 1. Characteristics of Cocoa Marketing and Pricing Systems

<table>
<thead>
<tr>
<th>CHARACTERISTIC</th>
<th>FREE MARKET</th>
<th>STABILIZATION FUND</th>
<th>MARKETING BOARD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legal Ownership</td>
<td>Traders, Exporters</td>
<td>Traders, Exporters</td>
<td>Marketing Board</td>
</tr>
<tr>
<td>Physical Handling of the Crop</td>
<td>Traders and exporters</td>
<td>Licensed Private agents</td>
<td>Marketing Board, LBCs</td>
</tr>
<tr>
<td>Domestic Price Setting</td>
<td>Market forces</td>
<td>Stabilization fund</td>
<td>Marketing Board and Government Institution</td>
</tr>
<tr>
<td>Price Stabilization</td>
<td>None</td>
<td>Yes</td>
<td>Yes but not explicit</td>
</tr>
<tr>
<td>Taxation</td>
<td>Absent or very low</td>
<td>Mainly explicit</td>
<td>Implicit</td>
</tr>
<tr>
<td>Marketing Costs and margins</td>
<td>Low</td>
<td>Medium to high</td>
<td>High</td>
</tr>
<tr>
<td>Producer Prices</td>
<td>High</td>
<td>Medium to Low</td>
<td>Low</td>
</tr>
</tbody>
</table>

Source: Authors’ construct, based on Akiyama et al. (2001)

Table 2 gives a summary of the benefits and disadvantages of each of the cocoa marketing systems.
Table 2. Advantages and Disadvantages of Cocoa Marketing Systems

<table>
<thead>
<tr>
<th>MARKETING SYSTEM</th>
<th>MARKETING BOARD</th>
<th>STABILIZATION FUND</th>
<th>FREE MARKET SYSTEM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Advantages</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-Stabilize producer prices against fluctuations in world market prices.</td>
<td>-Stabilize producer prices against fluctuations in the world market.</td>
<td>-High producer prices.</td>
</tr>
<tr>
<td></td>
<td>-Quality control</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-Input provision</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-Research and development</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Disadvantages</strong></td>
<td>-Low producer prices</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-Surpluses hardly stabilize prices; however, it is used to fund industrialization and developmental projects.</td>
<td>-Neglect of quality control, input provision, extension, credit, research and development</td>
<td>-Neglect of quality control, input provision, extension, credit, research and development</td>
</tr>
</tbody>
</table>

Source: Authors' Construct, based on Narratives from Williams (2009)

2.3 Historical Review of the Management of Ghana's Cocoa Sector

Ghana's cocoa sector over the years has been an interesting case study for various scholars because of the unique way the sector is regulated. Ghana Cocoa Marketing Board (GCMB) established in 1947 and renamed as Ghana Cocoa Board (COCOBOD) manages the sector under a marketing board system. This management structure differs from the free market and stabilization fund systems (see Table 1) commonly practiced in other cocoa-producing countries like Indonesia, Brazil, Cameroon and Nigeria.

As the sole marketing regulator of the cocoa sector, COCOBOD intermediates between primary producers, processors of cocoa beans and other stakeholders along the value chain through its subsidiaries. However, it is expected to do so in the most efficient and cost-effective manner.
As part of its duties, COCOBOD is responsible for determining the price of the beans for farmers through the Producer Price Review Committee (PPRC) at the beginning of the main crop season - starts in October every year (Sostizzo, 2017).

2.4 The Colonial Period 1898 to 1956

The management of cocoa in Ghana has undergone a series of restructuring efforts predating the colonial era. In 1898, the colonial government established the first official marketing scheme under an agreement that the government would pay in advance half of the price of the total cocoa supplied by the farmers at Aburi (in the Eastern Region) before they are exported (Guri, 1975). Unfortunately, this scheme only existed for a short period due to several criticisms levelled against it by the West African Trade Associations (Kyere, 2014). The abolishment of the marketing scheme gave birth to a highly competitive market between 1900 and 1939 as producer prices were determined through negotiations between farmers and multinational cocoa buying companies (Quarmine et al., 2014). At about the same period, nearly 300,000 cocoa farmers sold their cocoa beans to European companies and individuals through some estimated 1,500 brokers. The expectation that a high competition should have fostered an efficient market, did not materialise. Some firms operated at a loss while others abused the marketing scheme to their advantage. During low price periods, brokers understated the number of cocoa beans purchased with the intention of stocking and selling them during higher prices period. This practice resulted in losses being incurred on the immediate sale of cocoa on the world market (Guri, 1975).

Consequently, a ‘Buying Agreement’, which consisted of all exporters of West African cocoa, was created in 1937 to control the abuses that had occurred due to the high competition (Guri, 1975). This agreement was under the condition that all cocoa producers would be offered a uniform price (Laven, 2010). However, Ghanaian cocoa farmers expressed their dissatisfaction with the buying agreement and blamed the low prices for cocoa on the agreement. They argued that such a system was unnecessary and advocated for a market system in which they could sell their beans directly. In response, the government set up the Nowell Commission\textsuperscript{13} to investigate and suggest workable solutions.

\textsuperscript{13} A commission of enquiry set up to investigate cocoa hold up in Gold Coast. It was named after its chairman William Nowell who was a former director of the East African Agricultural Research Institute.
The commission thus indicated that the Buying Agreement did not favour both Ghanaian and Nigerian farmers, and exporters. Against this backdrop, the commission recommended the establishment of a co-operative marketing scheme, which was never implemented.

Instead, the British government established direct control over the cocoa market in West Africa with the advent of World War II. The system allowed the government to be involved in all facets of the supply chain, from the buying and reselling of the cocoa beans; buying all cocoa available for sale at a fixed price per annum (Muojam, 2014). In essence, the controlled market system insulated the farmers against fluctuations in the world market, given the partial close down of the export market during World War II. The government assured the farmers it would distribute profits obtained from the sale of cocoa to them through the colonial government for spending on things that would be beneficial to them (Dand, 2011; Guri, 1975). Long before the war ended, the British government declared its intention to ensure the continuity of the direct control over the market of cocoa which gave birth to Ghana Cocoa Marketing Board (GCMB) now COCOBOD in 1947. The GCMB was established with the sole purpose of insulating cocoa producers against the risk in the global cocoa market, originated by the closure of global market due to the war.

2.5 Post-Colonial Period 1957 to 1990

Following the attainment of independence in 1957, nationalisation pressure began to mount on the GCMB to operate independently from the colonial government. The nationalization pressure significantly transformed the managing of Ghana’s cocoa sector from a fairly liberal system to a complete state-controlled system, and independent from colonial rule. As a result, several subsidiaries of the GCMB were established with the majority of them currently in existence. The Cocoa Processing Company (CPC), one of the first subsidiaries became responsible for the two cocoa processing factories that were established in 1963. The Produce Buying Company (PBC), established in 1977 operated as the sole buyer for Ghana’s cocoa and responsible for internal marketing. The PBC employed purchasing clerks to buy the cocoa beans directly from the farm owners or their caretakers. The Cocoa Services Division (CSD) was also responsible for procurement and distribution of inputs, extension services, advising farmers on best agronomic practices. The Quality and Control Division, now Quality Control Commission was also mandated to maintain high-quality cocoa beans through checking, grading, bagging, and sealing the beans for export. The Cocoa Research Institute of Ghana is responsible for the study of cocoa cultivation (Laven, 2010).
Notwithstanding the creation of the subsidiaries to foster efficiency, the sector registered a sharp decline in output in the 1980s, from 581,000 tons in the 1964/65 to 160,000 tons in 1983/84. This implied a decline in market share of 28 percentage points [from 38 percent to 10 percent of global market share]. As a consequence, Ghana lost its position as the world's largest cocoa producer. \textit{The plummet in output was largely attributed to low profitability in production due to the movement of real producer price (Amedofu, 2009), inefficiencies in the state marketing board, inflationary pressures and exchange rate vulnerabilities, all current attributes of the sector}. Therefore, as part of efforts of the Ghanaian government to salvage the declining cocoa sector, the government adopted an Economic Recovery Program (ERP) in 1983 (Kolavalli & Vigneri, 2017). An increase in producer prices emerged strongly as one of the paramount concerns of the reforms (Vigneri & Kolavalli, 2017). To this end, strategic measures were put in place to change the organization that fixes the producer prices and the price-setting mechanism resulting in the establishment of the Producer Price Review Committee in 1984. The aim was to set prices at levels that will support farmers to increase their production (Quarmine et al., 2014).

In the 1990s, the structure and functioning of COCOBOD’s internal marketing experienced significant reforms. COCOBOD delegated its control over the procurement of cocoa at the farm gate to Licensed Buying Companies (LBCs). However, producer prices were administratively fixed. This was part of the liberalization pressure the World Bank and the International Monetary Fund (IMF) mounted on many developing countries to fully liberalize their commodities market in the 1990s. Regardless of the pressure from the Bretton Woods Institutions, liberalization of Ghana’s cocoa sector has been gradual and only partially liberalized to date (Vigneri & Kolavalli, 2017).
2.6 The Current Management Structure of COCOBOD

Currently, the sector is managed by COCOBOD, a public institution governed by a Board of Directors whose members are appointed by the President of Ghana. The board members typically have varied professional backgrounds and consist of representatives of COCOBOD and the Cocoa, Coffee and Shea Nut Farmers' Association. COCOBOD has long been under Ministry of Finance and Economic Planning (MOFEP) supervision until 2018 when the ministerial responsibility was transferred to the Ministry of Food and Agriculture (MOFA)\(^\text{14}\). The management structure consists of a Chief Executive Officer (CEO) and three (3) deputies responsible for Finance and Administration, Agronomy and Quality Control and Operations. There are nine directorates responsible for Human Resource, Research, Audit, Finance, Procurement, Health, Legal, Special Services (Security & Intelligence) and General Services (Estates, Civil works & Transport). Additionally, there are six departmental Heads also responsible for Public Affairs Department, Security Unit, Scholarship, Information Systems Unit, Estates Unit and Transport Unit.

\(^{14}\) The reason underlying the shift of the supervisory Ministry from the Ministry of Finance to Ministry of Food and Agriculture emanates from the fact that cocoa is an agricultural produce and therefore should be supervised by agricultural ministry.
Figure 3. COCOBOD's Management Structure

(Source: Authors’ construct (2019) with insight from COCOBOD)
COCOBOD has five subsidiaries performing distinct functions to facilitate the efficiency of Ghana’s cocoa sector (see Figure 4)

Figure 4. COCOBOD’s Subsidiaries

[Source: Authors’ construct with data from COCOBOD]
3.1 Introduction

The chapter chronicles the methodology used for addressing the research objectives of the study. The research approaches used are specified, justified and where various variables are used, they are defined.

3.2 Desk Study

A desk study was first conducted to gain an initial understanding of the management of Ghana's cocoa sector. This helped in formulating an investigative work targeting key areas in the producer price determination process and revenue management efficiency. Consequently, this informed the depth, scope and methodology of the project.

3.3 Stakeholder Mapping

The study mapped out key stakeholders along the cocoa value chain whose activities affect the pricing of cocoa and the management of cocoa revenue. The purpose was to investigate the role of the stakeholders in the sector and to represent same in the study thereby, enhancing the acceptability of the findings. The stakeholders include all members in the domestic supply chain, government institutions and some private consultants (See Table 3 for details).
Table 3. Key Stakeholders Within Ghana’s Cocoa Sector

<table>
<thead>
<tr>
<th>STAKEHOLDERS</th>
<th>ROLES/FUNCTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ministry of Finance and Economic Planning</td>
<td>The ministry supervised the activities of COCOBOD until 2018</td>
</tr>
<tr>
<td>Ministry of Agriculture</td>
<td>The ministry supervises the activities of COCOBOD</td>
</tr>
<tr>
<td>Ghana Cocoa Board (COCOBOD) and its Subsidiaries</td>
<td>The main regulator of the cocoa sector; implements government policies and programmes; producer price and FOB price setting</td>
</tr>
<tr>
<td>Cocoa Farmers</td>
<td>Farm production, cultivating and harvesting of cocoa beans.</td>
</tr>
<tr>
<td>Cocoa Processing Companies</td>
<td>Processing of cocoa</td>
</tr>
<tr>
<td>Input Companies</td>
<td>Importing and vending of fertilizer and other cocoa inputs</td>
</tr>
<tr>
<td>License Buying and Haulage Companies</td>
<td>In charge of local marketing and buying of cocoa and reselling to COCOBOD. Responsible for transporting of cocoa beans</td>
</tr>
<tr>
<td>Private Consultants</td>
<td>Consultants with knowledge in Ghana’s cocoa industry</td>
</tr>
</tbody>
</table>

[Source: Authors’ compilation]

3.4 Research Design

The components of the research design are the research philosophy, approach and strategy used to carry out the study in order to satisfy the objectives stipulated. The research design adopted is in line with one of the key philosophical stands presented by Saunders, Lewis, and Thornhill (2007) on their presentation of the Research Onion. This study adopts the pragmatism research philosophy because of the benefits of combining the strengths of the quantitative and the qualitative approaches of analysis. In the same vein, the sequential explanatory mixed method of Creswell, Plano, and Hanson (2003) has been used. This allows the quantitative analysis to be conducted hand in hand with qualitative analysis. Financial analysis has been conducted on COCOBOD, the producer prices and production nexus has also been analysed, and the perspectives of cocoa sector stakeholders assessed, using a survey. Interviews have also been conducted to gain insights from key stakeholders on quantitative results or for purely qualitative purposes.
3.5 Types and Sources of Data

The study employed a mixture of both primary and secondary data from different sources to complete the investigation. This is necessary because of the kind of research objectives the study wishes to examine. The data types and sources are grouped under the different research approaches adopted.

3.5.1 Data on Cocoa Price

Secondary data has been sourced from COCOBOD, the International Cocoa Organisation (ICCO) and the Bank of Ghana (BoG). Data from COCOBOD was chiefly from its financial statements and the technical reports of the Producer Price Review Committee (PPRC). Cocoa prices were sourced from both the Bank of Ghana and the International Cocoa Organisation (ICCO) - representing the average price per metric tonne of cocoa. There is a disparity between the prices given by the International Cocoa Organisation (ICCO) and the Bank of Ghana. The study explored the reasons for the variance. The dataset on producer price and its related prices like the world market prices were converted to similar currency units for the purpose of comparison. In this regard, the conversion from USD to GHS or vice versa is done using the exchange rate fixed by the PPRC in consultation with the Bank of Ghana for a specified year. The cocoa price analysis covers the 2007/2008 to 2016/2017 cocoa crop seasons.

3.5.2 Econometric Data, Modelling and Estimation Techniques

The relationships between cocoa production in Ghana and cocoa prices have been examined using time series estimation techniques. The study adapts the models used in earlier studies such as Verter (2016), Darkwah and Verter (2014) and Boansi (2013). Three (3) other essential variables that affect cocoa production, were included in the specified models as controls area harvested, foreign direct investment flow and GDP per capita. To examine the relationship that may exist between world cocoa price or cocoa producer price and cocoa production in Ghana, two multivariate regression models as specified below were adopted:
\[ \text{PROD} = f(WPRICE, ARHARV, FDI, GDPPC) \]  
Eqn. 1

\[ \text{PROD} = f(WPRICE, ARHARV, FDI) \]  
Eqn. 2

\[ \text{PROD}_t = \beta_0 + \beta_1 WPRICE_t + \beta_2 ARHARV_t + \beta_3 FDI_t + \beta_4 GDPPC_t + \epsilon_t \]  
Eqn. 3

\[ \text{PROD}_t = \beta_0 + \beta_1 WPRICE_t + \beta_2 ARHARV_t + \beta_3 FDI_t + \epsilon_t \]  
Eqn. 4

where PROD is Cocoa Production, WPRICE is World Cocoa Price based on dataset from International Monetary Fund (2019), ARHARV is Area Harvested, FDI is Foreign Direct Investment, GDPPC is Gross Domestic Product per Capita used as proxy for economic growth, \( \beta_0 \) is the intercept, \( \beta_1 - \beta_4 \) are the regressor coefficients and \( \epsilon_t \) is the error term. Two models are specified to resolve the issue of multicollinearity\(^{15} \) due to the independent variables, World Cocoa Price and Producer Price as grouping these variables in the same model can expose the model to ‘the curse’ of multicollinearity. GDPPC is not appearing in Equations 2, 4 and 6 as including many variables with limited dataset (as witnessed with PPRICE) can result in loss of degree of freedom causing multicollinearity, serial correlation and model misspecification.

Equations 3 and 4 were log-transformed in order to normalise the data and achieve a better interpretation of the results. In general terms, the function can be expressed in an econometric model form as presented in the following equations where \( \ln \) is the Natural Logarithm:

\[ \ln PROD_t = \beta_0 + \beta_1 \ln WPRICE_t + \beta_2 \ln ARHARV_t + \beta_3 \ln FDI_t + \beta_4 \ln GDPPC_t + \epsilon_t \]  
Eqn. 5

\[ \ln PROD_t = \beta_0 + \beta_1 \ln WPRICE_t + \beta_2 \ln ARHARV_t + \beta_3 \ln FDI_t + \epsilon_t \]  
Eqn. 6

\(^{15} \) Multicollinearity refers to a situation in which two or more explanatory variables in a multiple regression model are highly linearly related.

**Table 4. Description of Data and Sources**

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>DESCRIPTION</th>
<th>DATA SOURCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROD</td>
<td>Cocoa Production in Ghana</td>
<td>COCOBOD</td>
</tr>
<tr>
<td>WPRICE</td>
<td>Global Price of Cocoa (PCOCOUSDA) DOW</td>
<td>Federal Reserve Economic (FRED) Data</td>
</tr>
<tr>
<td>PPRICE</td>
<td>Cocoa Producer Price in Ghana</td>
<td>COCOBOD</td>
</tr>
<tr>
<td>ARHARV</td>
<td>Area Harvested</td>
<td>FAOSTAT</td>
</tr>
<tr>
<td>FDI</td>
<td>Foreign Direct Investment</td>
<td>The World Bank</td>
</tr>
<tr>
<td>GDPPC</td>
<td>GDP per capita (constant LCU)</td>
<td>The World Bank</td>
</tr>
</tbody>
</table>

(Source: Authors’ construct)

Prior to the time series estimation, a number of pre-estimation tests were conducted to determine the appropriate estimation techniques to adopt. Some of these tests include the unit root tests, optimal lag selection test and co-integration tests. Unit root test is relevant in time series data analysis since they are prone to spurious regression outputs where \(x\) and \(y\) series are non-stationary (follows a random-walk or has a unit root). Two (2) generally accepted tests, viz. Augmented Dickey-Fuller (ADF) test and a more robust variant, the Phillips and Peron (PP)\(^{16}\) test were employed for this analysis (Dickey & Fuller, 1979, 1981; Phillips & Perron, 1988). Additionally, an optimal lag selection test was conducted based on the autoregressive distributed lag (ARDL) model. To establish the short-run or long-run relationship that may exist between the variables, the ARDL bounds test for Co-integration was conducted.

---

\(^{16}\) The PP test corrects for possible serial correlation and time dependent heteroskedasticity in series.
Earlier studies on the relationship between cocoa production and cocoa prices focused primarily on the long-run effects at the expense of the short-run relationships even in scenarios where the statistical tests require that both short-run and long-run relationships should be examined. For instance, after finding evidence for co-integration, Darkwah and Verter (2014) elected to employ ordinary least squares (OLS) estimation over the Vector Error Correction Model. While the use of the OLS is not under contention because their co-integration test suggests that the variables (series) are related and can be combined in a linear function, this study chooses the ARDL model over the use of either the OLS, the VAR or the VEC models.

The ARDL estimation technique can be used without achieving the first difference (1) stationarity. It can also be used when the series are integrated of different orders. The model concurrently computes both short-run and long-run dynamic relationships. It provides a distinction between the dependent and independent variables which provide a ground for clearly testing the nexus between the variables. Finally, it allows for the use of different optimal lag lengths by different variables. It is worth noting that this study will focus solely on the long-run results. Granger Causality test are conducted to establish the causal relationship that may exist between the dependent and independent variables to aid policy direction (Granger, 1969).

The pre-estimation tests satisfied the above-stated conditions; therefore, they are used in analysing the relationship that may exist between cocoa production in Ghana and cocoa prices in the study.

3.5.3 Farmer Survey

To help present the perspectives of the key stakeholder (the farmer) in the cocoa value chain, primary data was collected from farmers in the three high producing regions in the country based on a calculated sample size through questionnaire administration. The study adapts the survey instruments utilised in previous cocoa research in Ghana such as Department for International Development (DFID) UK (2002) and Larson, Asuming-Brempong, Sarpong, Anim-Somuah, and Rosen (2010).
**Sample Population, Frame and Size**

The total number of cocoa farmers in the country make up the sample population for this survey. The sample frame, however, consists of all cocoa farmers in the three regions with the highest level of cocoa production in Ghana with concentration on the three highest producing districts in these regions. The total sample frame is summarized in Table 5 below.

