

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

**FINANCIAL EVALUATION OF COCOA MASS SPRAYING PROGRAMME
ON THE REVENUE GENERATION OF THE GHANA COCOA BOARD**

BY

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IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD
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DECLARATION

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

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ABSTRACT

Cocoa has historically been a key in the economic sector and a major source of export and fiscal earnings to the Ghanaian economy (Bulir 1998; McKay and Aryeetey 2005). Cultivation of cocoa in large quantity started in the 1900 in the country and by the middle 1960s, Ghana was the world's leading producer of cocoa producing 560,000 metric tons. Cocoa is by far Ghana's most important crop. It dominates the agricultural sector and is a major source of income for approximately 800,000 farmers and many others engaged in trade, transportation, and processing of cocoa. Due to the massive contribution of the cocoa sub-sector to the socio-economic development of the country, successive governments have formulated various policies to increase the production level of the sub-sector. The National Cocoa Diseases and Pests Control (CODAPEC) programme, popularly known as "cocoa mass spraying programme" was initiated by Government of Ghana through Ghana Cocoa Board. The programme was started in 2001 to provide free spraying of cocoa farms for the farmers in order to control capsids and black pod disease. The National Cocoa Diseases and Pests Control (CODAPEC) Unit was formed to ensure the effective implementation of the project. The aim of the project was to reduce the black pod disease incidence and mired infestation significantly to facilitate increased production of cocoa that would also translate into increasing farmers' income to enhance the living standard of farmers. It was on this basis that the study sought to identify whether it was worth implementing the Cocoa Mass Spraying Programme. It was found from the study that the programme is enjoying high levels of acceptance from the farmers in the country because it found a significant positive effect of total cost of the programme on the revenue generated which indicates that the programme is financially viable as it yields about 10 times the investment made. The study recommends a continuation of the programme to help boost revenue generation. Also, this study further recommends additional investments into the programme as the study finds a much higher increase in revenue with every cedi of investment in the programme.

DEDICATION

This project work is dedicated to God the Father, God the Son and God the Holy Spirit whose immeasurable guidance has sustained me throughout my life and to my great and wonderful wife Mrs. Elizabeth Osei Asante and my children Kofi Ofori-Frimpong, Dankwa Osei Asante and Aboagyewaa Osei Asante for their love.



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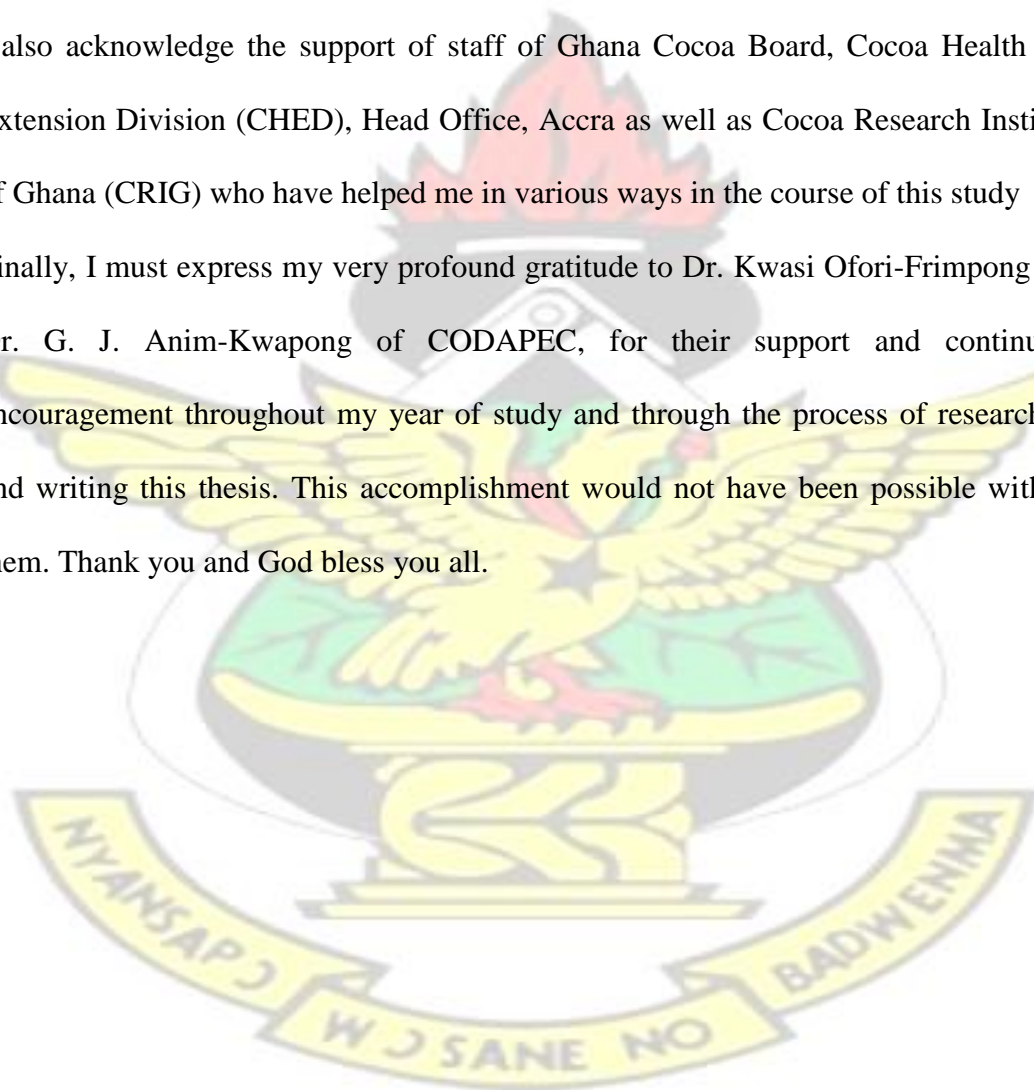


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LIST OF ABBREVIATION



ADB	-	Asian Development Bank
AfDB	-	The African Development Bank
CHED	-	Cocoa Health and Extension Division
CIF	-	Cost, Insurance, and Freight
CMC	-	Cocoa Marketing Company (Ghana) Limited
CMSP	-	Cocoa Mass Spraying Programme
COCOBOD	-	Ghana Cocoa Board
CODAPEC	-	Cocoa Disease And Pest Control
CRIG	-	Cocoa Research Institute of Ghana
CSSVD	-	Cocoa Swollen Shoot Virus Disease
F.O.B	-	Free On Board
GDP	-	Gross Domestic Product
LBCs	-	Licensed Buying Companies
MoFA	-	Ministry of Food Agriculture
PBC	-	Produce Buying Company
PPRC	-	Producer Price Review Committee
QCD	-	Quality Control Division
TCOST	-	Total Cost
TCT	-	Transaction Cost Theory
TREV	-	Total Revenue

CHAPTER ONE

INTRODUCTION

1.1. Background of the Study

Substantial resources and initiatives are given to research, investigations and projects in order not only to boost the production of cocoa but as well as to boost the living conditions of a poor cocoa farmer in a rural environment. Cocoa, that is used mostly in chocolate is an essential agricultural export commodity. Cocoa has a distinctive position in the economy of Ghana. It has played a pivotal role in Ghana's economic development for a long time. It continue to be a source of rural employment. More than 800,000 smallholder household's livelihood is supported by cocoa production (Anim-Kwapong and Frimpong, 2008). Many others rely on cocoa for a notable share of their income. For more than sixty years, cocoa production has been the mainstay of the economy of Ghana (Anim-Kwapong and Frimpong, 2008).

History ascribes the industrial production of cocoa to Tetteh Quarshie, an indigene who had moved to Fernando Po (now Bioko in Equatorial Guinea) and came back with Amelonado cocoa pods in 1879. In January 1893, the initial documented cargo of two bags of cocoa, was dispatched to Hamburg-Germany (Asuming-Brempong et al, 2007). From then cocoa has become the most important cash crop and a crucial source of foreign earnings for the Ghanaian Government and source of income for cocoa farmers. About one-third of all export revenue is provided by cocoa. This accounts for 25% to 30% of overall export earnings and adds to GDP by approximately 10% (Anang, 2015). Ghana used to be the dominant producer of cocoa for Sixty-six (66) years (1911-1977), with a market share ranging from 30% to 40% (Adjinah and Opoku, 2010). Records points out that production of cocoa accelerated

from 36.3 Metric Tons (MT) in 1891 to nearly 557,000 MT in 1964/65. This gave Ghana a foreign production share of about 33%. This made Ghana the leading cocoa producer during that time (Adjinah and Opoku, 2010c). Additionally, the “spectacular growth performance” of the economy in 2003 was largely ascribed to an extraordinary powerful output growth in Agriculture and moved the general growth rate up to 5.2% from a projected 4.7%. In turn, a scrutiny of the sector’s performance was entirely on production of cocoa and marketing, with output of 0.5% in 2002 to a sturdy performance of 16.4% growth.

Subsequently, production continued to fall to a lowest of 158,956 metric tons in 1983/84. This accounts for 9% of the world’s production. The production reduction was notably affected by the 1983 destructive drought, pests and diseases among others (Naminse, E.Y, Fosu, M, Nongyenge Y, 2012). Out of these factors, the pest known as mirids/capsids and Black Pod Disease were leading and Ghana eventually lost her status as the world’s number one producer. Without a doubt, production of cocoa is the primary operation in Ghana’s agricultural sector. In 2002 cocoa season, it contributed 22.4% of the overall Ghana’s foreign exchange. This accounted for 63% of the total foreign export accrued from the agricultural sector.

Through Ghana Cocoa Board, several interventions have been undertaken by the government to halt the decrease and enhance production of cocoa. Noteworthy of these interventions is the National Cocoa Disease and Pest Control (CODAPEC) programme, widely known as Cocoa Mass Spraying Programme. This study, therefore evaluates the recent control measure introduced by Government to improve

production of cocoa in Ghana using a statistical technique called intervention time series analysis.

1.2. Statement of the Problem

Average yield of cocoa farms has been low (350-400kg/ha) in Ghana compared to its competing countries such as Ivory Coast (800kg/ha) in spite of the mass spraying intervention (Baah, 2014). Thus Ghana Cocoa Board has had reviews of the mass spraying programme and its operational structure because the programme was thought of as not being effective (i.e., contributing adequately to increased national cocoa output). In 2014, a major restructuring of the operations of the CODAPEC was done to increase its effectiveness (Baah, 2014).