*Table 5. Sample Frame*

<table>
<thead>
<tr>
<th>ASHANTI REGION</th>
<th>WESTERN REGION</th>
<th>BRONG-AHAFO REGION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Districts</td>
<td>Farmers</td>
<td>Districts</td>
</tr>
<tr>
<td>Tepa</td>
<td>11,000</td>
<td>Juaboso</td>
</tr>
<tr>
<td>New Edubiase</td>
<td>10,000</td>
<td>Sefwi Wlawso</td>
</tr>
<tr>
<td>Antoakrom</td>
<td>19,000</td>
<td>Akontombra/Bodi</td>
</tr>
<tr>
<td>Total Number of Farmers (Sample Frame)</td>
<td>119,000</td>
<td></td>
</tr>
</tbody>
</table>

[Source: Authors’ Construct with Insights of Data from COCOSHE]

The formulae for calculating the sample size of this survey is adopted from Yamane (1967).

\[
\begin{align*}
n &= \frac{N}{1 + N(\alpha^2)} \\
&= \frac{119,000}{1 + 119,000(0.05^2)} = 399.997 \approx 400
\end{align*}
\]

Eqn. 7

Where \( n \) is the sample size, \( N \) is the sample frame and \( \alpha \) is the margin of error (the confidence level used in this calculation is 95percent making the margin of error, 0.05).

This gives:

\[
\begin{align*}
n &= \frac{119,000}{1 + 119,000(0.05^2)} = 399.997 \approx 400
\end{align*}
\]

Eqn. 8

The sample size for this survey is therefore 400 farmers. This number is distributed proportionally among the nine districts in the three regions as shown in Table 6 below.
The formulae adopted was;

\[
\frac{\text{Number of farmers per district}}{\text{Total number of farmers in the nine districts}} \times 400 \quad \text{Eqn. 9}
\]

<table>
<thead>
<tr>
<th>DISTRICTS</th>
<th>FORMULAE</th>
<th>SAMPLE SIZE</th>
<th>ADJUSTMENT FOR ERROR*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ASHANTI REGION</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tepa</td>
<td>(11000/119000) *400</td>
<td>37</td>
<td>40</td>
</tr>
<tr>
<td>New Edubiase</td>
<td>(10000/119000) *400</td>
<td>34</td>
<td>35</td>
</tr>
<tr>
<td>Antoakrom</td>
<td>(19000/119000) *400</td>
<td>64</td>
<td>65</td>
</tr>
<tr>
<td><strong>WESTERN REGION</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juaboso</td>
<td>(19000/119000) *400</td>
<td>64</td>
<td>65</td>
</tr>
<tr>
<td>Sefwi Wiawso</td>
<td>(15000/119000) *400</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Akontombra/Bodi</td>
<td>(11000/119000) *400</td>
<td>37</td>
<td>40</td>
</tr>
<tr>
<td><strong>BRONG-AHAFO REGION</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kasapin</td>
<td>(11000/119000) *400</td>
<td>37</td>
<td>40</td>
</tr>
<tr>
<td>Goaso</td>
<td>(14000/119000) *400</td>
<td>47</td>
<td>55</td>
</tr>
<tr>
<td>Ankrankwanta</td>
<td>(9000/119000) *400</td>
<td>30</td>
<td>35</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>400</strong></td>
<td><strong>425</strong></td>
</tr>
</tbody>
</table>

(Source: Authors’ Construct * The sample sizes for the various districts were adjusted to make up for unforeseen errors during field data collection)

### 3.5.4 Interview Survey

In addition to the farmer survey conducted, primary data is gathered through interviews. Interview guides that align with the objectives of the study were designed and used to guide the team’s conversations with the identified stakeholders (see Table 3). Each stakeholder had a specific interview guide that suited their expertise or operations. The stakeholders were selected based on their roles within the sector and their willingness to meet the team. The purpose of this is to also benefit from the strength of qualitative research method in exploring “…the how and why of what…” was observed in the quantitative analysis. This triangulation ensures that the study produces an understanding of the issues, and fills in any gaps that a single method cannot adequately address.
3.5.5 Data for Revenue Management in the Cocoa Sector

COCOBOD’s financial statements covering a period of 10 years from the 2008 financial year to 2017 financial year\(^{17}\) have been used for this analysis. The choice of the 10-year period is based on the following; Ghana adopted the International Financial Reporting Standard (IFRS) in 2007 - suggesting that financial statements prepared within the period can be analysed consistently, and comparable, without requiring further adjustments, and to allow enough time period for a true measure of the revenue management dynamics within the cocoa sector.


3.6 Data Analysis Techniques

Generally, the presentation of the results and analyses for cocoa price is conducted using tables and graphs. The various trends in the world market price and the producer prices reported by the Bank of Ghana and ICCO have been presented. The discrepancies in the producer price mechanism as employed by the PPRC is also highlighted in this analysis. The EViews Statistical Package is employed to help estimate the time series multivariate equations in finding the relationship that might exist between cocoa production in Ghana and cocoa prices. These results are displayed using tables as generated by EViews and the significance of the variables have been discussed. The Statistical Package for Social Sciences (SPSS) version 22 is used for the farmer survey primary data analysis whiles ATLAS.ti is used for textured aspects of the responses from the survey.

In line with the mixed research method, the financial analysis conducted for the quantitative aspect of the study comprised of ratio analysis and trend analysis of COCOBOD’s financial statement. In terms of ratio analysis, the study employed profitability, liquidity, solvency, turnover (efficiency) and cash flow ratios. Furthermore, a trend analysis of the assets and its components has also been conducted.

\(^{17}\) COCOBOD’s financial year starts on 1st October and ends on 30th September each year.
3.7 Financial Analysis

There are many financial ratios that are used for financial analysis. The aim of ratios is to express one financial statement item relative to another financial statement item in order to gain meaning into the financial statements. Generally, ratio analyses are conducted to ascertain the profitability, liquidity, efficiency and financial stability of an organisation. Given that COCOBOD is a State-Owned Enterprise (SOE), it’s may not necessarily be shareholder value maximization as in the private sector. As enshrined in the Ghana Cocoa Board Act 1984 (P.N.D.C.L. 81), the overarching object of the board is “to promote the general welfare of cocoa, coffee and shea farmers in the Republic”. Accordingly, the analysis of the financial information COCOBOD has to be conducted with this objective as a critical end goal. Thus, it is expected that COCOBOD operates efficiently to sustain profitability, enhance financial stability, ensure optimum liquidity and promote farmer’s welfare.

Profitability ratios, liquidity ratios, solvency ratios, turnover ratios and cash flow ratios are analysed to provide preliminary insights into the financial performance of COCOBOD. Different ratios under each category are used. Profitability ratios measure the ability of COCOBOD to generate income (profit) relative to revenue, total assets, capital employed and equity. High profitability ratios are preferable compared to lower ratios. Liquidity ratios explain COCOBOD’s ability to meet short-term debt obligations without raising external capital. Again, the decision rule rests with higher liquidity ratios is preferable since it suggests that COCOBOD is able to pay off its short-term obligations with some type of current assets easily. In addition to the three commonly used liquidity ratios, the working capital ratio has also been added to this category in this study. This ratio explains the ability of COCOBOD to use its working capital to finance its liabilities. A higher score for this ratio is preferable. Solvency ratios measure the extent to which COCOBOD’s assets are able to cover its long-term financial obligations. In addition, interest cover ratios are analysed; these explain the ability of COCOBOD to pay its financial costs or interest when they are due. The description of the profitability, liquidity and solvency ratios used for this study have been presented in Table 7.
# Table 7. Ratios and their Description

<table>
<thead>
<tr>
<th>RATIOS</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PROFITABILITY RATIOS</strong></td>
<td></td>
</tr>
<tr>
<td>Gross Profit Margin</td>
<td>Gross profit/Revenue</td>
</tr>
<tr>
<td>Operating Profit Margin</td>
<td>Operating profit (loss)/Revenue</td>
</tr>
<tr>
<td>Net Profit Margin**</td>
<td>Total Comprehensive Income/Revenue</td>
</tr>
<tr>
<td>Net Profit Margin</td>
<td>Profit(loss) for the Year/Revenue</td>
</tr>
<tr>
<td>Return on Capital Employed**</td>
<td>Total Comprehensive Income/Total Assets less Total Current Liabilities</td>
</tr>
<tr>
<td>Return on Capital Employed</td>
<td>Profit(loss) for the Year/Total Assets less Total Current Liabilities</td>
</tr>
<tr>
<td>Return on Equity**</td>
<td>Total Comprehensive Income/Total Equity</td>
</tr>
<tr>
<td>Return on Equity</td>
<td>Profit(loss) for the Year/Total Equity</td>
</tr>
<tr>
<td>Return on Asset**</td>
<td>Total Comprehensive Income/Total Assets</td>
</tr>
<tr>
<td>Return on Asset</td>
<td>Profit(loss) for the Year /Total Assets</td>
</tr>
<tr>
<td><strong>LIQUIDITY RATIOS</strong></td>
<td></td>
</tr>
<tr>
<td>Current Ratio</td>
<td>Total Current Assets/Total Current Liabilities</td>
</tr>
<tr>
<td>Acid Test</td>
<td>(Total Current Assets less Inventories)/ Total Current Liabilities</td>
</tr>
<tr>
<td>Cash Ratio</td>
<td>Cash and Cash Equivalents/Total Current Liabilities</td>
</tr>
<tr>
<td>Working Capital-to-Debt Ratio</td>
<td>(Cash and Cash Equivalents + Trade and other Receivables + Inventories – Trade and other Payables)/Total Liabilities</td>
</tr>
<tr>
<td><strong>SOLVENCY RATIOS</strong></td>
<td></td>
</tr>
<tr>
<td>Debt-to-Asset Ratio</td>
<td>Total Liabilities/Total Assets</td>
</tr>
<tr>
<td>Current Liability-to-Asset</td>
<td>Total Current Liabilities/Total Assets</td>
</tr>
<tr>
<td>Long-Term Liability-to-Asset</td>
<td>Total Non-Current Liabilities/Total Assets</td>
</tr>
<tr>
<td>Debt-to-Capital Ratio</td>
<td>Total Liabilities/Capital Contribution</td>
</tr>
<tr>
<td>Debt-to-Equity</td>
<td>Total Liabilities/Total Equity</td>
</tr>
<tr>
<td>Interest Coverage Ratio**</td>
<td>Total Comprehensive Income/Finance Costs</td>
</tr>
<tr>
<td>Interest Coverage Ratio</td>
<td>Profit(loss) for the Year/Finance Costs</td>
</tr>
</tbody>
</table>

[Source: Authors’ Construct]
Cash flow ratios and turnover or activity ratios have been included in the analyses. The turnover ratios measure the efficiency of COCOBOD in utilising its resources (assets) to generate revenue or how efficient it has been in reducing its costs. Cash flow ratios are also used for analysing the ability of COCOBOD to have enough cash to pay off its obligations when they are due. The study uses six (6) different ratios to explore the dynamics of the cash flow performance of COCOBOD. Operating cash flow ratio measures how capable COCOBOD is in generating cash from revenue while asset efficiency ratio is the capability to use resources in generating cash flow. Current liability coverage and long-term debt coverage ratios measure how long the company will take to pay off its current liabilities and non-current liabilities respectively assuming all cash flows from operating activities are dedicated for debt payment. In a similar vein, interest coverage ratio measures the ability of COCOBOD to use cash flow from operating activities to pay interest expenses on outstanding debts. Cash generating power measures the portion of cash generated from operating activities as compared to total cash flow. The external financing index portrays the ability of COCOBOD to finance its asset growth internally. A positive index suggests the company is not able to finance its asset growth internally while a negative index suggests that the company generates more than enough cash to finance asset growth. These ratios are described in Table 8.

### Table 8. Turnover and Cash Flow Ratios and their Description

<table>
<thead>
<tr>
<th>RATIOS</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TURNOVER RATIOS</strong></td>
<td></td>
</tr>
<tr>
<td>Asset Turnover ratio</td>
<td>Revenue/Total Assets</td>
</tr>
<tr>
<td>Capital Employed Turnover</td>
<td>Revenue/Total Assets less Total Current Liabilities</td>
</tr>
<tr>
<td>Fixed Assets Turnover</td>
<td>Revenue/PPE</td>
</tr>
<tr>
<td><strong>CASH FLOW RATIOS</strong></td>
<td></td>
</tr>
<tr>
<td>Operating Cash Flow to Sales Ratio</td>
<td>CFO/Revenue</td>
</tr>
<tr>
<td>Asset Efficiency Ratio</td>
<td>CFO/Total Assets</td>
</tr>
<tr>
<td>Interest Coverage Ratio</td>
<td>(CFO + Interest Paid + Repayment of Loans)/(Interest Paid + Repayment of Loans)</td>
</tr>
<tr>
<td>Cash Generating Power Ratio</td>
<td>CFO/(CFO+CFI+CFF)</td>
</tr>
<tr>
<td>External Financing Index Ratio</td>
<td>Net Cash Flow from financing activities/CFO</td>
</tr>
</tbody>
</table>

**Note** – CFO is cash flow from operating activities, CFI is cash flow from investing activities, CFF is cash flow from financing activities and PPE is property, plants and equipment.

[Source: Authors’ Construct ]
4.1 Introduction

In this section of the study, a detailed analysis of the cocoa price setting mechanism employed by Ghana through the Producer Price Review Committee (PPRC) is presented. This analysis consists of the evolution of the price setting structure, the current mechanism operational in the cocoa space and the inconsistencies of this pricing mechanism are underlined.

4.2 The World Market Price

The world market price of cocoa operates in a very transparent system at the stock exchanges in New York and London. The London market is operated by NYSE LIFFE which is a subsidiary of the NYSE Euronext. In New York, the market is controlled by ICE Futures US which is also a subsidiary of Intercontinental Exchange (ICE). Both ICE Futures US and NYSE LIFFE trade in cocoa futures contracts\(^{18}\) and the prices are determined by the relationship between demand, stocks and future supply. They play a significant role in the formation of cocoa prices throughout the world and a major point of reference in the determination of cocoa prices in various countries (Dand, 2011). Thus, a change in the price at these terminal markets is expected to influence the prices cocoa farmers receive. The importance of ICE and NYSE LIFFE in the determination of cocoa price warrants efficiency in its price discovery mechanism (Fountain & Heutz-Adams, 2018; Hütz-Adams, Huber, Knoke, Morazán, & Mürlebach, 2016; International Cocoa Organization (ICCO), 2010; Khamsi, 2011).

\(^{18}\) A future contract guarantees that a specific amount and quality of cocoa would be bought and delivered at a predetermined place and time in the future however the prices paid for the cocoa beans differ with regard to quality and delivery dates.
4.3 Review of the Administered Producer Price Mechanism in Ghana

Producer prices are determined based on world market price, in cocoa-producing countries. However, the movement of the exchange rate, inflation rate and government policies results in different producer prices (Amedofu, 2009). The price determination mechanism allows cocoa revenue to be forecast and this approach has changed over time. The approach has transitioned from a short-lived official marketing schemes and negotiations between producers and multinational corporations to an establishment of a PPRC in the determination of producer price for each season in Ghana (see Table 9 for information on the price evolution).

Table 9. Price Evolution
<table>
<thead>
<tr>
<th>PERIOD</th>
<th>PRICE DETERMINATION RULES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>COLONIAL</strong></td>
<td></td>
</tr>
<tr>
<td>1898-1900</td>
<td>An official marketing system that guarantees an advance half payment of the total beans supplied before exported by the British government</td>
</tr>
<tr>
<td>1900-1937</td>
<td>Negotiations between farmer cooperatives and multinational cocoa buying companies</td>
</tr>
<tr>
<td>1937-1947</td>
<td>A buying agreement that guarantees a uniform price by the British government</td>
</tr>
<tr>
<td><strong>COLONIAL/POSTCOLONIAL</strong></td>
<td></td>
</tr>
<tr>
<td>1947-1983</td>
<td>Pricing decisions made solely by COCOBOD based on world prices, government expectations and government revenues</td>
</tr>
<tr>
<td><strong>PPRC ERA</strong></td>
<td></td>
</tr>
<tr>
<td>1984-1998</td>
<td>Estimation of the average cost of production and price setting to guarantee a 20 percent profit margin to producers</td>
</tr>
<tr>
<td>1998-2000</td>
<td>Farmers negotiate price with the PPRC based on previous amounts received</td>
</tr>
<tr>
<td>2001-2018</td>
<td>Farmers are guaranteed at least 70 percent of the net FOB. Industry cost is deducted from the net COCOBOD revenue. A proportion of the net FOB is paid to the farmers.</td>
</tr>
</tbody>
</table>

*Source: Akiyama et al. (2001)*

Currently, a multi-stakeholder body, the **Producer Price Review Committee (PPRC)** established in 1983/84, which consist of representatives of the **Ministry of Finance and Economic Planning, Ministry of Agriculture, COCOBOD, Bank of Ghana, Quality Control Commission, Cocoa Marketing Committee, Institute of Statistical, Social and Economic Research (ISSER), LBCs, Cocoa Hauliers Association and Cocoa Farmers’ Association** (Laven et al., 2016) administratively sets the cocoa price for an entire crop year in Ghana (Vigneri & Kolavalli, 2017). The PPRC calculates the producer price based on the net revenue of COCOBOD, the projected future prices and sale of cocoa, explicit tax and farmers’ production cost, the crop size in the following year and the deduction of industry related cost (Laven et al., 2016) (see Table 10 and 11 for a sample PPRC sharing structure).
The data is obtained from the Cocoa Marketing Company (CMC), the Bank of Ghana, and the Research, Monitoring, and Evaluation Department (RMED) of COCOBOD. It is worth mentioning that the data from Bank of Ghana on cocoa prices is different from the ICCO monthly prices (see Figure 6).

**Table 10. Sample PPRC Free on Board (FOB) Sharing Structure**

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>VALUE</th>
<th>USD</th>
</tr>
</thead>
<tbody>
<tr>
<td>F.O.B Price (US$/tonne)</td>
<td>2,950</td>
<td>2,950</td>
</tr>
<tr>
<td>Exchange Rate: (GHC/US$1)</td>
<td>3.95</td>
<td>-</td>
</tr>
<tr>
<td>Projected Cocoa Production (tonnes)</td>
<td>850,000</td>
<td></td>
</tr>
<tr>
<td>Gross F.O.B. Value (GHC)</td>
<td>9,904,625,000</td>
<td>2,507,500,000</td>
</tr>
<tr>
<td>Disease and Pest Control Cost (GHC)</td>
<td>316,000,000</td>
<td>80,000,000</td>
</tr>
<tr>
<td>Scholarships (GHC)</td>
<td>5,000,000</td>
<td>1,265,823</td>
</tr>
<tr>
<td>Operational Input Cost (GHC)</td>
<td>130,350,000</td>
<td>33,000,000</td>
</tr>
<tr>
<td>CSSVD (Essam Proj.) Cost (GHC)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Fertilizer Application Hi-Tech (GHC)</td>
<td>355,600,000</td>
<td>90,025,316</td>
</tr>
<tr>
<td>Child Education Support (GHC)</td>
<td>4,000,000</td>
<td>1,02,658</td>
</tr>
<tr>
<td>Cocoa Roads (GHC)</td>
<td>592,500,000</td>
<td>150,000,000</td>
</tr>
<tr>
<td>Rehab. (Nurseries &amp; Seedlings) GHC</td>
<td>160,468,750</td>
<td>40,625,000</td>
</tr>
<tr>
<td>Net FOB (GHC)</td>
<td>8,340,806,250</td>
<td>2,111,596,519</td>
</tr>
<tr>
<td>Net FOB/Tonne (GHC)</td>
<td>9,813</td>
<td>2,484</td>
</tr>
</tbody>
</table>

**Source: PPRC Technical Report 2016/2017**

**Table 10** demonstrates how the PPRC determines its net FOB. The projected FOB price (USD/tonne)$^{19}$ and the exchange rate$^{20}$ are then multiplied with the projected cocoa production for the coming crop season to arrive at the Gross FOB. The industry cost (Disease and Pest Control Cost, Scholarships, Cocoa Roads) is then deducted from the Gross FOB to derive the net FOB. The net FOB is then divided by the projected cocoa production for the year to arrive at the Net FOB per tonne. The net FOB per tonne is then shared in margins among key stakeholders (see Table 14).

$^{19}$ projected world market price

$^{20}$ obtained from Bank of Ghana
Table 11. Net F.O.B. Sharing Structure for 2016/2017

<table>
<thead>
<tr>
<th>COST ITEMS/STAKEHOLDERS</th>
<th>2016/2017</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Net FOB SHARING (GHS Tonne)</td>
</tr>
<tr>
<td>Farmers</td>
<td>7,600.00</td>
</tr>
<tr>
<td>Stabilization Fund</td>
<td>110.00</td>
</tr>
<tr>
<td>Hauliers</td>
<td>266.00</td>
</tr>
<tr>
<td>CMC's Internal Marketing</td>
<td>88.00</td>
</tr>
<tr>
<td>Disinfestation/Grading/Sealing</td>
<td>121.00</td>
</tr>
<tr>
<td>Crop Financing</td>
<td>193.00</td>
</tr>
<tr>
<td>Scale Insp/Phytosanitary</td>
<td>5.00</td>
</tr>
<tr>
<td>Export Duty/ Cocoa Roads</td>
<td>210.03</td>
</tr>
<tr>
<td>Farmers’ Housing Scheme</td>
<td>-</td>
</tr>
<tr>
<td>Replanting/Rehabilitation (Cocoa)</td>
<td>-</td>
</tr>
<tr>
<td>Rehabilitation (Coffee)</td>
<td>3.00</td>
</tr>
<tr>
<td>COCOBOD</td>
<td>427.68</td>
</tr>
<tr>
<td>TOTAL</td>
<td>9812.71</td>
</tr>
</tbody>
</table>


In broad terms, the price is a percentage of the world market price of cocoa (Akiyama et al., 2001; Laven et al., 2016). A general principle that underpins the setting of the producer price is to pay farmers at least 70 percent of the net Free on Board (FOB)\(^{21}\) price, obtained from the world market (Ministry of Food and Agriculture (MOFA), 2018). Over the years, farmers’ share of the FOB has increased from 71.07 percent in 2009/2010 to 88.66 percent in 2017/2018\(^{22}\) (see Table 12). Regardless of the actual price at the time of selling, the margins received by the stakeholders are expected to remain the same, at least within the period under review.