Nyangteng (1980) argue that there have been mass spraying programs in Ghana since the 1950s. According to Nyangteng, these spraying programmes have contributed to increases in cocoa production but could not be sustained due largely to irregular and inadequate supply of inputs, mainly chemicals and spraying machines, leading to declines. Brempong et al. (2006) provide evidence to show that the mass spraying programme has had positive effects on cocoa production at the national level, which has resulted in extra production of about 700,000 metric tonnes in the 2003/04 and 2005/06 cocoa seasons. Also, Amoah (1995) observe that the 1964/65 season production figure of 580,000 metric tonnes was attributed to a large-scale capsid control programme embarked upon by the Ministry of Food and Agriculture.

According to Owusu-Achaw (2012), government and other partners in the cocoa sector; have not devote much of their efforts in evaluating the cocoa mass spraying

programme financially, its budgets, revenues and finance-related subsidiaries to agree on its viability for investment. However, since the inception of the programme, financial analyses have not been carried out to ascertain the viability and profitability.

Naminse et al. (2011) provide evidence from the Upper Denkyira West District that yield of cocoa shot up by 49.41% after the implementation of the cocoa mass spraying program initiated by the government. However, the Ghana News Agency (2010) observed that production of cocoa in the central region declined from 62,000MT in 2007/2008 to 56,000MT in 2008/2009 cocoa growing season. Abankwah (2010) argue that the economic fortunes of farmers have not improved significantly even after the mass spraying programme was implemented. Anang et al. (2013) suggest that the cocoa mass spraying programme has not been effective in the Wassa Amenfi West District of the Western Region of Ghana, due to inadequate supply of chemicals and spraying personnel.

Even though the cocoa mass spraying programme has had largely positive effects on the production of cocoa, no study in Ghana has considered the financial viability of the programme from the point of view of the government in order to encourage further implementation of the programme. Almost two decades after the programme was implemented, not much is known about its financial viability to the government. This study is important because there is empirical evidence (Abankwah, 2010; Anang et al., 2013) of ineffectiveness of the programme in certain parts of the country which may represent significant costs to the government. The study is pertinent as it establishes the viability of the programme to the government. This study contributes to the literature on cocoa mass spraying in Ghana.

1.3. Research Objectives

1.3.1. General Objectives

The general objective of the research is to evaluate the financial viability of cocoa mass spraying programme.

1.3.2. Specific Objectives

The researcher would like to accomplish these specific objectives:

1. To assess the operational cost relating to the cocoa mass spraying programme from 2006/2007 to 2015/2016 cocoa seasons.
2. To examine the revenues from cocoa production under the cocoa mass spraying programme from 2006/2007 to 2015/2016 cocoa seasons.
3. To examine the revenue from cocoa production before the cocoa mass spraying programme from 1990/1991 to 1999/2000 cocoa seasons.
4. To assess the financial viability of the cocoa mass spraying programme from 2006/2007 to 2015/2016 cocoa seasons.

1.4. Research Questions

1. What is the operational cost relating to the cocoa mass spraying programme from 2006/2007 to 2015/2016 cocoa seasons?
2. What are the revenues that are generated from the cocoa production under the cocoa mass spraying programme from 2006/2007 to 2015/2016 cocoa seasons?
3. What are the revenues that are generated from the cocoa production before the start of the cocoa mass spraying from 1990/1991 to 1999/2000 cocoa seasons?
4. What is the financial viability of the cocoa mass spraying programme 2006/2007 to 2015/2016 cocoa seasons?

1.5. Justification of the Study

According to the COCOBOD news in 2017, a magazine of the COCOBOD, Cocoa Research Institute of Ghana (CRIG) is a reputable research institute with eighty years of research tradition during which period it has accumulated considerable information and expertise on all aspects of cocoa cultivation. However, Owusu-Achaw (2012) observed that very little research has been conducted into the financial details of the government policy of Cocoa mass spraying programme. The government's introduction of the Mass Spraying Program to devote huge amounts of money to it in order to transform the cocoa sub-sector would not only be sufficient, but it is worth considering to assess the impact the program would have on the production of cocoa. The cocoa mass spraying programme must therefore be financially evaluated.

Evaluating the financial consequences of the Cocoa Mass Spraying Programme on the Revenue Generation of Ghana COCOBOD would disclose constraints facing the programme and its recommendations on how to resolve the constraints in order to make it more successful and increase revenue. This would be very vital to the Cocoa Disease and Pest Control (CODAPEC) Committee in revising its strategies for implementing the programme. This thesis will leave behind some significant literature for other fellow researchers who would like to conduct further analysis on cocoa in Ghana and in a different place.

The study seeks to bring to light the financial ramification of the cocoa mass spraying on COCOBODS financial status. COCOBOD and the government of Ghana could adopt findings and recommendations from the study to help in policies regarding the

cocoa sector. The study would act as an input or secondary source for any further research into financial results of mass spraying program for the academia.

1.6. Scope of the Study

The study will cover cocoa-growing districts in Ghana where mass spraying is conducted, thus severely restricting the scope for generalization to the entire population of the region and exceeding its boundaries. However, the sample is close in nature to the population of farms in Ghana's cocoa growing areas and can therefore be generalized. The study will therefore concentrate on the financial profitability of the cocoa mass spraying programme. The research will address issues on budgetary allocation, cost of inputs, cost of labour, revenue generation in the mass spraying programme.

1.7. Limitation of the Study

Insufficiency data on a specified subject due to variables is a limitation of research analysis. Limitation in analysis most often relates to educational research; however as a result of the actual fact that it's unacceptable to handle all variables, there's a limitation to all or any variety of analysis. The study covered all cocoa growing districts in the country from the period 1990/1991 cocoa season to 2015/2016 cocoa season. This research just like any other study has its own limitations. This study should have been carried out in all the times before and during the country's cocoa mass spraying programme to make generalizations of the outcome. Due to time and availability of data, however, this could not be accomplished. Statement was derived from the research questions and research objectives. The scope of the exercise as well

as the justification for the topic and the organization of the research work were discussed in Chapter one.

1.8. Organization of the Research Study

Five chapters will coordinate the research. The general introduction of the report is the first chapter of the review. The general introduction comprises of the background of the study which gives a general overview about the research topic. The problem statement is detailed out in the chapter. Out of the problem statement is derived the research questions and research objectives. The scope of the exercise as well as the justification for the topic and the organization of the research work is discussed in the first chapter of the study. The second chapter of the study constitutes the literature review of the topic. The works people have done which is related to the topic are reviewed and lessons learnt will inform the buildup of other chapters.

Chapter three of the report looks at the research methodology of the research work. The fourth chapter focuses on the empirical study of the data collected in order to evaluate the impact of the cocoa mass spraying program on revenue generation in the Cocoa Sector. The last chapter of the report is about the findings and recommendations that are derived from the analysis in chapter four. The chapter ends with the general conclusion of the report.

CHAPTER TWO

LITERATURE REVIEW

2.1. Introduction

The chapter reviews relevant literature on the financial evaluation of cocoa mass spraying programme on the Ghanaian economy. A summary of literature relevant to the research queries is given in the chapter. A literature review per Gray (2009) “offers an up-to-date understanding about the topic, its importance and structure. It collectively helps to recognize critical issues and topics that are substantially presented for further study wherever there are gaps in current knowledge.” In this chapter, key terms and concepts relevant to cocoa production in Ghana, mass spraying programme, the operational cost relating to cocoa mass spraying, cocoa yield and revenue and the financial relevance of the programme.

2.2. World Cocoa Industry

From the twentieth century to the present, the world cocoa industry has increased dramatically (Breisinger et al, 2008). The geographical location of producing, processes and consumption, the marketing structures and policies affecting the cacao sector have undergone changes. There are 40 to 50 million individuals around the world who rely on cocoa for their livelihood (Ministry of Manpower, Youth and Employment, 2007). The root of the cocoa tree dates back to four hundred B.C. in the foothills of the Andes in South America's Amazon and Orinoco basins, where it was referred to by the Mayans as "cacao" meaning "good food." The Swedish natural scientist, Carl Von Linné, gave the name "Theobroma cacao" or "food of the gods," (Grossman-Green and Bayer, 2009). In the 16th century, the Spanish began large-scale cocoa cultivation in Central America, which spread in the 17th century to the

British, French, and Dutch West Indies (Jamaica, Martinique and Suriname) and Brazil in the 18th century. (Grossman-Green and Bayer, 2009).

In 1840, cocoa tree growth was reported in São Tome and Fernando Po (present-day Equatorial Guinea) and from there it spread to other parts of West Africa, notably the Gold Coast (Ghana), Nigeria and Cote d'Ivoire. The three main varieties of *Theobroma cacao* are Forastero (constitutes 95 percent of cocoa production of the world), Criollo (tough to produce but of highest quality, Venezuela being the major producer), and Trinitario (a mix of Forastero and Criollo) (Ministry of Manpower, Youth and Employment, 2007). From 1930 to 1978, Ghana was the leading producer of the world's cocoa, with contribution share of 40% to the world's production (Nyanteng, 1980). Currently, Cote d'Ivoire is the largest producer of cocoa beans. These two nations are the world's leading producers of cocoa beans, with average shares of 38.9% and 19.3% respectively (Ministry of Manpower, Youth and Employment, 2007). With 12.8 percent of the world's total production, Indonesia is the largest non-African cocoa producer. While Brazil also produces large volumes of cocoa, much of it is consumed and little is exported.

2.3. Introduction of Ghana's Cocoa

Although Basel Missionaries operational under the Danish government was the first to bring cocoa to Ghana in 1857 (Suglo 2012). Their attempt to expand its growth from Akropong in the Eastern region to other parts of the country could not come to fruition. Tetteh Quarshie, a Ga blacksmith from Christianborg, played an instrumental role by developing it in Ghana. He returns to Ghana with cocoa beans in 1879 from

the island of Fernando Po (Bioko in Equatorial Guinea). There he did work on a cocoa plantation (Dand 1997).

The spread of cocoa by Tetteh Quarshie also started in Mampong-Akuapem in the eastern part of the country, where he set-up a cocoa nursery and sold the cocoa seedlings to local farmers (Polly 1963), who are believed to be the basis for the spread of the cocoa industry in Ghana as cocoa began to spread to other areas in the eastern region as well as Brong Ahafo, Ashanti and Western. While the first export of cocoa from the Gold Coast was said to have been produced in 1885, in January 1893, the first recorded shipment of two bags was sent to Hamburg (Grossman-Green and Bayer, 2008). By 1908, production was increasing steadily to exceed 20,000mt. Ghana was ranked the world's leading producer at a production volume of 41,000mt in 1911. In the early 1920s, with production of between 165, 000mt and 213,000mt, Ghana contributed about 40 percent of the total global supply of cocoa. The amount of exports increased rapidly to 218,000mt in 1925; 311,000mt in 1936; after which it fell to between 200,000mt and 300,000mt in the 1940s due to extreme drought and disease and pest outbreaks (Ministry of Manpower, Youth and Employment, 2007).