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\(^{21}\) Free On Board (FOB) is a contractual term that refers to the requirement that the seller delivers goods at the seller's cost via a specific route to a destination designated by the buyer.

\(^{22}\) See also the Perspectives of the LBCs on the Margin distribution.
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmers</td>
<td>74.84</td>
<td>76.04</td>
<td>78.42</td>
<td>79.17</td>
<td>75.65</td>
<td>73.52</td>
<td>77.45</td>
<td>88.66</td>
</tr>
<tr>
<td>Stabilization Fund</td>
<td>0.68</td>
<td>0.58</td>
<td>0</td>
<td>0</td>
<td>1.26</td>
<td>1.19</td>
<td>1.12</td>
<td>0</td>
</tr>
<tr>
<td>Buyers` Margin</td>
<td>8.01</td>
<td>7.94</td>
<td>7.92</td>
<td>8</td>
<td>8.98</td>
<td>8.53</td>
<td>8.04</td>
<td>8.19</td>
</tr>
<tr>
<td>Hauliers</td>
<td>3.28</td>
<td>3.25</td>
<td>3.25</td>
<td>3.21</td>
<td>3.03</td>
<td>2.88</td>
<td>2.71</td>
<td>2.76</td>
</tr>
<tr>
<td>CMC's internal marketing</td>
<td>1.06</td>
<td>1.05</td>
<td>1.04</td>
<td>1.03</td>
<td>1.01</td>
<td>0.95</td>
<td>0.9</td>
<td>1.42</td>
</tr>
<tr>
<td>Disinfestation/grading/sealing</td>
<td>1.46</td>
<td>1.45</td>
<td>1.45</td>
<td>1.43</td>
<td>1.38</td>
<td>1.31</td>
<td>1.23</td>
<td>2.13</td>
</tr>
<tr>
<td>Crop Financing</td>
<td>0.86</td>
<td>0.85</td>
<td>0.85</td>
<td>0.84</td>
<td>2.2</td>
<td>2.09</td>
<td>1.97</td>
<td>6.68</td>
</tr>
<tr>
<td>Scale Insp/Phytosanitary</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.06</td>
<td>0.05</td>
<td>0.05</td>
<td>0.04</td>
</tr>
<tr>
<td>Export Duty/Cocoa Roads</td>
<td>9.5</td>
<td>8.64</td>
<td>1.1</td>
<td>0.42</td>
<td>1.59</td>
<td>4.83</td>
<td>2.14</td>
<td>0</td>
</tr>
<tr>
<td>Farmers' Housing Scheme</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Replanting/Rehabilitation (Cocoa)</td>
<td>0.23</td>
<td>0.13</td>
<td>0.13</td>
<td>0.13</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Rehabilitation (Coffee)</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>0.52</td>
</tr>
<tr>
<td>COCOBOD</td>
<td>9.5</td>
<td>8.64</td>
<td>5.78</td>
<td>5.71</td>
<td>4.79</td>
<td>4.62</td>
<td>4.36</td>
<td>7.37</td>
</tr>
</tbody>
</table>

The existing difference between the Bank of Ghana prices\textsuperscript{23} and the ICCO prices\textsuperscript{24} coupled with the controlled pricing mechanism in Ghana inhibits producer prices from responding timely to changes in world market price (see Figure 5 for the deviation between BOG and ICCO prices). This may have a potential effect on the derivation of the net FOB in Ghana as the sourced institution (BoG) reports the world market price, which is lower than the reports of ICCO.

![DEVIATION BETWEEN ICCO AND BOG MONTHLY PRICES](image)

*Figure 6. Established Deviations Between ICCO and BOG Prices*

*Source: Authors’ Construct with inferences from ICCO and BOG Monthly Prices 2007-2016*

### 4.4 Analysis of the PPRC Projections and the Actual Prices 2016/2017

A review of the cocoa price at the time of selling for the 2016/2017 crop year indicated that though the actual price (GHS 2,677) was lower than projected (GHS 2,950) giving an adverse variation of 9.3 percent, the actual produced beans (969,765) was 14.09 percent higher than the projected number (850,000) of tones. For the ten-year period of study, there has been significant differences between the projected and the actual number of tonnes (see Table 13).

\textsuperscript{23} Bank of Ghana cocoa prices are used in calculating the producer prices in Ghana

\textsuperscript{24} Actual representation of the world market price
Over the years, there have also been several criticisms against the erratic delivery of COCOBOD programs to the farmers designed to increase production. This observation was also made at the validation sessions by stakeholders present.

“The delivery of inputs does not come on time. There is too much politics surrounding the delivery of inputs.”

“Since the inception of these programmes which has been a long time, the goodwill of the Board for introducing these programmes have not materialized. Cocoa farming is made worse-off as farmers will prefer to wait for inputs from COCOBOD which is characterized by erratic supply and delivery.”

Table 13 Projected and Actual Cocoa Production for 2007/08 to 2016/17 Crop Seasons

<table>
<thead>
<tr>
<th>CROP YEAR</th>
<th>PROJECTED VALUE</th>
<th>ACTUAL VALUE</th>
<th>VARIANCE</th>
<th>PERCENTAGE DIFF.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007/08</td>
<td>-</td>
<td>680,781</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2008/09</td>
<td>-</td>
<td>710,642</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2009/10</td>
<td>700,000</td>
<td>650,941</td>
<td>-49,059</td>
<td>-7.01</td>
</tr>
<tr>
<td>2010/11</td>
<td>960,000</td>
<td>1,012,839</td>
<td>52,839</td>
<td>5.50</td>
</tr>
<tr>
<td>2011/12</td>
<td>850,000</td>
<td>879,349</td>
<td>29,349</td>
<td>3.45</td>
</tr>
<tr>
<td>2012/13</td>
<td>800,000</td>
<td>835,467</td>
<td>35,467</td>
<td>4.43</td>
</tr>
<tr>
<td>2013/14</td>
<td>830,000</td>
<td>896,916</td>
<td>66,916</td>
<td>8.06</td>
</tr>
<tr>
<td>2014/15</td>
<td>850,000</td>
<td>740,254</td>
<td>-109,746</td>
<td>-12.91</td>
</tr>
<tr>
<td>2015/16</td>
<td>850,000</td>
<td>778,044</td>
<td>-71,956</td>
<td>-8.47</td>
</tr>
<tr>
<td>2016/17</td>
<td>850,000</td>
<td>969,510.69</td>
<td>119,511</td>
<td>14.06</td>
</tr>
</tbody>
</table>

[Source: Authors’ Construct with insight from COCOBOD website and PPRC Technical Reports]

25 Perspectives of Farmers
26 Perspectives of Input Sellers
To add to the above, in the same crop year 2016/2017, PPRC projected to spend an amount of GHS 316,000,000 on CODAPEC but only spent GHS 79,288,000\(^{27}\) on the programme implying that only about 25 percent of the projected amount was actually spent. Likewise, PPRC projected to spend GHS 355,600,000 on fertilizer application (Hi-Tech) but only spent GHS 117,215,000 on the programme. COCOBOD therefore spent only 33 percent of the projected amount allocated for fertilizer application which was deducted as part of the industry cost. It is quite striking that during the last four crop years before the 2016/2017 crop year, the actual amount spent on these two programmes was in most cases more than 100 percent of the projected amount. It is worth mentioning that in the 2013/2014 crop year COCOBOD spent over 1000 percent more than the projected amount on both CODAPEC and cocoa hi-tech fertilizer application.

Table 14 Actual and Projected Expenditure on CODEPEC and Cocoa Hi-Tech Fertilizer Application

<table>
<thead>
<tr>
<th>CROP YEAR</th>
<th>PROGRAMME</th>
<th>PROJECTED VALUE</th>
<th>ACTUAL VALUE</th>
<th>DIFFERENCE</th>
<th>Percent Spent</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012/13</td>
<td>Fertilizer Application Hi-Tech (GH¢)</td>
<td>-</td>
<td>71,166,000</td>
<td>-71,166,000</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Disease and Pest Control Cost (GH¢)</td>
<td>47,420,431</td>
<td>271,150,000</td>
<td>-223,729,569</td>
<td>572</td>
</tr>
<tr>
<td>2013/14</td>
<td>Fertilizer Application Hi-Tech (GH¢)</td>
<td>36,054,500</td>
<td>435,554,000</td>
<td>-399,499,500</td>
<td>1,208</td>
</tr>
<tr>
<td></td>
<td>Disease and Pest Control Cost (GH¢)</td>
<td>41,157,996</td>
<td>467,378,000</td>
<td>-426,220,004</td>
<td>1,136</td>
</tr>
<tr>
<td>2014/15</td>
<td>Fertilizer Application Hi-Tech (GH¢)</td>
<td>224,000,000</td>
<td>545,081,000</td>
<td>-321,081,000</td>
<td>243</td>
</tr>
<tr>
<td></td>
<td>Disease and Pest Control Cost (GH¢)</td>
<td>288,000,000</td>
<td>340,811,000</td>
<td>-52,811,000</td>
<td>118</td>
</tr>
<tr>
<td>2015/16</td>
<td>Fertilizer Application Hi-Tech (GH¢)</td>
<td>304,000,000</td>
<td>715,815,000</td>
<td>-411,815,000</td>
<td>235</td>
</tr>
<tr>
<td></td>
<td>Disease and Pest Control Cost (GH¢)</td>
<td>380,000,000</td>
<td>294,625,000</td>
<td>85,375,000</td>
<td>78</td>
</tr>
</tbody>
</table>

\(^{27}\) Amount obtained from COCOBOD 2016/2017 financial statements
Another striking difference of the actual and projected values for the 2016/17 crop year is the revenue generated from the sale of the cocoa beans. Following the PPRC price determination mechanism, all things being equal, the Gross FOB should be equivalent to the revenue of COCOBOD after sales of the cocoa produce. With this analogy, the actual Gross FOB of GHS 10,997,950,263 should be the revenue generated instead of the projected Gross FOB of GHS 9,904,625,000.

Table 15. Variance Analysis of the PPRC Sharing Structure for 2016/17 Crop Year

<table>
<thead>
<tr>
<th>N/S</th>
<th>VARIABLE</th>
<th>PROJECTED VALUE</th>
<th>ACTUAL VALUE</th>
<th>VARIANCE</th>
<th>% DIFF.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>F.O.B Price (US$/Ton)</td>
<td>2,950</td>
<td>2,677</td>
<td>-273</td>
<td>-9.254</td>
</tr>
<tr>
<td>2.</td>
<td>Exchange Rate: (GHC/US$1)</td>
<td>3.95</td>
<td>4.24</td>
<td>0.29</td>
<td>7.342</td>
</tr>
<tr>
<td>3.</td>
<td>Projected Cocoa Production (Tonnes)</td>
<td>850,000</td>
<td>969,765</td>
<td>119,765</td>
<td>14.090</td>
</tr>
<tr>
<td>4.</td>
<td>Gross F.O.B. Value (GHC)</td>
<td>9,904,625,000</td>
<td>10,997,950,263</td>
<td>1,093,325,263</td>
<td>11.039</td>
</tr>
<tr>
<td>5.</td>
<td>Disease and Pest Control Cost (GHC)</td>
<td>316,000,000</td>
<td>79,288,000</td>
<td>-236,712,000</td>
<td>-74.909</td>
</tr>
<tr>
<td>6.</td>
<td>Scholarships (GHC)</td>
<td>5,000,000</td>
<td>5,000,000*</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>7.</td>
<td>Operational Input Cost (GHC)</td>
<td>130,350,000</td>
<td>130,350,000*</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>8.</td>
<td>Fertilizer Application Hi-Tech (GHC)</td>
<td>355,600,000</td>
<td>117,215,000</td>
<td>-238,385,000</td>
<td>-67.037</td>
</tr>
<tr>
<td>9.</td>
<td>Child Education Support (GHC)</td>
<td>4,000,000</td>
<td>4,000,000*</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>10.</td>
<td>Cocoa Roads (GHC)</td>
<td>592,500,000</td>
<td>592,500,000</td>
<td>0</td>
<td>0.000</td>
</tr>
<tr>
<td>11.</td>
<td>Rehab. (Nurseries &amp; Seedlings)</td>
<td>160,468,750</td>
<td>160,468,750*</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>12.</td>
<td>Net FOB (GHC)</td>
<td>8340806250</td>
<td>9909128513</td>
<td>1,568,322,263</td>
<td>18.803</td>
</tr>
<tr>
<td>13.</td>
<td>Net FOB/Tonne (GHC)</td>
<td>9,813</td>
<td>10,218</td>
<td>405</td>
<td>4.127</td>
</tr>
</tbody>
</table>
From the data if the PPRC had projected the revenue accurately, the actual Gross FOB of GHS 10,997,950,263 should give a net FOB of GHS 10,218 instead of the projected net FOB of GHS 9,813 which suggest a better margin for all stakeholders. Sticking to the sharing structure of PPRC as displayed in Table 11, the farmer would have gotten GHS 7913.96 instead of 7600 per tonne which shows a difference of GHS 313.95. It is worth mentioning that the farmers were given a bonus of GHS 76,555,000 as stated in the COCOBOD 2016/17 financial statement. This works out to about GHS 78.94 per tonne of bonus. This bonus could however, not offset the difference of GHS 313.95 leaving an amount of GHS 235.01 unaccounted for which should have been added to the producer price of GHS 7,600.  This difference is even more alarming when the amount is multiplied by the actual production of cocoa, given an amount of GHS 22,314,292.65 that is not accounted for. This undermines the projection strategy used by the review committee and raises immediate concerns on the efficiency, accuracy and transparency of the PPRC price determination process.

The above findings corroborates the findings of Laven et al. (2016) which examined the determinants of cocoa prices in five cocoa producing countries including Ghana. The study argued that regardless of the multi-stakeholder process in fixing the farm gate price in Ghana, the entire process is questionable as it does not explicitly detail how the prices are determined and the rationale behind the price. There is a lack of understanding between the gross and the net FOB prices since the net FOB price does not detail the breakdown of the variables used for its calculation, making it difficult to trace.
4.5 The Underlying Issues in Current Pricing System and Stabilization Fund

The pricing system is designed to stabilize producer price by acting as an implicit stabilization fund to provide some insulation for farmers against fluctuations in world market prices (Akiyama et al., 2001). However, it is argued that the system has been extractive as government utilises the funds intended for this purpose to augment fiscal policy and as a result has failed to stabilize the producer price at a level that provides an adequate compensation on producers' land, labour and capital through time (Akiyama et al., 2001; Kpodo, 2017).

The producer price for the 2017/2018 crop year was maintained at GHS 7,600 which represents 88 percent of the net FOB, regardless of the 40 percent reduction in the world market price which forced some countries to reduce their producer prices (COCOBOD, 2018). COCOBOD could struggle to cover its expenditure unless it taps into the stabilization fund and also forfeits the government's share of the free on-board price with the likelihood of deteriorating the already underperforming domestic revenue. Additionally, COCOBOD would be expected to reduce its capital expenditure in the construction of roads and other areas in cocoa growing communities (World Bank, 2018).

The utilization of the stabilization fund by COCOBOD in areas other than insulating cocoa producers against low world market prices has serious implications. COCOBOD has indicated the cocoa stabilization fund is not meant to increase producer prices for cocoa in Ghana but to ensure stable income for cocoa farmers while maintaining the prevailing producer price in the event of low prices\(^2\). International Cocoa Organisation (ICCO) indicates that the Ghanaian producers usually receive an amount lower than what producers in fully liberalized countries receive. For instance, between the 2000/2001 to 2014/2015 crop year, the Ghanaian producers received 57 percent of the ICCO daily price. While Ghanaian producers in the 2014/2015 crop year, received 52 percent of the ICCO daily price, Cameroon, Brazil and Ecuador received 80 percent, 83 percent and 92 percent respectively of the ICCO daily price (Bymolt, Laven, & Tyzler, 2018) (see Figure 7)

As indicated in the above graph, Ghana’s share of the ICCO daily price has been low compared to other producing countries. The production years of 2007/2008 through to 2011/2012 are particularly worth noting, as the ratio increased from as low as 39 percent to as high as 85 percent respectively. In 2011/2012, Ghana received 85 percent of the ICCO daily price, the highest percentage Ghana received from 2007/2008 to 2014/2015. Nonetheless, in the same year, Cameroon and Brazil received 104 percent each, 19 percent higher than Ghana received. It is worth mentioning that Ghana surpassed Ecuador by 6 percent and Côte d’Ivoire by 28 percent in the 2011/2012 crop year.

The pricing system does not give room for possible negotiations. LBCs do not have any influence on the fixed price and cannot pay the farmers less than the fixed price. Although the LBCs may choose to pay the farmers a higher price than the floor price, cocoa farmers receive similar price for their produce. It must however be noted that apart from the selling price, some farmers enjoy input supply, loans, bonus and other incentives from some LBCs.
It has been argued that this approach discourages both the LBCs and the Purchasing Clerks (PCs) from ensuring the quality of the cocoa (Laven, 2010). In addition, cocoa producers do not benefit from an additional price during a bullish market season (Bymolt et al., 2018).

Furthermore, the administered pricing mechanism usually hinders marketing boards from transmitting market signals to producers and may likely result in distorted incentives and misallocation of resources. Quantitative effects are inadequately measured which makes cocoa producers vulnerable to price shocks. This, therefore, discourages farmers from producing cocoa (Akiyama et al., 2001) and justifies why many cocoa farmers intermittently shift to rubber and cashew plantation.
5.1 Introduction

A number of statistical results are presented and discussed in this section so as to establish the relationship between cocoa production and cocoa prices (World Market Price and Cocoa Producer Price in Ghana) while controlling for some relevant variables. The descriptive statistics of the variables, the unit root tests, results of the optimal lag order selection and the co-integration tests are conducted and presented. The ARDL model is used to examine the effect of both world market price and cocoa producer price on cocoa production in Ghana. The results are checked using diagnostics tests. Finally, a granger causality test is utilised to examine the causality between the variables used in the analysis. Before these statistical analyses, a review of past studies on the relationship between cocoa prices and cocoa production is undertaken.

5.2 Cocoa Producer Price and Production Nexus: Past Studies

Regardless of the numerous factors that affect the quantity of cocoa produced in a particular season, the potency of price in influencing output cannot be overlooked. According to general economic principles, price represents the equilibrium spot where sellers and buyers meet at the marketplace (Schnepf, 2006). As a result, a new market information can adjust the expectations of market participants and lead to a new equilibrium. Furthermore, general supply response models posit that “...the quantity of goods that an individual/firm is eager to supply within a definite period among other factors is a function of the price of the said commodity...” (Kolavalli et al., 2012). In the agricultural sector, this thinking has been used to study production patterns of crops.
For instance, in a study that sought to understand how agricultural production responds to price changes in Jamaica, Gafar (1997) concluded that agricultural output responds positively to price changes. The study also observed that individual crops respond to price change higher than that of aggregate crops.

However, in Africa, a study conducted by Bond (1983) painted a reverse picture of what Gafar (1997) found in Jamaica; a decline in agricultural production in most sub-Saharan Countries in the 1970s. Economists attributed the low agricultural performance to low price levels. In Ghana for instance, the World Bank provided the government with some evidence to suggest that the steady drop in cocoa production before the 1980s was as a result of low producer prices and hence admonished government to increase prices to stimulate production (Kolavalli et al., 2012). Therefore, Bond (1983) reviewed quantitative evidence on supply responses to producer prices from individual crop studies and provided proof on how agricultural production responds to changes in producer price in a selected number of African countries. As part of his findings, Bond indicated that for aggregate crops, farmers do respond to changes in the aggregate producer price index. A farmer may respond otherwise to a change in the producer price when it is combined with available consumer goods and improved infrastructure than to the price change alone.

Abdulai and Rieder (1995) sought to investigate the impact of agricultural price policy on cocoa supply in Ghana using an error correction estimation. The results suggested that cocoa supply is significantly influenced by the real producer price of cocoa, the real price of maize, the supply of manufactured goods and the real exchange rate. Also, in both the short and the long run, the production of cocoa was found to be inelastic. Boansi (2013) conducted an analysis of Ghana’s performance in the export of cocoa using the revealed comparative advantage and revealed symmetric comparative advantage measures of competitiveness for the periods 1964-69, 1983-92 and 2000-2010. As part of the study, the weight and effects of the main economic determining factors of cocoa exports, production and producer price for Ghana were also estimated. The results showed that, a unit rise in real producer price of cocoa results in an increase in export by 0.339 percent. Furthermore, increases in real farm gate price of cocoa aids farmers to invest appropriately in their farms in anticipation of a better and sustainable outputs in subsequent years.
Darkwah and Verter (2014) analysed data on cocoa production in Ghana from 1990 to 2011, with an objective of investigating the relationship between cocoa production and some selected determinants. The authors discovered a negative relationship between cocoa production and the world price of cocoa. As a result, they concluded that an increase in world market price may not necessarily stimulate an increase in local production, but rather may disincentivize farmers from expanding production. In explaining the possible reasons for such results, the authors indicate that, the current price-fixing system implemented in the country, is a causal factor, which deprives farmers of gains from increases in the world price.