Prominent among the diseases was Cocoa Swollen Shoot Virus. It was uncovered and found to be widespread in the Eastern Region well-known for bulk cocoa production as at that time. Through a series of reforms in the form of farm rehabilitation and replanting, mass spraying against diseases and pests, and increasing producer prices, action was undertaken to stop the declining trend in production. Nevertheless, due to difficulties in replanting farms in the Eastern Region as a result of environmental degradation problems (Vigneri and Kulavalli, undated), together with soil fertility

losses, in the 1940s the production center moved to the regions of Brong Ahafo and Ashanti, where fresh forest lands were planted with cocoa. (Grossman et al 2009). National production increased again between the 1950s and 1960s due to the rapid expansion of cultivation and the measures implemented to revamp the farms, particularly the mass spraying programme against capsids (Ministry of Manpower, Youth and Employment, 2007), but declined again in the late 1970's and 1980's (Kolavelli and Vigneri, undated).

2.4. Cocoa Production in Ghana

2.4.1. The Cocoa Tree and Cocoa Beans

Cocoa in the Equatorial Region is an important commercial crop. This region is characterized by high rainfall with annual mean of about 1,250mm and mean yearly temperature between 25.50 and 26.50 Degrees Celsius which is good for cocoa. In areas bordering the Gulf of Guinea in West Africa, it is widely cultivated. The crop is grown in countries which include Ghana, Nigeria, the Ivory Coast, Cameroun and Liberia (www.kisaso.com/freepedi). Currently, Ghana is the second largest producer of the world's cocoa (www.mbendi.com) after Cote d'Ivoire. The production of Cocoa in Ghana occurs in the rain forest regions of the country, namely, the Eastern, Volta, Central, Ashanti, Western and Brong Ahafo where rainfall is between 1000 and 1500mm per year. The crop year begins in October, when purchases of the main crop begin while the smaller mid-crop season starts in July. Most cocoa production in Ghana is carried out by peasant farmers on plots of land less than 3 hectares (www.mbendi.com/indy).

2.4.2. Characteristics of Cocoa

A much longer production period is characterized by cocoa than other tropical crops. It takes at least five years for new hybrid varieties to begin production and 10 to 15 years for the tree stock to reach its maximum potential (Teal, F.; Zeitlin, A.; and Maamah, H.;2006). Cocoa requires a hot and wet climate. The perfect climatic conditions for cocoa growth are the average shade temperature of 27 degrees Celsius and well distributed rainfall of at least 12 cm. A well-drained porous soil and shelter from strong winds and direct sun rays are also required for the crop. These features are found in high forest such as those in southern Ghana (www.kisaso.com/freepedia/cocoa). The cocoa tree grows to a height of about 10 meters or so in its natural state. On the branches and main trunk of the tree, the pods grow directly. The length of the cocoa pod is about 25cm and holds roughly 30 to 40 cocoa beans. Approximately 50% of cocoa is a fat identified as cocoa butter, which is very useful for producing confectionary (www.kisaso.com/freepedia/cocoa).

2.4.3. Cultivation of Cocoa in Ghana

Cocoa is the product of the cocoa tree's fruits. The cocoa tree grows to a height of approximately 10 meters or so in its natural state, but is pruned to a height of 6 to 7 meters to allow the plucking of cocoa pods. Its pods grow directly on the branches and main trunk of the tree. The cocoa pod is about 25 cm long and holds roughly 30 to 40 cocoa beans. Approximately 50% of the cocoa is a fat known as cocoa butter that is very useful in confectionery production. A hot, wet climate is important for Cocoa. The ideal climatic conditions for cocoa growth are the mean shade temperature of 27 ° C, with daily variation below 8 ° C, and well-distributed rainfall of at least 12 cm. A well-drained porous soil and shelter from strong winds and direct

sun rays are also required for the crop. These features are found in the main high forest belt of Ghana, and in Ivory Coast, in West Africa and in Brazil. Cocoa is a fairly adaptable crop and, while the tree is native to Central and South America, it has been successfully grown in African countries.

2.4.4. Ghana's Cocoa Production Trend

Between the 1910s and early 1960s, Ghana was number one producer of world's cocoa (www.mbendi.com/indy). In 1911, for instance, Ghana harvested 41000 metric tons of cocoa (www.kuapakooko.com/index). Ghana's cocoa production grew to between 165,000 and 213,000 metric tons within the 1920s, that drawn 40% of total world production. In Ghana, cocoa experienced a decline in production between 1976 and 1977 (www.kuapakooko.com/index). By the mid-1980s, cocoa production in Ghana had dwindled virtually to the purpose of unimportance reaching a 63 years low of 158,000 metric tons within the 1983/84 cocoa year. Average cocoa production grew at a rate of 11% between 1994 and 1999, and this improved to 16% between 2000 and 2003 (Teal, F.; Zeitlin, A.; and Maamah, H.; 2006). 614,000 tons was the production figure within the 2006/2007 cocoa year (G8 Africa Infrastructure Investment Conference, 6th-8th Jan 2010). It absolutely was suspected that the drop by production between 1976 and also the mid-1980s was because of a plague of pests and diseases like the capsid and swollen shot and fall producers price (www.kuapakooko.com/index). Factors like dramatic increase in fertilizer use, good rainfall, and reverse smuggling from Ivory Coast have conjointly been coupled to the increase in cocoa production in Ghana between the late 1990s and early 2000.

2.4.5. Cocoa Yield in Ghana

By comparable international standards, Ghana's cocoa yield remains low, with an average of just below 400kg/hectar on full bearing farms (www.gprg.org/pubs). This can be attributed to over-aging trees, inadequate field management, lack of recent scientific farming and also the damaging effects of crop insects and fungi attacks.

2.5. Socio-economic Importance of the Cocoa Industry in Ghana

It is difficult to overemphasize the importance of the cocoa industry to Ghana's economy. Cocoa has since 1911 been the backbone of the Ghanaian economy; the crop has made significant strides and major socio-economic contributions to date in areas such as employment, foreign exchange earnings, government revenue and Gross Domestic Product (GDP). Although commercial activities and manufacturing have shown drastic change for the past decades, about half of the total labour force in Ghana still draws its sustenance from the cocoa industry (Acquaah, 1999 and ISSER, 2004). COCOBOD (1998) indicated that Ghana's cocoa sector employs more than 800,000 smallholder farm families for whom cocoa accounts for around 70-100% of their annual household income. The report further noted that the cocoa industry alone employs about 25% of the total labour force in the country. Appiah (2000) emphasized, "Cocoa provides domestic incomes as well as being a major source of revenue for the provision of infrastructure and employs about 60% of the national agricultural labour force in the economy". The cocoa sector contributes greatly to foreign exchange earnings through export of cocoa beans. Ghana produced as much as 40% of the World's production and this accounted for 80% of the country's foreign exchange earnings. By the turn of 1950 cocoa was earning some 70% of Ghana's

foreign exchange and since then cocoa has provided on the average about 60% of Ghana's foreign exchange earnings (Amoah, 1998 and 2000, COCOBOD, 2000).

Cocoa has traditionally contributed to the economy as a major source of export earnings and investment fund in Ghana. Earnings from cocoa export in real terms rose to a peak of \$495million in 1987 from \$426 million in 1986 and then started declining. The dominance of this sector continued to decline as Ghana expanded its export base. Cocoa's share of export earnings steadily fell from 67% in 1966 to 26% in 1994 though it appears to have picked up to 35% in 1996 (Aryeetey and Fosu, 2005). In 2003 and 2004 cocoa accounted for 31.9% and 38.5% respectively. Cocoa displaced minerals as a major export in 2004 to break the long standing place enjoyed by mineral as Ghana's top foreign exchange earner from the late 70's to 2003 (ISSER, 2004). Government revenue from international trade transaction is derived basically from two sources, the import related taxes and export duties on cocoa. Manu (1973) indicated that export duty on cocoa accounts for one quarter (1/4) to almost one third (1/3) of total government revenue. Total tax from international trade amounted to ₵3,808.9 billion in 2004 (ISSER, 2004). Approximately two million (2 million) hectares of land representing 50% to 60% of the cultivated land area in the cocoa growing regions is under cocoa production. In addition cocoa's contribution to GDP is of vital importance to the country. In 2003/04 when cocoa output reached its highest level of 736.911 tonnes, the sector contributed nearly 18% to the total GDP in 2004 (ISSER, 2004). Cocoa which is mostly used in the production of chocolates, beverages and confectioneries, has medicinal value (Appiah, 2004). Ghana's cocoa described by many as the Golden Pod has also been considered by herbal practitioners as a tree of life, they claimed that most of the tropical diseases in the sub-region and

beyond could be treated with almost every plant growing on cocoa plant (mistletoe) and the cocoa plant itself. In Ghana, apart from the foreign exchange derived from the marketing of cocoa, other products like soft soap ('Alatasamina'), 'Alata'gel, cocoa butter soap, cocoa body cream, cocoa body lotion and animal feed are produced from the discarded pods and placenta after pod breaking operations, while cocoa jam, marmalade, cocoa wine and other cocoa hard and soft drinks are also produced from the sweating (Appiah, 2004). Thus as a single productive sector utilizing much labour and land and providing a lot of employment, foreign exchange and infrastructure, the cocoa industry is of great importance to the Ghanaian economy.

2.6. Cocoa Mass Spraying

Cocoa Mass Spraying Programme (CMSP) is the spraying of insecticides and fungicides freely for farmers through the Cocoa Disease and Pest Control (CODAPEC) unit of the Ghana Cocoa Board in the cocoa growing areas of Ghana. The programme aims at assisting farmers to maintain production levels and generate the needed foreign exchange for the development of Ghana. Capsids and insects which attack cocoa trees, feed on the young branches and cause an estimated crop loss of up to about 30% and hence affect cocoa marketing activities. (www.cocobod.gh/capsid_control.php). Confidor 200SL and Cocostar EC are some of the insecticides recommended for the control of capsids. (www.cocobod.gh/capsid_control.php). Cocoa Mass Spraying Programme in Ghana began in the early 1960's but for one reason or the other stopped in the late 1960's. The exercise was however, re-introduced in 2001 by the then government of Ghana.

The current mass spraying programme was introduced to improve production to about 1000, 000 tons by 2012 (Obeng and Opoku, 2008). Other goals were to train farmers and technical workers on the cultural and chemical methods of managing pests and diseases, educate and train local sprayers on the safe use of pesticides, increase farmers' incomes, and establish opportunities in rural communities for unemployed youth (Obeng and Opoku, 2008).

Under the Mass Cocoa Spraying Programme, the economic life of farmers must be affected positively by reducing the incidence of capsid and black pod, create jobs, and have a strong funding source(s). Again, it must not impact negatively on beneficiaries' social life, particularly health and education. And lastly, it must maintain or improve the current state of the environment going forward. All these ought to be happening under the guidance of strong institutions (Suglo, 2012). The study will therefore reveal the financial, economic, social, environmental, and institutional potentials and challenges of the cocoa spraying programme and the revenue generated by the Ghana Cocoa Board.