Also, Bymolt et al. (2018) in a study that attempted to demystify the cocoa sector in Ghana and Côte d’Ivoire” indicate that, there is a lack of evidence to suggest that low world prices slowed growth in cocoa production in recent decades. The study suggests that global trends have led “farmers [to] have sustained production expansion even when cocoa prices hit record lows in the late 1990s and early 2000s, although production rates varied across countries”. This suggests that, even in periods of low cocoa prices, cocoa has remained relatively competitive compared to other crops, implying that some other existing factors encourage farmers to expand cocoa production, other than the global price.

In light of the above, it can be inferred that there exists some form of relationship between cocoa prices and cocoa production in various producing countries. There is a likelihood of real producer price stimulating production when it is dependent on other factors such as, real exchange rate and availability of other goods and infrastructure. From the above studies, it can be argued that producer price alone does not drive production.

The trends of cocoa production and cocoa prices (world market price and producer prices) are presented in Figure 8 and 9.
Figure 8. The Relationship Between Cocoa Production in Ghana and World Market Price

[Source: Authors’ Construct with insight from COCOBOD Production Data and ICCO Prices]

Figure 8 displays a very paradoxical relationship between world market price and cocoa production in Ghana. The chart indicates that between 2007/2008 to 2009/2010 when price increased by 29 percent, production fell by 4 percent. Between 2010/2011 and 2015/2016 price fell by 0.38 percent and production declined by 23 percent. Over the study period (2007-2017) price has fallen by 15 percent while production has risen by 42 percent. This seems to suggest an indirect relationship between world prices and cocoa production.

Figure 9. The Relationship Between Cocoa Production and Producer Price in Ghana

[Source; Authors’ Construct with insight from COCOBOD and PPRC Technical Report 2007/2008-2016/2017]
Figure 9 shows that between 2007/2008 to 2010/2011 producer price increased by 167 percent while production increased by 49 percent. However, between 2011/2012 to 2015/2016, price increased by 107 percent and production decreased by 12 percent. Within the study period price has risen by 534 percent while production has also risen by 42 percent. The data suggests that the changes in output are less than proportionate to the changes in producer prices observed. However, it must be noted that the movement of the exchange rate and other macro-economic factors could account for this observation, as well as the output trends in Ghana.

5.3 Descriptive Statistics

The descriptive statistics of the time series is presented in Table 16. Cocoa production recorded an average annual of 412,000 tonnes with a minimum of 159,000 tonnes in 1984 and a maximum of 1.01 million tonnes in 2011. The average world market price of cocoa over 38 years to 2017 is USD1,925. The lowest price of USD904 was recorded in 2000 while the highest of USD3,135 was recorded in 2015. Conversely, the cocoa producer price recorded an average of GHS2,102 over the 21 years to 2017. The lowest cocoa producer price of GHS120 was recorded in 1997 while prices have been increasing in recent years continuously from 2008 to 2017. For instance, in 2008, the price was GHS950 and has been increasing since then to the highest of GHS7,600 in 2017.

The total area harvested for cocoa recorded an average of 1,330,000 hectares with a minimum of 687,000 hectares in 1995 and the maximum of 2,000,000 hectares in 2004. Over 43 years to 2017, Ghana received foreign direct investment inflows of USD808,000 on average. The lowest of USD18,300 (outflow) in 1976 while the highest of USD3.49 million was received in 2016. In terms of Gross Domestic Product per capita, the overall average over 58 years to 2017 was GHS3,007. The lowest level of GHS2,016 was reached in 1983 while the highest of GHS5,044 was reached in 2017.

---

29 In 2018/2019 cocoa season, the price of GHS7,600 was maintained again.
**Table 16. Descriptive Statistics**

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>OBS</th>
<th>MEAN</th>
<th>SD</th>
<th>MIN</th>
<th>MAX</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROD</td>
<td>69</td>
<td>412000</td>
<td>211000</td>
<td>159000</td>
<td>1010000</td>
</tr>
<tr>
<td>WPRICE</td>
<td>38</td>
<td>1925</td>
<td>650</td>
<td>904</td>
<td>3135</td>
</tr>
<tr>
<td>PPRICE</td>
<td>21</td>
<td>2102</td>
<td>2232</td>
<td>120</td>
<td>7600</td>
</tr>
<tr>
<td>ARHARV</td>
<td>57</td>
<td>1330000</td>
<td>377000</td>
<td>687000</td>
<td>2000000</td>
</tr>
<tr>
<td>FDI ('000)</td>
<td>43</td>
<td>808000</td>
<td>1290000</td>
<td>-18300</td>
<td>3490000</td>
</tr>
<tr>
<td>GDPPC</td>
<td>58</td>
<td>3007</td>
<td>724</td>
<td>2016</td>
<td>5044</td>
</tr>
</tbody>
</table>

(Source: EViews Output, 2019)

### 5.4 Unit Root Test

The results of the unit root tests on the variables at their levels are presented in **Table 17**. The Augmented Dickey-Fuller (ADF) test and Phillips-Peron (PP) test are presented side-by-side. The absolute test statistics of both the ADF and the PP tests are **less than the critical values at 5 percent for all variables**. This suggests that there is an evidence of unit root (non-stationarity) or that the series follows a random walk. To examine whether the non-stationary variables have any more unit roots at their first difference, a further analysis has been conducted which is reported in **Table 18**.

**Table 17. Unit Root or Stationarity Tests at Level**

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>CRITICAL VALUES**</th>
<th>LEVEL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1percent</td>
<td>5percent</td>
</tr>
<tr>
<td>lnPROD</td>
<td>-3.56</td>
<td>-2.916</td>
</tr>
<tr>
<td>lnWPRICE</td>
<td>-3.67</td>
<td>-2.966</td>
</tr>
<tr>
<td>lnPPRICE</td>
<td>-3.75</td>
<td>-3</td>
</tr>
<tr>
<td>lnARHARV</td>
<td>-3.57</td>
<td>-2.925</td>
</tr>
<tr>
<td>lnFDI</td>
<td>-3.66</td>
<td>-2.964</td>
</tr>
<tr>
<td>lnGDPPC</td>
<td>-3.57</td>
<td>-2.924</td>
</tr>
</tbody>
</table>

(Source: EViews Output, 2019)
To the contrary, the result of the unit root tests of the first difference of all the variables reveals that, they are all stationary, as the absolute value of the ADF and PP test statistics are all higher than the absolute values of the critical values. This satisfies a precondition for running an ARDL model, requiring that none of the variables should be stationary at second difference.

Table 18. Unit Root or Stationarity Tests at First Difference

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>CRITICAL VALUES**</th>
<th>FIRST DIFFERENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1percent</td>
<td>5percent</td>
</tr>
<tr>
<td>ΔlnPROD</td>
<td>-3.56</td>
<td>-2.916</td>
</tr>
<tr>
<td>ΔlnWPRICE</td>
<td>-3.68</td>
<td>-2.969</td>
</tr>
<tr>
<td>ΔlnPPPRICE</td>
<td>-3.75</td>
<td>-3</td>
</tr>
<tr>
<td>ΔlnARHARV</td>
<td>-3.57</td>
<td>-2.926</td>
</tr>
<tr>
<td>ΔlnFDI</td>
<td>-3.68</td>
<td>-2.969</td>
</tr>
<tr>
<td>ΔlnGDPPC</td>
<td>-3.57</td>
<td>-2.925</td>
</tr>
</tbody>
</table>

[Source: EViews Output, 2019]

5.5 Lag-Order Selection

Time series VAR lag order selection is determined initially for the two models covering the impact of world cocoa price and cocoa producer price on cocoa production. Using the Akaike Information Criterion (AIC), a lag length of 2 is identified to be optimal. Since the current study applies the ARDL model, the optimal lag length selection criteria embedded in the ARDL model is used. The results indicate an ARDL (1, 0, 0, 0, 1) lag selection model for the equation 5 and ARDL (1, 0, 0, 0) lag selection model for the equation 6. The use of this optimal lag length suggests that the preceding analysis addresses the possibility of losing degrees of freedom, reduces the possibility of multicollinearity among the regressors, serial correlation in the error terms and misspecifications in the errors.

30 See, 3.4.2 Econometric Data, Modelling and Estimation Techniques
5.6 Co-Integration Tests

The bound test is used to ascertain whether or not there is a long-run relationship (co-integration) among the variables. The null hypothesis is that there exists no co-integration among the variables while the alternate hypothesis is that there is co-integration among the variables. The result yields a t-statistic (or F-statistic) and their corresponding critical values with a lower bound (when $l(0)$) and an upper bound (when $l(1)$). The null hypothesis is rejected when the t-statistic or F-statistic is greater than the critical values. In this case, the results of the analysis for both equation 5 and equation 6 are presented in Table 19 and Table 20 respectively. Only the results of the t-statistics are presented in this case.

**Table 19. Bounds Test 1**

<table>
<thead>
<tr>
<th>TEST STATISTIC</th>
<th>VALUE</th>
<th>SIGNIFICANCE</th>
<th>CRITICAL VALUES</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-Statistics</td>
<td>-6.41**</td>
<td>10percent</td>
<td>-2.57</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5percent</td>
<td>-2.86</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.50percent</td>
<td>-3.13</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1percent</td>
<td>-3.43</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Upper Bound</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-3.66</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-3.99</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-4.26</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-4.6</td>
</tr>
</tbody>
</table>

(Source: EViews Output, 2019 **)

The result in Table 19 shows that the t-statistics of 6.41 in absolute terms is greater than the critical values reported. This suggests that we reject the null hypothesis of no co-integration, an indication of a long-run relationship (co-integration) among the variables in Equation 5. Again, the result in Table 20 shows that the t-statistics of 6.86 in absolute terms is greater than the critical values reported. We reject the null hypothesis of no co-integration, an indication of a long-run relationship (co-integration) among the variables in Equation 6.
### Table 20. Bounds Test 2

<table>
<thead>
<tr>
<th>TEST STATISTIC</th>
<th>VALUE</th>
<th>SIGNIFICANCE</th>
<th>CRITICAL VALUES</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lower Bound</td>
<td>Upper Bound</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10percent</td>
<td>-2.57</td>
<td>-3.46</td>
</tr>
<tr>
<td>T-Statistics</td>
<td>-6.35**</td>
<td>5percent</td>
<td>-2.86</td>
<td>-3.78</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.50percent</td>
<td>-3.13</td>
<td>-4.05</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1percent</td>
<td>-3.43</td>
<td>-4.37</td>
</tr>
</tbody>
</table>

[Source: EViews Output, 2019 **]

Since co-integration was observed in the two (2) models, the ARDL is run to examine the long-run relationships among the variables and their respective short-run dynamics. The ARDL long-run form regression is estimated, as well as, the ARDL Error Correction Model (ECM) regression to reveal the short-term dynamics.

#### 5.7 ARDL Estimations

The results of the short-run dynamics in the ARDL model are included in an ARDL error correction model. Attached to the short-run dynamics is an error correction coefficient which needs to be within the range of 0 to 1 for the model to be accurately specified. Due to the small range of the dataset employed as well as the short lag length of the model, the results of the short-run dynamics are not presented31. However, the regression is run to ensure that the Error Correction Model coefficient or the co-integrating equation is negative and is within the acceptable range. In model 5, the ECM coefficient was -0.8697 while in model 6, -0.9442 was the ECM coefficient. A negative sign suggests that short-run shocks would be rectified in the long-run (Banerjee, Dolado, & Mestre, 1998). This means that the independent variables adjust partially by about 86.97 percent in the short-run toward its long-run equilibrium in model 5 and by 94.42 percent in model 6. This provides confirmation of the long-run equilibrium relationship running from the dependent variable to the independent variables in the two models.

---

31 The full outputs of this analysis have not been presented in this report since the limited lag length resulted in limited results for the short-term dynamics.
The results of the long-run estimation are presented in Table 21 for Equation 5 and Table 23 for Equation 6 respectively. The results in Table 21 show that all the explanatory variables significantly affect cocoa production in Ghana except for the world market price of cocoa which has a negative impact on cocoa production in Ghana. Specifically, the results show that the world market price of cocoa negatively affects cocoa production at 10 percent level of significance. This suggests that an increase of world cocoa price of 1 percent results in a decline in cocoa production (output) by 0.18 percent. In effect, world price increases do not induce farmers to increase the total cocoa production. This result agrees with the result of Darkwah and Verter (2014) who found that cocoa production decreases by 0.22 percent as a result of a 1 percent increase in world market price of cocoa.

Table 21. Cocoa Production and World Price of Cocoa

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STATISTIC</th>
<th>PROB.</th>
</tr>
</thead>
<tbody>
<tr>
<td>InWPRICE</td>
<td>-0.182</td>
<td>0.0918</td>
<td>-1.9772</td>
<td>0.057</td>
</tr>
<tr>
<td>InARHARV</td>
<td>0.5235</td>
<td>0.1195</td>
<td>4.3805</td>
<td>0.0001</td>
</tr>
<tr>
<td>InFDI</td>
<td>0.0674</td>
<td>0.0297</td>
<td>2.2668</td>
<td>0.0305</td>
</tr>
<tr>
<td>InGDPPC</td>
<td>0.853</td>
<td>0.299</td>
<td>2.8526</td>
<td>0.0077</td>
</tr>
<tr>
<td>Constant</td>
<td>-1.124</td>
<td>1.8121</td>
<td>-0.6202</td>
<td>0.5396</td>
</tr>
</tbody>
</table>

[Source: EViews Output, 2019]

The results also indicate that area harvested has a positive significant effect on cocoa production in Ghana at 1 percent level of significance. This suggests that a 1 percent increase in area harvested of cocoa results in 0.52 percent increase in cocoa production. This result is similar to that of Darkwah and Verter (2014) but with a smaller impact of 0.35 percent. Other studies such as Vigneri (2007) and Fadipe, Adenuga, and Ilori (2012) also found a similar relationship between area harvested and cocoa production in Nigeria. Again, the results indicate a positive significant effect of foreign direct inflows on cocoa production in Ghana at 5 percent level of significance. This suggests that a 1 percent increase in foreign direct investment inflow in Ghana could result in a 0.07 percent increase in cocoa production in Ghana.
In the case of Gross Domestic Product per capita, the results indicate a positive significant relationship with 1 percent level of significance. The result suggests that a 1 percent increase in Gross Domestic Product per capita will result in a 0.85 percent increase in cocoa production in Ghana. This result is similar to the findings of Darkwah and Verter (2014).

Table 22. Serial Correlation and Heteroskedasticity Tests 1

<table>
<thead>
<tr>
<th>Breusch-Godfrey Serial Correlation LM Test:</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>F-statistic</td>
<td>0.2645</td>
<td>Prob. F(2,29)</td>
<td>0.7695</td>
</tr>
<tr>
<td>Obs*R-squared</td>
<td>0.6806</td>
<td>Prob. Chi-Square(2)</td>
<td>0.7115</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Heteroskedasticity Test: Breusch-Pagan-Godfrey</th>
</tr>
</thead>
<tbody>
<tr>
<td>F-statistic</td>
</tr>
<tr>
<td>Obs*R-squared</td>
</tr>
<tr>
<td>Scaled explained SS</td>
</tr>
</tbody>
</table>

(Source: EViews Output, 2019)

The model has been tested for its robustness with regard to serial correlation, heteroskedasticity, CUSUM and CUSUM squared. The results show that the model does not suffer from serial correlation or heteroskedasticity. In addition, the results of the CUSUM and CUSUM squared tests shows that the stability of the model is within acceptable range, based on 5 percent level of significance. The results of serial correlation and heteroskedasticity for equation 5 are presented in Table 22. In addition, the stability tests, CUSUM and CUSUM squared for Equation 6 are presented in Figure 10.

---

32 CUSUM test is the cumulative sum of the recursive residuals test, which was proposed by Brown, Durbin, and Evans (1975).

33 The graphical presentation of the tests can be based on the 5 percent level of significance which is associated with the red lines which represents the 5 percent critical lines. Once the results from the models fall within the 5 percent critical lines, we can conclude that there is not suggestion of parameter or variance instability.
To show the impact of producer price of cocoa using, the results of Table 23 are presented and discussed as follows. The findings indicate that the producer price of cocoa has a positive effect on cocoa production in Ghana with a statistical significance of 5 percent. This implies that when Ghanaian cocoa farmers receive increases in the farmgate prices, they tend to increase cocoa production. Comparing this finding with the earlier result on the world market price of cocoa, there is an indication that increasing cocoa producer price will result in increasing levels of cocoa production as opposed to the decline in cocoa production with increasing levels of world market price of cocoa. A plausible explanation to this can be associated with the hoarding behaviour of cocoa farmers. Farmers could be hoarding their cocoa beans during times that the producer price is low while they will be interested in selling it when the producer price is increased. In this model, area harvested positively affects cocoa production at 1 percent level of significance. This result also suggests that when farmers increase their area harvested, it augments their cocoa production. Finally, the result of the foreign direct investment reveals a positive effect on cocoa production at 5 percent level of significance.
Table 23. Cocoa Production and Producer Price of Cocoa

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STATISTIC</th>
<th>PROB.</th>
</tr>
</thead>
<tbody>
<tr>
<td>InPPRICE</td>
<td>0.1012</td>
<td>0.0437</td>
<td>2.3149</td>
<td>0.0342</td>
</tr>
<tr>
<td>InARHARV</td>
<td>0.9378</td>
<td>0.2502</td>
<td>3.7475</td>
<td>0.0018</td>
</tr>
<tr>
<td>InFDI</td>
<td>0.0793</td>
<td>0.0311</td>
<td>2.5466</td>
<td>0.0216</td>
</tr>
<tr>
<td>Constant</td>
<td>-2.367</td>
<td>3.4664</td>
<td>-0.6828</td>
<td>0.5045</td>
</tr>
</tbody>
</table>

[Source: EViews Output, 2019]

The results of the ARDL model have been checked for robustness with regard to serial correlation, heteroskedasticity, CUSUM and CUSUM squared tests. The results indicate that the time series dataset does not suffer from any curse of these statistical criteria. The results of serial correlation and heteroskedasticity are presented in Table 24. In addition, the results of the CUSUM and CUSUM squared tests are presented in Figure 11.

Table 24. Serial Correlation and Heteroskedasticity Tests for Equation 2

<table>
<thead>
<tr>
<th>Breusch-Godfrey Serial Correlation LM Test:</th>
</tr>
</thead>
<tbody>
<tr>
<td>F-statistic</td>
</tr>
<tr>
<td>Obs*R-squared</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Heteroskedasticity Test: Breusch-Pagan-Godfrey</th>
</tr>
</thead>
<tbody>
<tr>
<td>F-statistic</td>
</tr>
<tr>
<td>Obs*R-squared</td>
</tr>
<tr>
<td>Scaled explained SS</td>
</tr>
</tbody>
</table>

[Source: EViews Output, 2019]
5.8 Granger Causality

The granger causality test is conducted to serve as a complement to the earlier regression results and provide a statistical evidence of the directions of causation. The results are presented in Table 25 and Table 26. The results in Table 25 reports the null hypotheses, the F-statistics and probability. We interpret the results by using benchmark p-values of 0.01, 0.05 and 0.1 such that the result is significance when p-value is less than 0.1. The arrows show the direction of causation that has been hypothesized.
The results indicate that the relationship between the world price and production of cocoa in Ghana is not statistically significant and causal. However, there is statistical evidence for a unidirectional causality between producer price of cocoa in Ghana and cocoa production in Ghana such that producer price influences production. This suggests that adequate compensation of cocoa farmers in terms of increasing producer prices results in increased cocoa production. It also suggests that the world market price of cocoa is not adequate enough to drive cocoa production in Ghana. As regards the causality between the world price of cocoa and cocoa producer price, there is evidence of a bidirectional relationship. Producer price of cocoa significantly cause world market price of cocoa and world market price of cocoa also significantly cause cocoa producer price. The comparatively high significance of 1 percent in the case of world market price to producer price suggests the importance of world market price in causing the level of producer price of cocoa in Ghana.