2.7. Pests and Diseases Control in Cocoa Production

The major diseases affecting cocoa in Ghana include the Cocoa Swollen Shoot Virus Disease (CSSVD); the Black pod disease and the toxic capsid/mirid (Akate) pest. Since the detection of CSSVD, the only treatment has been the cutting down of the affected cocoa tree (Acquaah, 1999). Evidence provided by Cocoa Services Division indicates that an estimated 100,000 hectares of productive capacity was lost during the period of 1945-1990 as a result of the CSSVD attack (Amoah, 1998). Cocoa mirids also known as capsid is an insect or pest that feeds on the cocoa stems and pods.

Amoah (1998), estimated losses due to capsid attacks at 20% of world crop output annually. In spite of the massive research support towards its eradication, the mirids is still widespread with the main control measure being spraying of the cocoa farms with various insecticides. To effectively deal with the threat of cocoa pests and diseases, the National Cocoa Disease and Pest Control (CODAPEC) Committee set up decentralized local government structures at the district level as conduit for implementation by supervisors (COCOBOD, 2001).

2.8. Institutional Framework of the 'Mass Spraying' Programme in Ghana

Cocoa Diseases and Pests control Committee (CODAPEC) was set up as the program Implementing Body in 2001 by the Government of Ghana. The program was developed to provide farmers with free assistance to combat cocoa diseases and pests such as capsids and blackpod. The organizational structure for the management of the programme as outlined by Obeng and Opoku (2008) consists of the following:

- The National Coordinators. They ensure availability of spraying machines, chemicals and protective cloths. Workers' Salaries are determined by them.
- Regional Coordinators. The task force consists of; the Regional Minister, the Regional Cocoa Manager, Chief Farmer in the region, and the Regional representative from licensed cocoa buying companies. They allocate spraying machines, chemicals and protective cloths to the various districts.
- The District Coordinators. The task force comprises; the District Chief Executive, the District Chief Farmer, the District Cocoa Manager, and the District representative from licensed private cocoa buying companies in the district.

They ensure fair distribution of chemicals, spraying machines and protective cloths gangs in the selected communities. Supervision for effective utilization of materials is also done by them.

- Local Coordinators. The task force consists of; the Local Supervisor of the Spraying Gang, Assemblyman, Farmer, and Local representative from licensed private cocoa buying companies. The spraying exercise is done by the spraying gang which consists of six members and supervision is done by a supervisor.

COCOBOD recommended a four-times spraying in a year, within July, August, September, and November, based on the advice of Cocoa Research Institute of Ghana (CRIG). The institutional structure is important because the entire spraying exercise is carried out along this framework managed by human beings. The structure therefore will give an idea of whether the system could be exploited for personal gains, a matter that can make the programme unsustainable.

2.8.1. Training

The programme begins each season with the training of farmers, gang supervisors and mechanics by project coordinators and CRIG resource persons. Trainees are taken through effective pesticide application procedures with a focus on the dosages of different pesticides and the risks of pesticide exposure. Also the use of protective clothing, handling and minor repairs of spraying machines, the observance of personal hygiene, the protection of the workplace, first aid and the use, handling and disposal procedures of empty containers. During each training session, the functions and duties of stakeholders are also clarified (Obeng and Opoku, 2008).

2.8.2. Insecticides

Eight fungicide types, Ridomil Gold 66 plus WP (Cuprous oxide + mefenoxam), Metalin 72 plus WP (Cuprous oxide + metalaxyl), Nordox 75 WG (Cuprous oxide), Funguran-0H WP (Cupric Hydroxide), Champion WP (Cupric hydroxide) and Kocide 2000 WP (Cupric Hydroxide), Fungikill WP (Cupric hydroxide + metalaxyl) and Agro-Comet WP (Cuprous oxide + metalaxyl) are recommended for spraying against the black pod. Similarly, three insecticide types, Confidor (Imidacloprid), Akate Master (Bifenthrin) and Actara (Thiamethoxam) are being used (Obeng and Opoku, 2008).

2.9. Achievements of CODAPEC

Though it is difficult to find any statistical analysis of the current spraying programme to determine the real achievement, increases in output have been attributed to the programme. A publication by Obeng and Opoku in 2008, confirms this situation. However, this attribution needs to be investigated because the spraying programme came with fertilizer subsidy and distribution of improved seedlings. Therefore, until the contributions of the three programmes are evaluated and statistically disaggregated, the claim that increased production after 2001 is due to the mass spraying will not be sustainable. It is a fact that cocoa production has gone up from about 300,000 tons in 2000/01 crop season through 740,000 tons in 2006/07 to the current 1,000,000 tons reported in 2010/11, as to whether the spraying programme accounts for this is yet to be ascertained. It is worthy to note that similar claims were made for the 1956 and other spraying programmes, but moving forward these programmes proved unsustainable and production declined. The factors of yield increases are many and varied; improved technology, favourable weather, smuggling

from neighbouring countries, increased producer price and removal of market restrictions could all contribute to increased production (Breigsinger et al, 2008; Vigneri, 2008).