In the quest to provide further insights into the causality relationships, additional results are presented in Table 27.
Table 26. Granger Causality B

<table>
<thead>
<tr>
<th>NULL HYPOTHESIS</th>
<th>OBS</th>
<th>F-STAT</th>
<th>PROB.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area Harvested → Cocoa Production</td>
<td>55</td>
<td>3.064</td>
<td>0.056</td>
</tr>
<tr>
<td>Cocoa Production → Area Harvested</td>
<td></td>
<td>1.88</td>
<td>0.163</td>
</tr>
<tr>
<td>Foreign Direct Investment → Cocoa Production</td>
<td>36</td>
<td>0.892</td>
<td>0.42</td>
</tr>
<tr>
<td><strong>Cocoa Production → Foreign Direct Investment</strong></td>
<td></td>
<td><strong>3.375</strong></td>
<td><strong>0.047</strong></td>
</tr>
<tr>
<td>GDP per capita → Cocoa Production</td>
<td>56</td>
<td>4.894</td>
<td>0.011</td>
</tr>
<tr>
<td>Cocoa Production → GDP per capita</td>
<td></td>
<td>1.7</td>
<td>0.193</td>
</tr>
<tr>
<td><strong>Area Harvested → World Price</strong></td>
<td>36</td>
<td><strong>3.738</strong></td>
<td><strong>0.035</strong></td>
</tr>
<tr>
<td>World Price → Area Harvested</td>
<td></td>
<td>2.744</td>
<td>0.08</td>
</tr>
</tbody>
</table>

[Source: EViews Output, 2019]

The results indicate that there is a unidirectional causal relationship from area harvested on cocoa production in Ghana. This suggests that the size of the cocoa farm area harvested affects the level of cocoa production in Ghana. Again, there is a unidirectional causal relationship between cocoa production and foreign direct investment which suggests that increased cocoa production in Ghana results in a change in the level of foreign direct investment that flows into Ghana. It is also observed that the level of macroeconomic performance measured by gross domestic product per capita has a causality relationship with the level of cocoa production in Ghana. This unidirectional relationship suggests that when the economy performs well, cocoa production also increases in Ghana. A bidirectional causal relationship is evidenced between area harvested and the world market price of cocoa. This result suggests that the area harvested of cocoa determines the world market price of cocoa. Likewise, the level of world market price of cocoa causes changes in the level of area of cocoa harvested. This relationship is essential given that the market forces work through speculations on the factors of supply of cocoa beans and the area harvested is a vital factor.
5.9 Policy Implications of Analysis

The study therefore recommends the following:

1. The government should achieve sustainable production of cocoa by ensuring the farmers received a fair and increased compensation. In addition, farm inputs and financial supports in form of soft loans should be provided to the farmers. The farmers should be educated on productivity enhancing methods that they can implement in their farms to increase production.

2. Essentially, the cocoa processing industry of Ghana should be developed to carry out value adding activities which would provide more benefits to the country.

3. The pricing mechanism should be determined based on economic reasons instead of allowing politics to override realistic economic decisions.

4. Government should set up an independent price setting committee who can economically review the input factors to determine cocoa producer price in Ghana.
6.1 Introduction

In this chapter, the cocoa value chain of Ghana has been described briefly. Further, the perspectives of key stakeholders such as farmers, LBCs, input providers and experts are presented on pertinent issues around the pricing mechanism, revenue management and overall operations of the cocoa sector.

6.2 Cocoa Value Chain in Ghana

Ghana's cocoa value chain is a network of several players consisting of Input Providers, Farmers, Licensed Buying Companies (LBCs) and their clerks, Hauliers, CMC and Cocoa Processors (see Figure 12). The activities of each of these players at every stage of the chain collectively transform the beans into a finished product. The partial liberalization of Ghana’s cocoa sector significantly altered the internal marketing of cocoa allowing the entrance of several LBCs into the cocoa value chain, although identical functions are performed. The 2015/2016 crop year for instance, 46 LBCs were licensed by COCOBOD out of which 87 percent remain active (COCOBOD, 2015). (See Figure 12 for the market share of LBCs). Licensed Buying Companies through Purchasing Clerks (PCs) buy cocoa from farmers in about 2700 centres (Vigneri & Santos, 2007). In order to buy more volumes and influence farmers to sell produce to them, individual LBCs adopt several strategies including the provision of inputs and soft loans (Mulangu, Miranda, & Maïga, 2017).
6.2.1 Marketing Process of the Sector

 Ahead of every crop season, COCOBOD secures a syndicated loan from foreign banks guaranteed by forward sales. This loan is used to support the purchases of cocoa beans. The Ministry of Finance and Economic Planning (MoFEP) oversees the process of acquiring the syndicated loan by ensuring the viability of the loan request. In addition, MoF defends the loan request during approval process by parliament.

 After obtaining the syndicated loan (seed fund) it is distributed among the LBCs based on their market share for the prior three years. The LBCs transfer these funds to their district managers or purchasing clerks based on the number of bags each district can provide. After purchases, the cocoa is transported from the farm gate to the depot.
The Quality Control Company (QCC) of COCOBOD then inspects the quality and quantity, after which grading and sealing is undertaken. The graded and sealed bags are transported from the depots to the ports at Takoradi, Tema or Kumasi (Kaase). At the ports, the QCC checks the quantity and quality again before taking it into their possession (COCOBOD). The LBCs are then given Cocoa Taken Over Receivables (CTOR) to prepare invoices to COCOBOD to receive payment. The Cocoa Marketing Company (CMC) finally takes over the sealed cocoa and export about 80 percent of the cocoa beans (see Figure 1 for Ghana's major export destinations) and sell the remaining 20 percent to local processing industries (Bangmarigu & Qineti, 2018).

![Figure 13. Market Share of Processing Companies](image)

Source: [COCOBOD's 2015/2016 Annual Report]
6.3 cocoa farmers as key stakeholders in the value chain

Cocoa farmers are the most important stakeholders in the cocoa value chain. We conduct a field study to capture the views of these farmers on key issues in the value chain. This part of the study reports on the findings from the field survey with farmers, their views on the price setting mechanism and revenue management in the cocoa sector and how these affect their livelihoods.
6.3.1 Demographic Information of Respondents

The total population of cocoa farmers in Ghana are about 800,000. In this study, questionnaires were administered to 425 cocoa farmers in the three largest cocoa producing regions (Western, Ashanti and Brong Ahafo) in Ghana. The distribution of the questionnaires is as elaborated in table 27.

Table 27. Regional Distribution of Responses

<table>
<thead>
<tr>
<th>REGION</th>
<th>FREQUENCY</th>
<th>PERCENT</th>
<th>CUMULATIVE PERCENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ashanti</td>
<td>142</td>
<td>33.4</td>
<td>33.4</td>
</tr>
<tr>
<td>Brong Ahafo</td>
<td>127</td>
<td>29.9</td>
<td>63.3</td>
</tr>
<tr>
<td>Western</td>
<td>156</td>
<td>36.7</td>
<td>100</td>
</tr>
<tr>
<td>Total</td>
<td>425</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

[Source: Field Survey (SPSS Output), 2019]

Specifically, the responses originate from 9 farming Districts; three (3) District in each region. Antoakrom, New Edubiase and Tepa Districts fall under the Ashanti Region. Nkrankwanta, Goaso and Kasapin Districts fall under the Brong Ahafo Region with Akontombra/Bodi, Juaboso and Sefwi-Wiawso Districts under the Western Region. Figure 14 provides the graphical representation of the responses by Districts.

---

34 This report sticks to the previous demarcations of 10 regions in Ghana. The cocoa producing regions follows in this sequence; Western, Ashanti, Brong Ahafo, Eastern, Central and Volta.
Out of the total respondents, 136 were females whiles 289 were males representing 32 percent and 68 percent respectively. A generalisation can be made based on this finding that there are more males involved in cocoa farming in Ghana than females. From Figure 15, it can be inferred that majority of the respondents (75 percent) are above 44 years. The data reported here appears to suggest youth involvement in cocoa farming is low as they contribute just about 25 percent of the sample. It could be argued that these two findings threaten the sustainability of the sector.

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**Figure 15. Responses Grouped by Districts**

[Source: Field Survey (SPSS Output), 2019]

35 African Union (2006) and Ghana National Youth Policy defines youth as persons within the age bracket of 15 to 35 years.
Figure 16. Age Brackets of Cocoa Farmers.

(Source: Field Survey (SPSS Output), 2019)

Figure 17. Educational Status of Cocoa Farmers

(Source: Field Survey (SPSS Output), 2019)
In terms of the educational level of the respondents as indicated in Figure 16, majority of the farmers representing 74.06 percent have either acquired just a basic level education (44.81 percent) or had no education at all (29.25 percent). 25.94 percent of the sampled farmers had a much higher education which demonstrate the level of knowledge the respondents have on the topics of the survey.

Another underlying demographic factor is the household size of the farmers. The results indicate that from a total of 423 sampled farmers, the overall mean of the household size of the farmers is 7.8 suggesting that cocoa farmers have an average household size of eight (8) which is greater than the national average of 4 reported in the Ghana Living Standard Survey report (Ghana Statistical Service (GSS), 2014). The minimum household size recorded is 1 while the maximum is 24 people. This seems to suggest that the farmers have a high household dependency which may stretch their incomes.

This result is in harmony with earlier cocoa sector studies on the household size of cocoa farmers. Amos (2007) reported an average of 8 household size among Nigerian cocoa farmers. In addition, Danso-Abbeam, Addai, and Ehiakpor (2014) reported an average household size of 6 in Bibiani-Anhwiaso-Bekwai in the Western region. The higher dependency of the farmers may explain the dissatisfaction of farmers in terms of the producer price.
### Table 28. Primary and Secondary Occupations of Cocoa Farmers

<table>
<thead>
<tr>
<th>OCCUPATION</th>
<th>NUMBER OF FARMERS (MAIN)</th>
<th>NUMBER OF FARMERS (SECONDARY)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farming</td>
<td>371</td>
<td>52</td>
</tr>
<tr>
<td>Public servant</td>
<td>29</td>
<td>12</td>
</tr>
<tr>
<td>Trading/entrepreneur</td>
<td>19</td>
<td>122</td>
</tr>
<tr>
<td>Masonry</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Carpentry</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>None</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Pension</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Driving</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Laborer [(non)agriculture related]</td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>Manufacturing</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Religious leader/Pastor</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Purchasing clerk</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Electrician</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Installer</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Stool lands collector</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Vulcanizer</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>423</strong></td>
<td><strong>222</strong></td>
</tr>
</tbody>
</table>

(Source: Field Survey (ATLAS.ti Output), 2019)

In furtherance to analysing the basic demographics of the cocoa farmers, Table 29 provides a list of primary and secondary occupations of cocoa farmers in Ghana. The results indicate that 371 respondents have farming as their main occupation and 52 respondents rely on farming as a secondary occupation. This reinforces the importance of farming as an occupation and a source of income to the respondents and the entire people in the districts. Again, it confirms the records of the agricultural sector employing about 60 percent of the Ghanaian working population.
6.3.2 General Information on Cocoa Farms

Cocoa farmers in Ghana have been referred to as smallholder farmers as a result of the family-focused motives of the farmers which results in small farm sizes. This is validated by the results gathered from the survey as presented in Table 30. The average farm size of the sampled farmers was 11.59 acres (4.69 hectares) whiles the average land size dedicated to cocoa farming is 9.16 acres (or 3.71 hectares). This result is similar to the cocoa farm size reported by studies like Danso-Abbeam et al. (2014) with 3.65 hectares and Kongor et al. (2018) with 4.4 hectares. It is worrying that these ‘small’ farm sizes are coming from regions with the highest cocoa production in the country.

The family-focused motives of farmers and the fact that lands are traditionally owned gives the farmer or family head the luxury to divide an already small parcel of land into smaller pieces among a big family size

*It is surprising to see that in some parts of the cocoa growing communities, farmers are not farm owners but cocoa tree owners*.

One striking recommendation made by stakeholders, was to revisit the land tenure system the country practices where lands are owned by families and chiefs to making lands state-owned (if not fully, then partially). This will give the government some control of lands in the country to help in allocating larger land sizes to agriculture and especially cocoa growing activities. However, it is worth mentioning that there are complexities associated with state ownership of agriculture land which undermines this recommendation. For instance, Kasanga and Kotey (2001) argues that state management of land is beneficial to government bureaucracies at the expense of the interest of poorer groups. It further posits that compulsory acquisition of land has resulted in social unrest, displacement of villagers and landlessness of communities that are affected.

The findings from the econometric analysis of the cocoa production and prices revealed that area harvested significantly increases cocoa production by approximately 72 percent.

---

36 Perspectives of Input Sellers.
37 The average of the coefficients for equation 5 and 6 in ARDL results.
To this end, policies should be made to increase the area harvested of cocoa which will positively increase production.

However, COCOBOD argues that the new direction to be adopted to increase yield is the “vertical cultivation” - where more pods are harvested from a single tree instead of the horizontal approach of increasing land or farm size. The horizontal approach according to COCOBOD is not environmentally friendly.

Table 29. Descriptive Statistics on Farm Sizes

<table>
<thead>
<tr>
<th>Description</th>
<th>N</th>
<th>Min.</th>
<th>Max.</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total size of farm (acres)</td>
<td>425</td>
<td>1</td>
<td>80</td>
<td>11.59</td>
<td>10.26</td>
</tr>
<tr>
<td>Size of cocoa farm (acres)</td>
<td>424</td>
<td>1</td>
<td>60</td>
<td>9.16</td>
<td>8.072</td>
</tr>
<tr>
<td>Period of cultivating cocoa farm (years)</td>
<td>420</td>
<td>2</td>
<td>60</td>
<td>18.04</td>
<td>10.81</td>
</tr>
</tbody>
</table>

[Source: Field Survey (SPSS Output), 2019]

It is observed that a total of 404 farmers out of 421 representing 95.96 percent claimed ownership of their farms. To further explore the mode of land acquisition among the cocoa farmers, 47.76 percent of the cocoa farmers own the lands through inheritance\(^{38}\). Similarly, 0.24 percent of the farmers claimed the land is a family property.

**LAND (FARM) ACQUISITION**

![Mode of Farm Acquisition among Farmers](Figure 18. Mode of Farm Acquisition among Farmers)

[Source: Field Survey (SPSS Output), 2019]

\(^{38}\) See analysis on farm and land size of the sampled farmers
In the word cloud in Figure 18, the five (5) main food crops that create significant income for cocoa farmers are plantain, cassava, cocoyam, yam and maize. Out of a total of 423 farmers, 362 representing 85.58 percent, indicate that they grow other food crops apart from cocoa. The farmers indicate that these are a means to supplement revenue streams from cocoa cultivation as cocoa is a seasonal crop.

Figure 19. Word Cloud of Most Important Food Crops in Terms of Revenue Creation

[Source: Field Survey (ATLAS.ti Output), 2019]
6.3.3 Analysis of Cocoa Farm Inputs

The results in Figure 18 show that cocoa farmers rely heavily on farm inputs to help increase cocoa yield which comes at a high cost (see Table 31 and 32).

![Cocoa Farm Inputs](image)

*Figure 20. Cocoa Farmer’s Patronage of Farm Inputs*

*Source: Field Survey (SPSS Output), 2019*

Table 32 reports an overall average cost incurred on the farms in a crop year as GHS 2,726 with a minimum amount of GHS45 and a maximum amount of GHS30,000 and an associated standard deviation of GHS 3,435.64, which is very large. The farmers indicate receiving input COCOBOD, government (Extension Officers) and Licence Buying Companies (LBCs). However, these support systems should be enhanced to help reduce the cost involved in cocoa production.
Table 30. Cost of Some Factors of Production

<table>
<thead>
<tr>
<th>FARM INPUTS</th>
<th>N</th>
<th>MIN.</th>
<th>MAX.</th>
<th>MEAN</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fertilizer cost</td>
<td>170</td>
<td>0</td>
<td>12480</td>
<td>883.89</td>
<td>1477.34</td>
</tr>
<tr>
<td>Insecticides cost</td>
<td>402</td>
<td>0</td>
<td>10000</td>
<td>446.23</td>
<td>720.52</td>
</tr>
<tr>
<td>Herbicides cost</td>
<td>149</td>
<td>0</td>
<td>1920</td>
<td>236.91</td>
<td>227.63</td>
</tr>
<tr>
<td>Spraying Machine cost</td>
<td>381</td>
<td>0</td>
<td>5000</td>
<td>440.85</td>
<td>668.73</td>
</tr>
<tr>
<td>Labour employed</td>
<td>384</td>
<td>0</td>
<td>50</td>
<td>5.37</td>
<td>5.63</td>
</tr>
<tr>
<td>Labour cost</td>
<td>389</td>
<td>0</td>
<td>35000</td>
<td>1140.31</td>
<td>2549.16</td>
</tr>
</tbody>
</table>

[Source: Field Survey (SPSS Output), 2019]

Table 31. Cost of Some Cocoa Farming Activities

<table>
<thead>
<tr>
<th>COCOA FARM PRACTICES/ACTIVITIES</th>
<th>N</th>
<th>MIN.</th>
<th>MAX.</th>
<th>MEAN</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land preparation</td>
<td>337</td>
<td>0</td>
<td>9000</td>
<td>428.07</td>
<td>727.28</td>
</tr>
<tr>
<td>Planting</td>
<td>331</td>
<td>0</td>
<td>5000</td>
<td>289.31</td>
<td>483.52</td>
</tr>
<tr>
<td>Pruning</td>
<td>396</td>
<td>0</td>
<td>6596</td>
<td>159.91</td>
<td>403.19</td>
</tr>
<tr>
<td>Maintenance (weeding)</td>
<td>409</td>
<td>0</td>
<td>10560</td>
<td>596.38</td>
<td>967.89</td>
</tr>
<tr>
<td><strong>Overall Cost of Farming</strong></td>
<td>419</td>
<td>45</td>
<td>30000</td>
<td>2725.95</td>
<td>3435.64</td>
</tr>
</tbody>
</table>

[Source: Field Survey (SPSS Output), 2019]

6.3.4 Pricing, Sales and Cocoa Farm Revenue

The results of the bags of cocoa harvested by the sampled farmers and the amount of money earned from the bags harvested are reported in Table 33. The results suggest that the cocoa farmers harvest an average of 21 bags with an associated average revenue of GHS10,336. The number of bags and the total revenues vary significantly on a farmer to farmer basis as shown by the high standard deviation.

Table 32. Bags of Cocoa Harvested and Earnings.

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>N</th>
<th>MIN.</th>
<th>MAX.</th>
<th>MEAN</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bags of cocoa harvested (past 12 months)</td>
<td>423</td>
<td>0.5</td>
<td>400</td>
<td>21.46</td>
<td>31.49</td>
</tr>
<tr>
<td>Income from bags of cocoa harvested (in GHS)</td>
<td>421</td>
<td>237.5</td>
<td>190000</td>
<td>10336.39</td>
<td>15126.31</td>
</tr>
</tbody>
</table>

[Source: Field Survey (SPSS Output), 2019]
Comparing Tables 32 and 33, it can be verified that producing cocoa on a large scale reduces the cost of farming. The minimum cost of farming was recorded to be GHS 45 however; this cost yields a revenue of just GHS 237.5 from 0.5 bag of cocoa. The maximum cost of farming is reported to be GHS 30,000 yielding a revenue of GHS 190,000 which proves that the smaller the farm size, the higher the cost and the lower the profits which runs into negatives (loss). The standard deviations also suggest that quite a number of respondents are producing on small scale and therefore are running at a loss. 

*From this, it can be argued that the issues around low income of the cocoa farmer has more to do with the output from cocoa cultivation than the price a bag of cocoa.*

In total, 56.24 percent of the farmers indicated that 80 to 100 percent of their income is derived from cocoa farming. In addition, just 1.65 percent also suggested that 20 percent of their total income is obtained from cocoa farming (see Figure 20). The data reported here appears to support the assumption that cocoa farmers over-depend on their cocoa farms to make ends meet. A reasonable approach to tackle this issue is to provide cocoa farmers with the necessary measures to diversify their crop production. Although most of the cocoa farmers are already practising crop diversification (see Figure 18), just a little percentage (about 20) of their income comes from these other crops (see Figure 20). This guarantees income for cocoa farmers throughout the year that may relieve the farmers from the disadvantages of depending on a seasonal crop.

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**Figure 21. Proportion of Cocoa Farmer's Income from Cocoa Farm**

(Source: Field Survey (SPSS Output), 2019)
The results again illustrate that **80 percent of the farmers do not have knowledge of how the producer price is set.** The farmers with knowledge of the producer price setting acquired such information from different mediums. For instance, the media is a key source (therefore this channel should be used more to relay information to farmers) of the producer price information. Other farmers stated that the knowledge of the pricing setting mechanism was obtained from farmer-based meetings, extension officers, purchasing clerks, the LBCs or co-workers. While some of the farmers indicated that COCOBOD, a farmer representative and other stakeholders meet at a committee level to set the prices, others also provided answers which suggested lack of understanding of the mechanism. The following is a combination of some of the views of the farmers:

“**COCOBOD (considers the) world market price and come out with a producer price for farmers**”. A “**Committee meets and decides the price of cocoa before it is announced**”. “**I know it is set by the people in the foreign lands by world cocoa board, when it increases there, it is also increased here**”. “**The government sets the price through parliament**”. “**The national chief farmer meets with government to come out with the price of cocoa in Accra**”.

Majority (88 percent) of the respondents are of the view that farmers do not have a fair representation on the Producer Price Review Committee. The maintenance of the cocoa producer price at GHS7,600 for three consecutive years amidst price increases for farm inputs and general high cost of living in the country were examples cited during the survey to buttress the finding of lack of fair representation on the PPRC. This finding goes hand in hand with the findings of production and the wellbeing of the economy (GDPPC). Here, it can be argued that the Producer Price can be adequate on its own but when its combined with broader developments in the economy such as high inflation rate, then the revenues of the farmers are stretched. It was estimated that GDPPC has a statistically positive effect on cocoa production and a percentage change in GDPPC, will result in an 85 percent change in cocoa production in the direction of GDPPC.
An essential part of the representation of cocoa farmers on the PPRC is the work of Ghana Cocoa, Coffee and Sheanut Farmers Association (COCOSHE). Respondents were asked to indicate if they know of the existence of COCOSHE and its function, interestingly, 85 percent of the farmers did not know the organisation. This result is quite striking and undermines the farmers' representation on the PPRC, as the farmers have little knowledge of their representative. There have been suggestions for the organisation of elections from the grassroots to the national level to ensure the association has the needed mandate. A recommendation for this suggestion from the supervising ministry has not yielded results.

**Farmers and Producer Prices**

![Bar chart showing farmers' perception on producer prices](chart.png)

*Figure 22. Cocoa Farmer’s Perception on Producer Prices*

*Source: Field Survey (SPSS Output), 2019*

Results from the level of satisfaction with the current producer price demonstrated that 94 percent of the sampled cocoa farmers were not satisfied with the then price of GHS 7600 per tonne. Those who were satisfied were of the opinion that the world market price has reduced which should imply a reduction in producer price however, to their benefit, the price was maintained. Those who were dissatisfied with the current price lamented that the price is too low and it is unable to cover the cost incurred in producing the cocoa beans. They cited the increasing cost of living, increasing cost of cocoa inputs and farmers’ hard work as the basis for a price increase to ensure that their efforts are fully compensated.

*A farmer reiterated that the current price of cocoa should be increased by 50 percent. Beyond these responses, some farmers are of the view that the government is “cheating” the farmers by offering them a “woefully inadequate” compensation for their efforts, which results in them running at a loss.*
The farmers also believe that COCOBOD is not serving the interest of farmers. Only 30 percent of the respondents believe COCOBOD serves their interest while 70 percent do not believe their interest is considered by the Regulator. Farmers who responded affirmatively pointed out some of the supports and benefits they receive from COCOBOD. These interventions include educational scholarships for children of cocoa farmers, subsidy and free distribution of inputs and educating farmers on best cocoa farming techniques. This notwithstanding, some of these farmers suggest that COCOBOD needs to perform better than it is currently. Some farmers believe that COCOBOD is ‘slacking’ in executing its mandate of satisfying the interest of the farmers. It is the view of most of these farmers that COCOBOD is focused on their employees and not how these farmers fare. They believe that there is a myopic approach used in addressing their concerns such that budgeted inputs and scholarships are given to a selected few. Apart from not benefiting from these schemes, the farmer is left to engage in hard work only to be paid an inadequate price. The issue of the cocoa roads is another key concern for the farmers. They believe that COCOBOD should take proactive actions in addressing issues surrounding it.
Opinions of the respondents differed as to whether the adoption of a free market system may result in higher income for cocoa farmers. Specifically, 55.6 percent believe that the free market system may not guarantee higher income while 44.2 percent believes the free market system will enable them have better compensation for their produce. The farmers that responded in the affirmative argue that the free market system will result in competition and stimulate high producer prices. They also indicate that in the free market system, the buyers will be able to provide support to the cocoa farmers so as to enhance production. It is important to note that the pathways for realising these supposed gains from the market are not easy and simple as perceived by the farmers. On the contrary, some cited that the low level of education of the farmers, volatility in cocoa prices and a possible anti-competitive action of cocoa buyers are some possible factors that could defeat the ability of a free market system to ensure better compensation for the farmers.

Figure 24. Financial Inclusion of Cocoa Farmers

[Source: Field Survey (SPSS Output), 2019]
The financial inclusion of the cocoa farmers is of key essence to enhancing the efficiency and effectiveness of the activities of the farmers. The results indicate that cash-based transactions dominate the payment system of the cocoa farmers. Overall, 96.24 percent of the cocoa farmers affirm to making transactions by cash. Mobile money is the second prominent mode of payment among cocoa farmers. The 1.65 percent in the case of mobile money usage, 1.41 percent in the case of E-zwich usage and 0.71 percent in the case of cheque/bank transfer utilisation portrays that there is still a lot to be done to enhance the farmers' use of cashless means of payment. The result of the modes of payments is presented in Figure 23.

6.3.5 Farmers' Welfare and Poverty Levels
A thorough assessment of evidence from surveys and research papers that sought to analyse the incidence and extent of poverty among Ghanaian farmers have ranked cocoa farmers better off than other food crop producers probably due to the secured market system that cocoa farmers enjoy. According to a report by the World Bank published in 2007, poverty among cocoa-producing households have reduced from 60.1 percent in the 1990s to 23.9 percent in 2005 (Kolavalli & Vigneri, 2011). Nonetheless, the enormous reduction in poverty among cocoa farmers and their households does not necessarily mean they have sufficient income to cater for their needs (World Bank, 2007). Among majority of cocoa-producing households, a greater proportion of their income is sourced from cocoa beans sales which means that a change in the price is expected to affect their disposable income and purchasing power. A number of studies have established the connection between local prices and poverty among farmers. After reviewing the present conditions of cocoa growing countries in West Africa, Wessel and Quist-Wessel (2015) indicate that low farm gate price is preventing cocoa farmers from climbing out of poverty. An analysis of proceeds from cocoa farming using the results from two rural surveys conducted in 1996 and 2006 showed that cocoa farming and production has been less lucrative for farmers. In other words, income from producing cocoa has shrunk over time as net profit was found to be 7 percent less in 2006 than in 1996 (Kolavalli & Vigneri, 2011). This report provides an empirical result of the responses of cocoa farmers about their welfare as presented in Figure 23.
The general clue from the responses is that the welfare of cocoa farmers may be improving and that can be attributed to the relatively high producer price of cocoa maintained over the past three years. This is in concordance with the earlier finding of Breisinger et al. (2007) that poverty rate among cocoa farmers has reduced from 60.1 percent in 1991/1992 to 23.9 percent in 2005/2006. The results show that the sampled farmers can afford decent meal, portable water, medical care and satisfy the educational needs of their children up to at least the basic level. Farmers are in the position to pay long debts however; the saving culture of the farmers was not encouraging as only 59 percent indicated that they have savings in the form of liquid assets.
6.4 Perspectives of Licence Buying Companies (LBCs)

One of the paramount reasons for establishing the PPRC as part of the reforms was to have stakeholders’ input into the price determination process and also facilitate a decent return on their investment. It was, therefore, necessary to investigate the knowledge and perception of Licensed Buying Companies on the process of determining the margins of all the stakeholders to fully grasp their level of inclusion in the process. Key Licensed buying companies both foreign and local were interviewed and their responses are themed along the following lines:

1. LBCs perspectives on the Producer price determination process;
2. LBCs Representation on the PPRC;
3. LBCs Perspectives on the Liberalization of Ghana’s Cocoa Marketing System;
4. LBCs competitive strategies;
5. LBCs Perspectives on the cocoa weighing scales manipulation;
6. Challenges; and
7. Recommendations.

6.4.1 LBCs Perspectives on the Price Determination Process

LBCs admitted that the price mechanism to an extent is desirable as it seeks to protect the interest of all the stakeholders. However, they are of the opinion that the price is designed to protect the interest of farmers at the detriment of the other stakeholders. This is evidenced by the maintenance of the producer price at GHS 7600 per tonne for three consecutive years (2016/2017 to 2018/2019) regardless of the drop in the world market price. Over the same period, LBCs margin have reduced by approximately 11 percent. Although the reduction of LBCs’ margin is to avert some of the risks associated with the maintenance of the producer price on the government, the action is having negative financial implications on their business. It is worrying as the share of the LBCs’ margin is further worsened by the rising cost of fuel, labour and administrative cost. The foreign LBCs bemoaned that although the margins have reduced by 11 percent, in reality, it has reduced by 40 percent as business is transacted in dollars. The depreciating Ghana cedi is significantly affecting finances of the foreign LBCs since their activities involve foreign exchange transactions.
Issues of high bad debts and inability of some farmers to meet their obligations of supplying their cocoa beans after they are paid, takes a further toll on the business of LBCs.

6.4.2 LBCs Representation on the PPRC

Licensed Cocoa Buying Association of Ghana (LICOBAG) represents the LBCs on the PPRC. Each year LBCs send their cost estimates to the LICOBAG to be articulated and considered during the price determination process. Notwithstanding, LICOBAG’s influence on the committee is very minimal if not absent as they are unable to negotiate for better margins on behalf of the LBCs. One contributing factor to LICOBAG’s low level of influence on the PPRC is the weakness and lack of independence of its current structure. They indicated that the president of LICOBAG is a Director of one of the LBCs and the association is hosted by Produce Buying Company (PBC) Limited, a subsidiary of the regulator.39

6.4.3 Liberalization of Ghana’s Cocoa Marketing System

The local LBCs also expostulate the idea of a liberalized cocoa marketing system because a liberalized market system would breed unhealthy competition, placing the foreign LBCs at a position to abuse the system at the disadvantage of the local ones. In addition, farmers would not be insulated against low world market prices and furtherly, quality of Ghana's cocoa beans would be compromised. To this end, the local LBCs admonished that the marketing board system is desirable as it brings some form of sanity in the cocoa industry.

6.4.4 LBCs Competitive Strategies

Local LBCs suggest an unhealthy competition existing between the foreign LBCs and themselves. One reason for local LBC's inability to withstand competition with foreign LBCs is the ability to secure cheaper sources of funding. In addition, foreign LBCs have the financial might to deliver enough incentives to attract farmers.

39 PBC limited is a public limited liability with the government owning over 70 percent shares. It has remained the highest cocoa beans purchaser among the LBCs with over 31 percent shares. It is the only Licensed Buying Company (LBC) listed on the Ghana Stock Exchange however on August 15, 2019 PBC Limited was suspended from the Ghana Stock Exchange https://www.myjoyonline.com/business/2019/August-13th/ghana-stock-exchange-justifies-suspension-of-pbc.php
Nevertheless, foreign LBCs disputed that pre-financing strategy gives them a competitive advantage over the local LBCs. Pre-financing does not guarantee that farmers would sell their beans to them. The strategy has rather encouraged the farmers to be disloyal and not fulfil their part of the bargain. The central reason being that farmers are only loyal to buyers who are ready to offer immediate cash at the time of selling. Additionally, farmers are loyal to purchasing clerks whom they have established a direct relationship with.

Besides the foreign LBCs pre-financing strategy, the venturing of foreign processing companies in the buying of cocoa has made the competition in the sector keener than ever.

6.4.5 LBCs Perspectives on the Cocoa Weighing Scales Manipulation

The LBCs confirmed the adjustment of scales for weighing, to account for shrinking of beans when they dry completely. COCOBOD sells a bag of cocoa on the international market at 62.25 Kg but the LBCs sell to COCOBOD at 64 Kg, the beans are however bought at 66 Kg from the farmer. The reason being that, it is a commodity that shrinks when it dries completely. This is a strategy for PCs to remain competitive in their line of work. The PCs would then have to dry the beans themselves which comes at a cost. In addition, transporting the beans from the farm gate to the PCs shed also comes at an extra cost. In some circumstances, there are also a lot of foreign materials found in the beans bought which are sorted by the PCs. Regardless of these, it was indicated that the fact that the PCs cheat the cocoa farmers cannot be completely ruled out but the adjustment of the scale is done for a purpose. *PCs are allowed to adjust the scale up to 4 kilos but they abuse the margin.* To correct this Ghana Standards Board demands for the use of testing stones to ensure that weighing scales are accurate.

6.4.6 Challenges

a. Reduction and politicization of seed fund

One major challenge of the LBCs is the reduction in the seed fund from COCOBOD. LBCs are therefore forced to seek alternate sources of funding from domestic banks which comes at a high-interest rate. Again, the allocation of the seed fund used to be allocated purely on calculations related to market share but now it is politicized – according to LBCs, which means an LBC must be connected to the corridors of power to receive enough seed fund.
b. **Delay of payment**

The delay of payments from COCOBOD after the delivery of the cocoa beans was another recurrent challenge for the LBCs. All the interviewed LBCs lamented that after the cocoa beans have been delivered to COCOBOD, payment should be made to the LBCs within 13 days. However, this payment is usually delayed by COCOBOD to over 60 days without any compensation leading to an extra financial burden on business as the loans acquired from the local banks' interest would be accumulating. In the end, this burden overrides the benefit derived from the low-interest rate of COCOBOD's seed fund.

c. **Inconsistency in the PPRC sharing**

Another predominant concern of LBCs is the inconsistency in the PPRC sharing structure. The sharing structure is not fixed and it is skewed to the interest of farmers to score political points which question the sustainability of the sector. Although the underlining principle of the sharing structure is not to pay farmers less than 70 percent of the net FOB, the farmers are overpaid in some years, they argue for the ruling party to gain political votes. This strategy if continued will force other stakeholders out of the business.

### 6.5 Perspectives of Input Providers

This section of the report highlights general perspectives of input providers in the value chain. These highlighted perspectives were gathered from the interview exercise conducted as part of the data collection methodologies adopted for this study. The perspectives were detailed under the following sub-titles:

1. The Producer Price Mechanism
2. COCOBOD's subsidized programmes
3. The way forward

This group provides the farmer with the needed inputs and materials to help in the cultivation, maintenance, and harvesting of cocoa. These providers fall under the authority of COCOBOD as the regulator of the sector and are directly monitored by the Cocoa Research Institute of Ghana, a subsidiary of the COCOBOD.
Inputs are essential to cocoa productivity and when farmers apply these inputs in the right proportions and periods, high yields and quality of the beans are assured. Generally, the input companies supply the farmer with chemicals (pesticides, weedicides insecticides, etc.), equipment/machinery (spraying machines, motor vehicles, tricycles, etc.) and capital (in some cases) through their operating credit institutions or programmes. Majority of the suppliers import these inputs and materials as the financial and technical might needed to produce these inputs to meet international standards are lacking.

6.5.1 Producer Price Mechanism

Some respondents had no idea of the price build up and the operations of the PPRC. The main concern of the seller like any producer is profit-making. However, the few with knowledge on the price-setting mechanism implied that the price of a bag which sums up to be the income of the farmer is low and does not compensate enough for the hard work that goes into cultivating cocoa. As a profit-making entity which gets its source of income from the incomes of these farmers, the situation is worrying. It was established that farmers are not able to purchase inputs which are needed to ensure higher quality and yields. The timely and regular application of these inputs is considered part of the best cocoa farming practices. The industry costs including subsidies for inputs that are deducted before the net FOB is attained is not the most optimal means of supplying inputs. They argue, that the subsidies added to the producer price to enable the farmer to personally handle the purchase of inputs for his farm.

6.5.2 COCOBOD’s Subsidized Programmes

The sellers acknowledged the positive intentions behind these subsidized programmes as a way to help the farmer engage in best farming practices. Since the inception of these programmes, the goodwill of the regulator for introducing these programmes have not been fully realised. These programmes discourage farmers from patronizing the services of input providers as products and services delivered are deemed expensive. Regardless of the inconsistency in the delivery of these programmes, farmers are willing to wait several months for the free inputs or mass spraying which goes a long way to affect their yields and productivity. This creates problems for the providers and make any kind of special arrangements with the farmers very difficult.

40 This assertion can be empirically tested by further studies to establish the effect COCOBOD’s programmes have had on cocoa production.
Additionally, they argue that some inputs are smuggled and sold to farmers at low prices which distorts the price in the input market. The market is again flooded with fake inputs which are sold at very cheap prices resulting in less demand for original inputs which are tested and proven to give good results.

6.5.3 The Way Forward

The providers insist that the farmer is in a good position to handle the buying of inputs on his own without having to wait for free products and therefore pointed out that subsidized COCOBOD programmes should be discontinued to pave way for higher producer prices. Finally, the government through COCOBOD was entreated to acknowledge the efforts input sellers are making to increase the production of cocoa and create the enabling environment for this part of the cocoa value chain to thrive.

6.6 Perspectives of Experts in the Cocoa Sector

In order to enrich the content of this study, the perspective of renowned experts with rich knowledge in the dynamics of the cocoa industry especially the price-setting mechanism and its associated revenue management arrangements within the Board of the industry were solicited. The main role of these industry activists is to ensure that there is a sustainable supply of quality cocoa in the country by protecting the welfare of farmers. In another scope, the agenda becomes advising governments of producing countries to adopt the right policies for cocoa. Below are themes along which these perspectives are organized.

1. Producer Price Mechanism
2. Management of the Cocoa Sector
3. Liberalization of the Sector

6.6.1 Producer Price Mechanism

The price mechanism in Ghana is quite fair as the farmer is given at least 70 percent of the net FOB price and the government through COCOBOD is seen to provide the farmers with other services such as better planting materials, fertilizers, research and extension services. The existing pricing mechanism as was indicated is good for the country because of the following reasons:
i. It serves as a platform to stabilize the local currency as it is the only commodity that constantly supplies Ghana's economy with an average amount of $1.2 billion annually.

ii. The marketing board system has the potential to stabilize producer prices against international price volatility.

iii. The announcement and maintenance of cocoa prices ahead of cocoa buying season provide price guarantee to cocoa farmers. This enables them to plan ahead of time.

Nonetheless, they argue that the price setting procedure has always been political rendering the price-setting committee, PPRC, incapable of setting a realistic price for cocoa produce. It will, therefore, be more prudent for the setting up of an independent price-setting committee with the role of economically reviewing input factors before announcing the producer price for the year. It should be noted that this is a function currently performed by the PPRC.

Another opinion is that the farmer is not adequately represented on the price-setting committee. This led to the questioning of the mandate given to Cocoa Coffee and Sheanut Association of farmers (COCOSHE) to represent farmers on the PPRC. It has been argued that the farmers should be given that right to choose their own representation on the PPRC to negotiate for better producer prices and as a result, encouraged the setting up of more farmer. The counter narratives from COCOSHE in response to this development is captured as “[they] present the expected producer price in consultation with the farmers to the PPRC. However, the difficulty is that the proposed price of the farmers cannot be readily accepted as the government and other players have a say in determining the producer price. The government approved producer price comes later on cocoa day. In effect, there is usually a difference between the estimates given by farmers at the regional level and the approved producer price. This creates a wide expectation gap since the farmers are not fully made to understand the reasons for the price differences...”. For example, in setting the 2019/2020 producer price, the government allowed an increase of GHC40 while farmers expected an increase between GHC 150 and GHC 200. It is therefore, the responsibility of various stakeholders such as COCOBOD and PPRC to explain to the understanding of farmers, the rationale behind this discrepancy in expected and actual prices.
A key source of inefficiency in the process of the price determination is how much of the revenue is retained as “industry” costs to offer services to producers. In that instance, the use of the stabilization fund becomes questionable. The retained funds can be used to fund these “industry costs”. In 2010 for instance, the retained funds were poorly utilised for mass spraying and other subsidized programs.

The price harmonization policy between Ghana and Côte d'Ivoire will help strengthen the two countries' position in the determination of the world market prices of cocoa since they contribute about 60 percent of the world’s production.

6.6.2 Management of the Cocoa Sector

The politicization of the sector is a major factor which has led to the mismanagement of the sector by COCOBOD. The appointment of the CEO and the other deputies by the president strengthens the politicization of the sector and hinders transparency of COCOBOD's revenue management strategies. There was hence the call for revamping of the management structure to foster transparency and accountability. The financing of the sector and the financial programs of the Board is not open enough. The freedom to borrow off the financial books has created room for the Regulator to mismanage funds. This is one major reason for the lack of transparency in the system. Additionally, there is the lack of incentives to contain costs. The procurement of products and services for the subsidization programmes and mass spraying activities, should not be done by government because the moment the government engages in such huge procurement, associated inefficiencies emerge.

6.6.3 Liberalization of the Sector

The view was that in theory, liberalization would foster and ensure competition. However, the smallholder farmers in Ghana's cocoa sector do not have the capacity to negotiate with international buyers.

Consequently, liberalization of Ghana's cocoa sector is going to open the gates for industry players who are stronger to abuse the system and even pay the farmer very less. The quality of Ghana's cocoa beans would also deteriorate when the system is liberalized.
7.1 Introduction

This chapter provides an analysis of the financial statement of COCOBOD to gain insights into the revenue and expenditure management strategies of the organisation. This analysis is essential since COCOBOD is the regulator and the sole exporter of cocoa in Ghana. Also, majority of the industry related expenditure (which are deducted from the gross FOB price) are managed by COCOBOD. Thus, the performance of COCOBOD is relevant for understanding how the sector is managed. This aspect of the study utilises historic financial information over 11 years from 2008 to 2018 and five categories of ratios which are profitability ratios, liquidity ratios, solvency ratios, turnover ratios and cash flow ratios. A trend analysis on key financial statement items is done to understand the extent of growth in the financial figures over the study period.

7.2 Preliminary Insights into COCOBOD’s Financials

The audited financial statement of COCOBOD presented negative total comprehensive income from 2012 to 2018 except for the financial year 2014 where total comprehensive income registered a positive of GHS1.97 billion. For that year, total other comprehensive income which includes gains from revaluation of Property Plants and Equipment (PPE), fair valuation gains and gains from re-measurement of defined benefit scheme was GHS1.74 billion. These results raise concerns about how COCOBOD has efficiently managed its revenues from the sale of cocoa over the study period. The debt structure of COCOBOD continues to have more liabilities which raise concerns about debt financing and the ability to generate revenues to pay for financial obligations. Some preliminary financial information has been presented in Table 33.
### Table 33. Financial Statement Summaries for 2011-2018

<table>
<thead>
<tr>
<th>Description</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cocoa Sales ('000 Tonnes)</td>
<td><strong>1013</strong></td>
<td>879</td>
<td>835</td>
<td>897</td>
<td>740</td>
<td>778</td>
<td><strong>970</strong></td>
<td>904</td>
</tr>
<tr>
<td>Revenue (GHS '000)</td>
<td>4,754,198</td>
<td>4,529,686</td>
<td>3,710,565</td>
<td>6,025,750</td>
<td>7,533,890</td>
<td>9,145,815</td>
<td>10,245,118</td>
<td>8,961,963</td>
</tr>
<tr>
<td>Cost of Sales (GHS '000)</td>
<td>4,407,622</td>
<td>3,798,887</td>
<td>3,711,804</td>
<td>4,914,276</td>
<td>6,153,980</td>
<td>7,213,026</td>
<td>8,570,434</td>
<td>7,210,223</td>
</tr>
<tr>
<td>Operating Expenses (GHS '000)</td>
<td>343,624</td>
<td>743,549</td>
<td>767,709</td>
<td>676,999</td>
<td><strong>1,156,955</strong></td>
<td><strong>2,059,291</strong></td>
<td><strong>1,627,162</strong></td>
<td><strong>1,346,192</strong></td>
</tr>
<tr>
<td>Revenue per Tonne (GHS)</td>
<td>4,693.93</td>
<td>5,151.18</td>
<td>4,441.31</td>
<td>6,718.30</td>
<td>10,177.44</td>
<td>11,754.88</td>
<td>10,561.98</td>
<td>9,913.68</td>
</tr>
<tr>
<td>Cost of Sales to Revenue (%)</td>
<td>92.71</td>
<td>83.87</td>
<td>100.03</td>
<td>81.55</td>
<td>81.68</td>
<td>78.87</td>
<td>83.65</td>
<td>80.45</td>
</tr>
<tr>
<td>Operating expenses to Revenue (%)</td>
<td>7.23</td>
<td>16.42</td>
<td>20.69</td>
<td>11.24</td>
<td>15.36</td>
<td>22.52</td>
<td>15.88</td>
<td>15.02</td>
</tr>
<tr>
<td>Total Cost to Revenue (%)</td>
<td>99.94</td>
<td>100.28</td>
<td>120.72</td>
<td>92.79</td>
<td>97.04</td>
<td>101.38</td>
<td>99.54</td>
<td>95.47</td>
</tr>
<tr>
<td>Total comprehensive income (GHS '000)</td>
<td>4,248</td>
<td><strong>-87,764</strong></td>
<td><strong>-1,053,351</strong></td>
<td>1,972,024</td>
<td><strong>-28,181</strong></td>
<td><strong>-199,100</strong></td>
<td><strong>-194,233</strong></td>
<td><strong>-101,082</strong></td>
</tr>
<tr>
<td>Property Plant and Equipment (GHS '000)</td>
<td>349,270</td>
<td>339,438</td>
<td>406,465</td>
<td><strong>2,139,216</strong></td>
<td><strong>2,023,835</strong></td>
<td><strong>2,008,819</strong></td>
<td><strong>2,116,381</strong></td>
<td><strong>2,125,472</strong></td>
</tr>
<tr>
<td>Total Equity (GHS '000)</td>
<td>203,119</td>
<td>8,549</td>
<td>-1,044,802</td>
<td>927,222</td>
<td>899,041</td>
<td>1,795,761</td>
<td>1,601,528</td>
<td>1,500,446</td>
</tr>
<tr>
<td>Total Liabilities (GHS '000)</td>
<td>1,917,212</td>
<td>3,041,367</td>
<td>3,673,255</td>
<td>3,665,979</td>
<td>4,485,562</td>
<td>4,639,219</td>
<td>7,743,405</td>
<td>9,938,773</td>
</tr>
</tbody>
</table>

[Source: Authors’ Construct]
Although Ghana’s cocoa production reached an all-time high of 1 million tonnes in 2011, the high expenses incurred for the same period reduced profits. The direct cost\(^{41}\) of GHS4.407 billion incurred in 2011 represents 92.7 percent of COCOBOD’s total revenue. At the same time, operating expenses form 7.23 percent of total revenue. Comparatively, in 2018, direct costs to revenue increased by 80.46 percent while operating expenses to revenue increased to 15.02 percent. It is evident that indirect costs to revenue has been increasing over the years. In most of the years, the sum of direct costs and operating costs represents more than 100 percent of revenue which undermines the ability of COCOBOD to break-even. Revenue per tonne of cocoa of GHS4694 and GHS5151 has been recorded in 2011 and 2012 respectively. This increased to GHS10562 and GHS9914 in 2017 and 2018 respectively. The direct costs of 2018 have been decreased by a government support of approximately GHS1.49 billion. Without this support, COCOBOD would have made an additional loss of about GHS1.49 billion.

There are different factors that affect revenue as compared to factors that affect the cost of sales of COCOBOD. Cocoa price at the terminals or the type of cocoa beans sold could affect the revenue recorded significantly. Ghana has a two-cycle cocoa season consisting of the main crop season and the light crop season. The light crop is sold at a discount of 20 percent, while the main crop is usually exported and sold at full price. High proportion of light crop in the total cocoa production for a season could result in a decrease in the total revenue for COCOBOD but not necessarily a proportional decrease in the cost of sales or overheads. This phenomenon explains why in 2011 when the country recorded the highest production level, there was high cost of sales that reduced profitability. The projections by COCOBOD which are used by the PPRC in determining the producer price should be able to estimate the proportion of the main crop and the proportion of the light crop that could be sold. In effect, exposure of revenue as a result of light crop sales should be mitigated to some level.

\(^{41}\) In 2017, expenses on cocoa roads has been excluded from direct costs and rather added retrospectively (also in 2016) as part of administrative expenses which is part of operating costs. Based on the importance of cost behavior in classification of cost, the study sticks to the cost classifications offered in the annual reports. On 1 October 2017, COCOBOD entered a concession agreement with the Ministry of Roads and Highways which enables them to capitalize the completed roads as intangible assets (or contract assets when it is work-in-progress or under rehabilitation) on their statement of financial position for 10 years.
7.3 Corporate Finance of COCOBOD

COCOBOD has utilised various tools to finance its operations. One of the key sources of finance is equity capital which is provided by government. Over the years, debt has increased and now is the greatest share of the overall capital structure. There are various sources and types of debts which have been acquired over the years. Mainly, COCOBOD has utilised long-term loans, medium-term loans and short-term loans. Currently, there is an annual loan facility (also known as the syndicated loan) which is a receivables-backed trade finance facility meant to finance the purchase of cocoa beans from farmers. In 2019, for instance, the organisation received a loan of USD1.3 billion as a result of an agreement with twenty-four (24) participating banks led by MUFG Bank Limited, Rabobank, Natixis, Societe General, NedBank Limited and Ghana International Bank.

Earlier, domestic loans were sourced, in the form of Bank of Ghana denominated cocoa bills. The bills are not exposed to the foreign exchange translation risk which comes as a result of converting foreign-denominated debt to Ghana cedis. However, the interest rates associated with the loans are comparatively high; coupled with the lack of financial muscle of banks in Ghana to raise the high volume of funds needed. Some of the short-term loans are now converted into long-term. Currently, there is a 10-year loan from the Bank of Ghana of about GHS1.9-2billion. It was initially cocoa bills which the aspect for the commercial banks have been paid for while the Bank of Ghana converted its portion to a 10-year loan. Prices fell in 2017 and COCOBOD through the Bank of Ghana issued cocoa bills with a rate of about 22 percent to finance the purchase of cocoa beans. The company was not able to make profits when the bills matured and so the bills were rolled over. About 80% of the liabilities of COCOBOD are cocoa bills from commercial banks through the Bank of Ghana. The interest of 22-23% is very high which has put pressure on COCOBOD's balance sheet.

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42 https://www.cocobod.gh/news_details/id/228/cocobod%20seals%20deal%20on%20usd1.3%20billion%20cocoa%20syndicated%20loan
43 https://www.ghanaweb.com/ghanahomepage/business/bog-introduces-cocoa-bills-27905
COCOBOD has also utilised medium-term facilities as a source of funding. The first medium-term loan, was procured over 2007-2010, with the next facility being solicited over 2012-2016. As the currency plummeted in value in 2016, the cedi liability of COCOBOD increased, leading to the institution, securing additional bills in January 2017. As prices plummeted in subsequent years, profits were reportedly affected and the interests on the facilities were rolled over usually after 6 months at every maturity. Within the same period, 2012-2016\textsuperscript{44}, there was a medium-term loan facility (3-years) of about USD300 million. There are also cases of foreign exchange translation costs, which worsen the finances of the institution in the short term. Medium-term loans are usually project targeted (e.g. warehouse, PEPs). The first one which was contracted in 2007 was for the Takoradi warehouse. The current medium-term facility is the fourth in a series.

To COCOBOD, the only way to get the debt issues sorted is to issue a bond which will be used to pay the debts and structure a payment plan over time. There are various actions aimed at raising the maiden long-term bond which is expected to range between USD1.5 billion to USD2 billion over a tenor of 10-20 years.

\textsuperscript{44} This has been renewed to 2016-2019 and recently to 2019-2022.
7.4 Profitability of COCOBOD

A series of ten profitability ratios have been employed to analyse how COCOBOD generates revenue and profit or incur costs given capital employed, equity or total assets. The results of the ratio analyses have been presented in Figures 26 to 29.

Figure 26. Profitability of COCOBOD (Focus on Profit Margins)
[Source: Authors’ Construct]

Figure 26 reports the results of the gross profit margin, operating profit margin, the net profit margin and the net profit margin (including other comprehensive income45). The results show that from 2008 to 2013 crop years, all the four metrics decreased.

45 The ratios with ** are those that account for “other comprehensive income” in computing the profit.
In the 2013 crop year, all the four metrics recorded the lowest performance. This suggests that over these years, profits relative to revenue declined. The deterioration of profitability ratios is an indication of declining revenues or increasing expenses.

This will be considered in a later analysis. Yet, a gap is evident between the results of gross profit margin and operating profit margin such that the two ratios have widened over the study period. This suggests that the rate at which operating expenses increase over the period was higher than how revenues increased. In the 2014 crop year, all the four metrics increased and net profit margin (other comprehensive income inclusive) registered a little over 30 percent. However, this is driven by high revaluation gains on PPE, fair value gains and gains on defined benefits of employees of COCOBOD. Also, in exception of gross profit margin, the other three metrics such as operating profit margin, the net profit margin and the net profit margin (including other comprehensive income) recorded a decline in subsequent years until 2016. Performance appears to be picking up a bit in 2017 and 2018.

Figure 27. Profitability of COCOBOD (Focus on Return on Equity)

[Source: Authors’ Construct]
Figure 27 shows the results of return on equity with and without adjustments for other comprehensive income. Similar to the general conclusion on the results reported in Figure 26, return on equity decreased over the period 2008 - 2012, increased in 2013 and eventually decreased until 2016. Also, a disparity which is caused by including gains and losses from other comprehensive income in the 2014 results is evident. A detailed investigation into the cause of the spikes in the 2012 and 2013 results of the return on equity reveals that they were caused by the huge total comprehensive losses made of GHS 88 million and GHS 1.05 billion respectively. The 2012 results (of the two return on equity measures) differ as a result of the impact of the loss for that year on total equity (through retained earnings). The high return on equity (other comprehensive income inclusive) in 2014 was as a result of high other comprehensive income of GHS1.74 billion recorded for the year. In similar fashion, the performances of 2017 and 2018 appear to be improving. This can be attributed mainly to the government revenue support received in 2018 and the capitalisation of cocoa roads.

Figure 28. Profitability of COCOBOD (Focus on Return on Capital Employed)

[Source: Authors’ construct]
Finally, *Figure 28* and *Figure 29* presents the results for how efficient COCOBOD uses its resources (total assets and capital employed) in generating profits. Generally, from 2008 to 2010, COCOBOD was able to use its resources to generate increasing levels of profit. However, this deteriorated until it reached the lowest of more than negative 100 percent (return on capital employed) and more than negative 40 percent (return on assets) in the 2013 crop year. The cosmetic effect of the other comprehensive income on the ratios has also been evident in the 2014 crop year in this case.

![Graph showing profitability of COCOBOD](image)

*Figure 29. Profitability of COCOBOD (Focus on Return on Asset)*

[Source: Authors’ Construct]

The business model that COCOBOD uses in-part explains the deteriorating results that COCOBOD obtain over the study period. The revenue received is volatile depending on the season of the crop (i.e. main crop or light crop) sold and prices at the terminal are also volatile.

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46 Capital employed is computed as either the sum of equity and long-term liabilities or total assets less current liabilities. The aim of segregating the ratios based on equity, capital employed and total assets is to understand how each type of resources used by COCOBOD is utilized to generate profit.
All of these dynamics are at place irrespective of the fact that the producer price is guaranteed, overhead costs are fixed and the direct costs do not necessarily change as the revenue falls. For instance, in 2016-17, the world price fell by 40% but COCOBOD did not reduce the price which is paid to the cocoa farmers. Other jurisdictions had their producer prices decreased but not Ghana. Similarly, prices fell by about 30 percent in 2017/2018 but the price was still maintained at GHS7,600 per tonne. From day 1, there is a gap already and the operations of COCOBOD are marked to be on a deficit budget as the price paid to farmers is way above the price in the market and costs of sales or operating costs do not decline when prices fall. Apart from exploring various ways to cut the costs of operation, there is the need to explore the avenues to enhance the revenue-side. This is possible in two main ways, to increase production of cocoa beans and to explore means of increasing the prices at which Ghana’s cocoa is bought at the terminal. This could explains the current actions of COCOBOD which aim to receive a Living Income Differential (LID) of USD400 on every tonne of cocoa sold\textsuperscript{47}.

\textsuperscript{47} This initiative is initiated by Ghana and Côte d’Ivoire.
### 7.5 Liquidity of COCOBOD

Four essential liquidity ratios have been used to assess how COCOBOD meets its short-term obligations with its resources. These include current ratio, acid test, cash ratio and working capital to debt ratio\(^{48}\).

![Trends of Liquidity Ratios](https://example.com/figure30.png)

**Figure 30. Trends of Liquidity Ratios**

[Source: Authors’ Construct]

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\(^{48}\) Current ratio, acid test and cash ratio are traditional liquidity ratios. Working capital to debt ratio is included in the liquidity measures since the first three are ratios related to working capital. The working capital to debt ratio which measures the ability of a company to eliminate its debt using its working capital could also be classed among solvency ratios.
COCOBOD’s ability to pay its current liabilities with its current assets declined between 2008 and 2011 crop year as shown by the current ratio. However, in 2011 to 2015, the current ratio increased but at a slower pace.

In 2016, there has been a swift change in the upwards direction which did not last to the following years, the ratio fell. The increase in the current ratio represents greater ability of COCOBOD to meet short-term financial obligations. On the contrary, a decrease represents a declining ability to meet short-term financial obligations. A similar movement in the current ratio is evident in the acid test ratio. The insignificant differences between the two ratios suggest that the total inventory held by COCOBOD does not materially distort the trend in the current ratio.

The cash ratio is used to explore the ability of COCOBOD to immediately pay off its short-term commitments with cash and cash equivalents. As evident in the results, cash ratio of COCOBOD decreased over the study period from 1.33 in the 2008 crop year to 0.15 in the 2018 crop year. This suggests that COCOBOD was able to pay off its short-term obligations immediately with the ability to pay additional 33 percent of short-term obligations in 2008 but this deteriorated over the study period and as of 2018, only 15 percent of the short-term obligations could be paid off immediately. The differences between the acid test ratio and the cash ratio increased over the period suggesting that receivables increased over the period to some extent. The difference between current asset and current liability constitutes the working capital of COCOBOD. The ratio of working capital to debt decreased from 2008 to 2010, increased in 2011 and has since witnessed a downward trend until 2017. There was also a slight increase in 2018. The downward trend shows that the ability of COCOBOD to pay its debts using working capital has been decreasing.

The exposure of COCOBOD to the weak liquidity stance is significantly caused by the fact that short-term liabilities are significant components of operations. In fact, each year, there is an annual facility which is obtained to finance the purchase of cocoa beans from the farmers. Also, the interests from the cocoa bills and medium-term loans are carried over where losses are made and so increasing the current liabilities of COCOBOD.
7.6 Solvency of COCOBOD

Solvency ratios of COCOBOD were analysed to examine how the company is able to meet its long-term obligations. In essence, this provides an insight into the going concern status of the company. The results of these ratios are presented in Figure 31 to 35.

Figure 31. Solvency of COCOBOD (Focus on Debt to Assets)

[Source: Authors' Construct]

Figure 31 reports the findings of the ratio of debt to assets, which is further divided into current liability to asset ratio and long-term liability to asset ratio. Generally, debt to asset ratio increased over the period under study. The highest level of this ratio has been recorded in the 2013 crop year. From 2008 to 2011, current liabilities increased while long-term liabilities decreased.

This trend changes from 2011 to 2013. From 2011, the total long-term liabilities increased to a peak of 77 percent in 2013 before remaining constant. From 2014 to 2016, the two ratios registered similar positions in the capital structure of the company. A key strategic stance of COCOBOD is to depend more on long-term liabilities with lesser interest obligations as compared to short-term liabilities with high interests. The results of 2017 and 2018 seems to defeat this objective as short-term liabilities...
grew to as high as 71 percent of total assets. Also, there is the general observation of growth in the level of total debt that forms the capital structure of COCOBOD. While the use of high debt is not a bad strategy, but utilisation has to be consistent with strategy. For instance, liquidity risk exposure is inevitable if the organisation is not able to generate earnings and cashflow to service debts.

COCOBOD has indicated that the switch to the long-term loans is the way to go. It has been argued that the long-terms loans are more flexible and do not necessarily swell up the balance sheet so much. Some of the woes of COCOBOD has been attributed to the cocoa bills that has been acquired by COCOBOD in the past.

![Figure 32. Solvency of COCOBOD (Focus on Interest Coverage)](image)

*Figure 32. Solvency of COCOBOD (Focus on Interest Coverage)*

*Source: Authors’ Construct*

The results of the interest cover of COCOBOD are presented in Figure 32. The results pertain to the period 2012 to 2018 as data for earlier years is unavailable. The results show that apart from 2014, interest coverage ratio has been decreasing up to 2016. This suggests that the financial stamina of COCOBOD to honour its financial obligations has been deteriorating over the period. Although COCOBOD has been commended for paying its syndicated loans (comprising the principals and
interests) on time, the debt servicing ability generally appears to be declining. This is mainly due to the high interest that have accrued as a result of the cocoa bills. The results for 2017 and 2018 has shown some level of improvement although it is still in negatives as a result of the net losses.

![Figure 33. Interest Charges and Profits of COCOBOD](Source: Authors’ Construct)

To further analyse this result, interest income and interest expense relationship are examined as presented in Figure 33. Results show that both finance costs and finance income which are the cost paid and interest received respectively by COCOBOD in borrowing money to carry out its activities increased over time. The linear trend line shows that finance cost increases are higher than the rate of increase of finance income. In effect, interest income cannot completely pay off interest expenses, an indication that there is no motivation to borrow funds except they are to be used for some purpose.
From the results of debt to equity ratio which is reported in Figure 34, it is evident that the ratio increased slightly over the period. There is a significant spike of over 35,000 percent in the ratio for 2012 as a result of huge losses made during the 2011 and 2012 crop years. The effect is that total equity decreased significantly whiles debt did not, causing the extraordinary increase. The ratio of debt to capital is also presented in Figure 35. The ratio of debt to capital has increased over the study period. This is because the initial capital of COCOBOD has remained at GHS 393,000 over the study period.
7.7 Turnover of COCOBOD

To further explore the relationship between some key financial statement components, a number of turnover ratios are examined as presented in Figure 36.

Asset turnover increased from 1.57 in 2008 to 3.95 in 2009. Over the rest of the study period, the asset turnover decreased to 0.78 in 2018. The decline shows that although COCOBOD has acquired more assets (with significant growth in PPE over the period) it has not been so efficient in using these assets to generate revenue.
Focusing on PPE, the fixed assets turnover recorded a steeper decline over the study period, which suggests that the increasing level of investment in PPE by COCOBOD is not commensurate with growth in revenue. This corroborates the narrative by some officials of COCOBOD about the state of some of the assets of COCOBOD across the country, as a result of a weak maintenance culture, currently being reviewed.

Investigating further, the ratio of capital employed turnover shows an increase from 2008 to 2011 and decreases until 2016. In 2018, COCOBOD recorded 2.74 suggesting some level of improvement. This is similar to the results of the decomposition of debt to asset ratio presented in Figure 31, which has been discussed earlier. In effect, COCOBOD has been efficient in using its capital employed to generate high revenues from 2008 to 2011. After 2011, the company not been efficient in using its capital employed to generate revenue. The decrease of the level of efficiency in using capital employed is related to the increasing long-term liabilities in the capital structure of COCOBOD. From 2011, COCOBOD started to increase its long-term liabilities while short-term liabilities decrease.
This suggests that the company is not able to efficiently use long-term liabilities in the form of financial facilities in acquiring assets for generating revenue. These results provide the basis for the assertion that COCOBOD does not make efficient use of its long-term financial facilities. Again, the decline in the capital employed turnover and increasing long-term debt coincide with the high cocoa production recorded in the 2011 crop year.

This gives an indication that as a result of the high cocoa production for that year, the management of COCOBOD changed its capital structure policy (strategy) and this is yet to generate positive gains.

**7.8 Cash Flow of COCOBOD**

In business analysis, “cash is king” and so the cash position of any organisation is a relevant area to provide some insight into performance. Earlier in Figure 30, it was reported that the cash ratio of COCOBOD worsened over the study period. A number of cash flow ratios are analysed with the results presented in Figure 37 to 38. The focus of the analysis in this section is on the Cash Flow Statement of COCOBOD.

*Figure 37. Cash Flow Analysis of COCOBOD 1*

[Source: Authors' Construct]
Operating cash flow to revenue measures the ability of COCOBOD to convert its sales to cash. This ratio increased marginally in 2009 and declined until 2011. It later increased slowly up to 2014 but has been declining since. Generally, the decreasing trend as can be observed in Figure 37 suggests that COCOBOD is not efficient in converting its sales into cash. The asset efficiency ratio also measures the ability of COCOBOD to use its total assets in generating cash. The results indicated that apart from 2009 and 2010 where the ratio recorded results above 0.1, the other years recorded ratios that are negative or very low. Again, from 2014 to 2018, the results indicate the declining ability of COCOBOD to use its resources to generate cash.

![Chart](chart.png)

*Figure 38. Cash Flow Analysis of COCOBOD*  
[Source: Authors' Construct]
Furthermore, considering the cash generating power ratio, COCOBOD registers a relatively stable trend from 2008 to 2012 but in 2013, the highest ratio of 12.32 was recorded. This initially suggests that in that year, a greater portion of total cash flow was from operating activities. However, this result is high because of the high negative operating cashflow and negative total cashflow recorded. The ratio of the two negative cashflows resulted in the high positive result which in reality is an unfavourable result. There has been a stable trend in the cash flow interest coverage ratio although the last two years of the study period registered increases. These results offer further insights into earlier discussions on liquidity and solvency. In the case of external financing index, the general results indicate an almost constant trend except for 2015 and 2016 which recorded relatively lower ratios.

There is a noteworthy point about the cashflow of COCOBOD. It is seasonal or cyclical as COCOBOD is more liquid from October to December, after this, most of the cash flows will come from sales from factories and prepayments. From February-July/August, the cocoa beans are shipped for sales. Out of the total receipt, 70 percent is used to pay the loans while 30 percent is used for operations. The loan is about 90 percent of the cash that COCOBOD as of October. The drawdown of the syndicated loan from Bank of Ghana is undertaken in three phases, 50 percent (October), 40 percent (November) and 10 percent (December). It is expected that by January, 80 percent of the crop should be bought so that from December, shipping is expected to commence. In 2019 for instance, CMC will start shipping from October-November-December for the main crop season. The light crop will come in July, August and September.

7.9 Trend Analysis of Assets

Trends in terms of the growth rate of financial statement line items provide insights to understand the various ratio analysis or to confirm the earlier findings. As a result of the differences in the financial reporting approach, from 2008 to 2011 as well as from 2012 to 2018, aggregate items have been used as opposed to the disaggregated items.
The year 2008 has been used as a base year for the analysis\(^{49}\). The results of the growth in non-current assets are reported in Figure 39. Generally, PPE, total non-current assets and total assets of COCOBOD evidenced significant growth over the period as compared to 2008 financial year figures. The PPE captured on the balance sheet are buildings and produce sheds, plant and equipment, furniture, motor vehicles and leasehold properties.

It is worth noting that the assets of COCOBOD have an appreciable growth over the years as reported. This is no guarantee of efficient utilisation, as has been discussed. A key stakeholder indicates that:

\[ \text{“...we have a lot of assets and they are not new properties we acquired. They are old assets but because we do not have money (to maintain them), a lot of them are deteriorated. ... If you go out there and see the number of COCOBOD properties that have been left, you will be shocked”.} \]

There is some level of rehabilitation exercises carried out by COCOBOD to maintain the assets. However, the current level at which it is undertaken is not sufficient, as a result of limited resources available for such exercises.

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\(^{49}\)Ghana adopted the IFRS in 2007 and by 2008, compliance will have increased. In addition, the use of financial statements under the same accounting standards will foster comparability and more accurate inferences.
7.10 Strategic Choices

The performances over the cocoa crop years under review suggests that unless effective strategic decisions are taken, revenues and profitability will continue to decrease. There are notable observations that are worth mentioning which include the issues around the stabilisation fund, the cocoa roads, government revenue support, productivity enhancement programmes, the farmers’ social security fund and farmers’ welfare fund.

Figure 39. Trend Analysis of COCOBOD Assets

[Source: Authors’ Construct]
The stabilisation fund has been affected significantly by the fact that COCOBOD has maintained the producer price at GHS7,600 per tonne over three consecutive years until the current cocoa crop year of 2019/2020 when it has been increased to GHS8,249 per tonne. Although an annual provision is to be made into the stabilisation fund, because of the low prices recorded in the 2017/2018 crop year, the PPRC did not make any additional provision for the stabilisation fund, instead the prior year provisions were used to offset the dip in prices. A fiscal concern is raised with regard to government’s revenue support of GHS1,627,045,000 which has been provided to COCOBOD. Out of this, a total of about GHS1,487,922,000 has been used to offset some part of direct costs while the remainder is deferred to the 2018/2019 crop year. Although COCOBOD indicated the non-recurrence of this event, there is still the tendency of it occurring since the producer prices are pegged for the whole crop year. The effect of revenue supports to the sector could have fiscal implications as the country is now implementing fiscal responsibility regulations.

The financial information of COCOBOD only provides little information on two key funds which are meant to support the farmers – the farmers’ social security and the farmers’ welfare fund. The former is established under section 26 of the Ghana Cocoa Board Act 1984 (PNDCL Law 81), as amended to establish a contributory insurance scheme for cocoa, coffee and sheanuts farmers within the framework of the Social Security Fund. The company has not yet made regulations through legislative instruments to give full effect of the provisions on this fund. The farmers’ welfare fund which is established under section 27 of the Act has not shown any improvements as the company continues to make losses. A sum of not more than 10 percent of net profit of COCOBOD is supposed to be transferred each year into the fund. The fund is meant to be used for farmer welfare enhancing initiatives such as development projects in cocoa, coffee, or sheanuts producing areas, provision of farmer benefits like low interest-bearing welfare loans, refresher courses, scholarships for wards and others. Until, the profitability of performance of the company increases, these laudable initiatives will still be left unimplemented.

The cocoa roads have been associated with complexity even in terms of implementation and accounting for it since the establishment of the Infrastructure Development Trust Fund in 2015/2016. From 2014/2015 to 2016/2017, a total of USD150million per annum has been appropriated for cocoa roads as determined by the PPRC. There are periods that it has been recorded as direct cost while there are periods that it has been recorded as indirect costs.
The dicey nature of issues related to it makes it an issue of interest. Currently, there is some sort of finalisation with regard to accounting for the costs as COCOBOD has now entered into a service concession agreement with the Ministry of Roads and Highways (the grantor) which is acting on behalf of the Government of Ghana to construct and/or rehabilitate roads in cocoa growing areas. These cocoa roads are supposed to be on the balance sheet of COCOBOD over a 10-year period after which the roads will be made available to the grantor.

In addition, the productivity enhancing programmes which are meant to increase cocoa production are of key concern. This includes hand pollination, irrigation for farmers, cocoa rehabilitation and mass pruning. It is worth noting that while COCOBOD has taken the decision to carry out these interventions, they should be accompanied with educating the farmers to first appreciate the importance of the programmes in increasing their productivity. Also, the fact that majority (between 60 and 80 percent) of the farmers are old (above 50 years), some of the crop husbandry activities they carry out need to be supported with the help of extension officers on the field. The issues with regards to targeting farmers in terms of distributing inputs and providing support services is undermined by the fact that, there is no comprehensive database for all farmers. In the current ecosystem where digitalisation in the agriculture sector is of interest, it is important for COCOBOD to leverage the technologies to address the deficiencies in its engagements with the farmers.

The key performance concerns in the cocoa sector can be dealt with when revenues are increased coupled with the increase in local processing and consumption of cocoa. The price harmonisation initiative between Ghana and Cote d'Ivoire seems to be a move in increasing the revenue to the sector. Currently, the floor price of USD2,600 per tonne is set as the gross FOB price and an additional living income differential (LID) of USD400 per tonne irrespective of the terminal market price. There is also a proposal, for a stabilisation fund to be established for both countries so that revenues in excess of USD2900 of the achieved weighted average prices will be stored for use when prices dip in the future. Specifically, the fund is meant to be used when prices fall below the critical value of USD2200 FOB price per tonne. Bonusses are meant to be paid to farmers from the excess of over USD2,600 up to USD2,900. The differences in the marketing systems of the two jurisdictions need to be considered critically as the two countries are making efforts to improve the welfare of the farmers.
7.11 Summary

This section of the study provided financial statement analysis of COCOBOD from 2008 crop year to 2018 crop year. The analysis covers profitability ratios, liquidity ratios, solvency ratios, cash flow ratio and trend analysis. Generally, some findings from the analyses include decline in profitability ratios, worsening conditions in terms of conservative liquidity ratios and a change in COCOBOD’s debt structure accompanied with declining performance which is linked to increasing long-term liabilities in the debt structure. There has also been evidence of declining efficiency of COCOBOD to generate revenues or positive value addition through the use of its resources. Cash flows have also moved in the direction of the earlier findings, coupled with a declining ability of COCOBOD to generate cash flows.
8.1 Introduction

This section summarises and concludes on the key findings of the study. In addition, various recommendations and policy directions are provided to aid in enhancing the development of the cocoa sector in general.

8.2 Summary of Findings and Recommendations

The far-reaching aim of the study is to investigate the structure of Ghana's cocoa sector, the revenue management strategy of the sector and provide stakeholder-centred perspectives on the various issues. To achieve this aim, the study conducted empirical analyses around four key issues. First, the study probes into the current cocoa pricing mechanism of Ghana. Secondly, the study examines the nexus between cocoa prices (world price and producer price) and cocoa production in Ghana. The penultimate objective is to explore the perspectives of stakeholders in the cocoa sector on the producer price mechanisms and revenue management. First-hand information gathered from the cocoa farmers, the LBCs, the input providers, and some experts in the cocoa sector. Finally, the study examines the revenue and expenditure management strategies of COCOBOD. The summary of the findings and the respective recommendations are provided in the sections below.

8.2.1 Cocoa Producer Pricing and Production

The study identified that the pricing mechanism is desirable as it ensures that farmers get at least 70 percent of the net FOB prices whilst ensuring that the farmers also have access to planting materials, fertilizers and research and extension services that the farmer may be unable to provide for himself. The price mechanism also has the potential to stabilize producer prices against international price volatility. However, a review of the producer price mechanism revealed significant differences between the projected and actual variables, which seems to undermine the efficiency of COCOBOD's programmes designed to boost production.
For instance, the actual spending on the industry cost of COCOBOD’s programs such as CODAPEC and Hi-Tech have in most cases remarkably exceeded the projected allocations made by the PPRC. Since the pricing mechanism is used to predict COCOBOD revenues, any vast differences between projected and actuals may give inaccurate predictions of future cash flows and result in mismanagement of cocoa revenues. It is therefore not surprising why many scholars have stipulated that the rationale behind the PPRC prices are unknown and therefore not transparent.

The impact of cocoa prices (world market price and cocoa producer price) on cocoa production in Ghana was examined by employing time series econometrics techniques. Using the ARDL model, the results indicate that cocoa production in Ghana is negatively and significantly affected by world cocoa price. This suggests that cocoa production decreases with an increase in world cocoa price. This can be explained with the fact that any benefit of cocoa price increase would be received by COCOBOD which sets prices of cocoa on behalf of cocoa farmers. On the contrary, the results indicated that cocoa producer price positively affects cocoa production in Ghana. This suggests that cocoa farmers are able to increase cocoa production when they are offered a commensurate compensation for their efforts. The results indicate that the control variables such as area harvested, foreign direct investment and gross domestic product per capita have a positive effect on cocoa production at statistically significant levels. The various models have been checked using diagnostic tests for robustness. The study therefore recommends the following:

1. The government should achieve sustainable production of cocoa by ensuring the farmers received a fair compensation. In addition, farm inputs and financial supports in form of soft loans should be provided to the farmers. The farmers should be educated on productivity enhancing methods that they can implement in their farms to increase production.

2. Essentially, the cocoa processing industry of Ghana should be developed to carry out value adding activities which would provide more benefits to the country.

3. The pricing mechanism should be determined based on economic reasons instead of allowing politics to override realistic economic decisions.

4. Government should set up an independent price setting committee who can economically review the input factors to determine cocoa producer price in Ghana.
8.2.2 Cocoa Farmers, LBCs and Input Providers

The cocoa value chain is a network of several players consisting of Farmers, Input Providers, Licensed Buying Companies (LBCs) and their clerks, Hauliers, CMC and Cocoa Processors with COCOBOD as the regulator of this industry. These players work together to see to the production (cultivation and harvesting), internal purchase, hauling, exportation and the processing of the cocoa bean. The perspectives of these players were gathered to understand their position on matters around the objectives of this study.

The cocoa pricing mechanism in Ghana is structured to allocate margins to all stakeholders in the sector of which the farmer receives the highest percentage (at least 70 percent of the net FOB). In spite of these efforts, the study reported about 95 percent of the sampled farmers were not satisfied with the current producer price. The mandate given to COCOSHE to represent farmers on the PPRC was also questioned buttressed by the fact that 85 percent of the farmers had no knowledge of the Association and its function to represent their interests on the PPRC. The other stakeholders in the value chain expressed a lack of attention to their interests in the sharing structure as margins constantly keep falling especially the Licensed Buying Companies (LBCs). Regardless of the dissatisfaction expressed by these industry players on the issues of the price setting mechanism and the practice of the Board system, the idea of a liberalised marketing system was not a welcoming alternative. The liberalization of Ghana's cocoa sector will open the gates for industry players who are stronger to abuse the system leading farmers to receive less price for cocoa which will affect the quality of cocoa beans in the long run. It was therefore, admonished that government rather focus on improving the pricing mechanism within that system. The following are some recommendations to aid the operations in the cocoa value chain:

1. Regarding price determination, the idea behind setting up the Producer Price Determination Committee as part of reforms was to have stakeholders’ inputs into price determination process. However, the study showed that stakeholders are not confident in their representation which led to a dissatisfaction with the margins and prices allocated as part of the sharing structure. It is therefore recommended that the price determination process is made more transparent affording every player the chance to contribute to a process designed for his/her wellbeing. The contributions and recommendations of these players can be published alongside the processes that led to the prevailing price for a crop season.
2. Periodic public education should be organised for the stakeholders especially the farmers to ensure a better understanding of the price determination dynamics.

3. To ensure that the farmer is adequately represented on the PPRC, this study recommends that farmers should be organized into strong Farmer Based Organisations (FBOs) with elections held to select representatives of the farmers on the price setting committee. This will help the representation of farmers on the PPRC providing the enabling environment to negotiate for better prices. These organizations will also help with distribution of inputs for COCBOD’s subsidized programmes to solve the problem of erratic delivery and supply of these inputs. The efforts of COCOSHE should be supported with more capacity building for its executives. They should be supported to communicate relevant policy decisions to the farmers. Essentially, the membership base should also be broadened to cover all farmers.

4. The sector is also advised to take advantage of Public-Private Partnership arrangements to help in the operations, programmes and projects of the sector. For instance, the fertilizer subsidy programme and other quasi activities can be outsourced to private entities subjected to periodic reviews by the regulator to ensure the delivery of farmers inputs in an efficient manner.

5. Again, government can be effective by providing a liberal avenue where an arrangement with banks and rural service centers to develop a chit system (electronic system) to facilitate the efficient delivery of these service that will do away with manual handling of the services which mostly lead to inefficiency and corruption. This is because, the heavy involvement of government in these services allows it to be politicized and therefore defeats the purpose of its implementation.
8.2.3 The Management of COCOBOD

In furtherance, the study found some relevant results in the analysis of the revenue (and expenditure) management strategies of COCOBOD. The analysis which was based on the financial reports covering period 2008 to 2017. Generally, suggests a declining level of profitability, worsening conditions in terms of liquidity and a change in COCOBOD's debt structure accompanied with declining performance which is linked to increasing levels of long-term liabilities in the debt structure. There has also been evidence of declining efficiency of COCOBOD to generate revenues or positive value addition through the use of its resources. Cash flows have also moved in the direction of the earlier findings, coupled with a declining ability of COCOBOD to generate cash flows. Specifically, in spite of the surge in the cocoa production in Ghana over the study period, operating costs have been increasing. This exerts a downward pressure on the profitability of the cocoa regulator. From 2015 to 2017, COCOBOD has been making losses from its operations with the cumulating loss of GHS 621.7 million. All liquidity measures have declined over the study period. These adverse trends in liquidity raises concerns with the ability of COCOBOD to maintain the liquidity needed to meet its short-term financial obligations. Long-term debts increased over the study period coupled with the deterioration of interest cover ratio, a measure of the ability of earnings to pay off interests on outstanding debts when they are due. Overall, the cash generating capacity of COCOBOD is declining. In terms of turnover ratios which measure the efficiency or effectiveness of COCOBOD, results portray a downward trend in all the ratios. A pivotal driver identified is the lack of maintenance culture on the part of COCOBOD and the inability to make judicious use of the assets available to them.

The study further calls for an overhaul of the operations of COCOBOD in terms of enhancing efficiency and effectiveness. Specific recommendations are as follows:

1. The results of the deterioration of financial ratios questions how COCOBOD is taking steps to move the sector up the value chain. It is evident that there are difficulties in solely depending on the revenue from sales of cocoa beans while higher economic gains could be achieved when the sector operates up the value chain.
2. The revenue management of the sector can only be improved by increasing the terminal price of cocoa received, the production of cocoa or both. In effect, COCOBOD should educate the farmers on cocoa farming best practices so as to increase the yield. This brings in focus the recently assessed AfDB fund and call for efficiency and effectiveness in implementing the project across all cocoa growing regions.

3. COCOBOD should be proactive in asset management, maintenance culture and facility management so as to reduce the negative effect of not managing the assets properly. Management should raise awareness of the staff and motivate them to contribute to the effort to enhance maintenance culture. Management can use the strategy of nudging which involves changing the behaviour of their employees and the actors in the cocoa value chain that utilise any of their assets without necessarily forbidden options or significantly changing their incentives. At the strategic level, fixed assets acquisition should be based on a cost-benefit analysis and an insight into the benefits that can be attained.

4. The results of the analysis with regard to expenditure management provides a cause of worry as operating costs continue to increase. Although management indicates that some of the costs are uncontrollable, there is still scope for controllable costs such as cocoa roads, staff costs and finance costs to be managed well. It is necessary that current debt levels which are almost unsustainable should be addressed. The initiative of COCOBOD to extend the tenor of its loans is appropriate. However, it is vital for COCOBOD and its management to be effective at utilising the loans that are acquired, so as to achieve the desired objectives. There is the need for caution as the pedigree has been associated with funds being utilized for other purposes.

5. The current narrative about the cocoa roads are not so favourable considering the economic and social implications on the actors in the industry. As COCOBOD is now about to capitalise the costs of the cocoa roads, it is worthy of note that such classification is to the effect that future returns from the use of the cocoa roads will accrue to COCOBOD. The logic behind the choice of where to construct the roads and its peripheral decisions should be done in a transparent and open manner. Also, it will be interesting for the management to find out how much capitalising the roads will be beneficial to COCOBOD in monetary terms.
This is at the back of the fact that the dilapidated state of cocoa roads is a cost component in the current distribution costs which is only deducted for hauliers that use the cocoa roads.

6. In as much as stakeholders have expressed their views about the political nature of the industry, for the board to enhance efficiency and effectiveness in its operations, there is the need for choosing meritocracy above politics. There is less utilisation of technology in the sector. COCOBOD is yet to develop a comprehensive database for its stakeholders especially farmers. Thus, distribution of inputs has not been targeted as should be and are mostly associated with inefficiency and smuggling. The efficiency of the employees of COCOBOD is also a matter of concern that has to be addressed.

7. The strategic decisions regarding capital structure, investments decisions, working capital management or long-term decisions should be depoliticised. Politicizing these decisions would give more opportunities for some actors to take sub-optimal decisions which would not survive the test of time.

### 8.3 Limitations

1. The financial statements of COCOBOD used for the analysis followed an inconsistent format over the study period which made it difficult to consider the decomposed aspects of the various line items. Notwithstanding, in most cases, the composite line items are used so as to provide insights from the data available.

2. The projections of the PPRC do not cover the time frame for the cocoa production which dates to the 1940s. The available dataset covers the period 1997 to 2017. Thus, the study used a shorter time span for the analysis on how producer prices affect cocoa production in Ghana.

3. The cocoa prices could be based on the New York market price or the London market price or the ICCO price. This study uses the ICCO price since it standardizes the prices for both the New York and the London markets. Since Ghana trades on the London market, it will be interesting for future studies to use the London prices to explore the relationship.
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