2.10. Challenges of CODAPEC

Pilfering and diversion of chemicals, lack of reliable data on farm sizes (leading to manipulations by spraying gangs), political discrimination in selection of beneficiary farm, and inappropriate spraying periods, are some of the challenges identified by Obeng and Opoku(2008). These challenges occur in spite of the elaborate institutional framework put in place to implement the programme. This study, in trying to comment on the sustaining of the programme, will assess the challenges for the needed solutions.

2.11. Drivers of Cocoa Production in Ghana

It is believed that cocoa production and therefore cocoa marketing in Ghana are driven by factors that include climatic conditions, particularly rainfall patterns, fertilizer application level, cocoa smuggling from Cote D'Ivoire, cocoa mass spraying, size of cocoa farms, and labor availability (www.gprg.org/pubs). Healthy rainfall, coupled with a drastic rise in fertilizer use, a reverse smuggling (from the Cote d'Ivoire) is a healthy sign for increasing cocoa production. A 1% increase in land under cocoa cultivation is expected to increase the yield of cocoa by 0.5%. Again, a 1% rise in labor will boost cocoa production by 0.09% and a 1% increase in fertilizer use will boost production by 0.07%. It is also assumed that the level of cocoa mass spraying affects the production of cocoa. (www.gprg.org/pubs).

2.12. Cocoa Marketing and Pricing in Ghana

The Cocoa Marketing Company (Ghana) Limited (CMC) is a wholly-owned subsidiary of the Ghana Cocoa Board (COCOBOD), and has the sole responsibility for the sale and export of cocoa beans. It also sells some of the cocoa products from the Cocoa Processing Companies in Ghana to overseas destinations. The company had the same responsibility for coffee and sheanuts until 1991 when the internal and external marketing of the two commodities were privatized (COCOBOD, 2003). The determination of cocoa producer prices is done by the Producer Price Review Committee (PPRC). The committee comprises of COCOBOD officials, a farmer's representative, government representatives and representatives of the LBCs. Producer price policy is aimed at providing remunerative prices for cocoa farmers. It is the intention of the COCOBOD to increase the farmers' share of the free on board (fob) price to 70% by the year 2004/05 (Sarpong, 2005).

2.13. Internal Marketing of Cocoa

The COCOBOD reverted to the multiple buying system of cocoa purchasing in June, 1993 following a government decision to re-introduce competition into the internal marketing of cocoa. Prospective buyers initially apply to the COCOBOD and upon vetting by an independent committee; successful applicants are granted provisional licenses which may be converted into full licenses if COCOBOD is satisfied that the provisional licensees have adequate operational logistics for effective operation. The Licensed Buying Companies (LBCs) are required to abide by the regulations and guide-lines set out by COCOBOD. In addition to Produce Buying Company Limited (PBC Ltd), a subsidiary of COCOBOD, about twenty-five(25) LBCs and 4,600 buying centres were in operation between 1993 and 1997 (COCOBOD, 2003). Some

of the LBCs included: -Adwumapa Buyers Limited, Akuafo Adamfo Marketing Ltd, Trans royal (Ghana) Limited and Kuapa Cocoa Limited. The LBCs purchase cocoa directly from farmers at a minimum producer price set by PPRC. The 2005/06 producer price was GH¢0.90 per kilogram of dried cocoa beans. After purchasing the cocoa, the LBCs invite the Quality Control Division to grade and seal the cocoa at a fee determined by the PPRC. The graded and sealed cocoa is evacuated by the LBCs with private cocoa haulers to designated take-over points such as Tema port, Takoradi port and an inland port at Kaase in Kumasi. Officials of the Cocoa Marketing Company (CMC) take over the cocoa at the various take-over points. The LBCs are paid by the COCOBOD according to margins set by the PPRC. After the take-over, management of the cocoa becomes the responsibility of the CMC until it is shipped overseas (COCOBOD, 2003).

2.14. External Marketing of Cocoa

Most external sales of cocoa are made on standard contract. External marketing of cocoa is made on 'fob', 'cif' or 'ex store'. Ex store implies the sale of cocoa in warehouse. Such sales are confined to the secondary market in consuming countries and the cocoa may be immediately available (spot cocoa) or available at some specified time in the future. In the case of the 'cif' and 'fob' cocoa the COCOBOD is allowed to ship the cocoa at any time during a specified two- or three-month period (Wood and Lass, 1998). Ghanaian cocoa beans shipped in Hessian bags (jute sacks) contains about 62.5kgs of beans. The bags are marked to indicate the country of origin, the grade and whether the cocoa is main or light crop, mid or summer crop. Cocoa from Ghana and Nigeria are sold on the basis of the nominal bag weight

(shipping weight) with the buyer having a claim if the weight is not within 1.5% of the nominal weight (Wood and Lass, 1998).

2.15. Marketing Reform in Ghana's Cocoa Sector-1992

Following a World Bank policy on Ghana in 1992, government of Ghana decided to liberalize cocoa marketing. This led to Licensing of many Buying Companies (LBC's) to do the internal marketing of cocoa (Anna Laven, ADMIDst). Notwithstanding the 1992 cocoa sector reforms, Ghana the second largest cocoa producer in the world remains the only country in the world without a fully liberalized cocoa marketing system. So far, there is partial liberalization. There is liberalization in the internal marketing, privatization of inputs such as chemical and reform of cocoa extension services. Ghana Cocoa Board (COCOBOD), a state-owned institution, continues to control the external marketing of cocoa through its subsidiary, the Cocoa Marketing Company. The Quality Control Division (QCD), also a subsidiary of COCOBOD, is responsible for the final quality checks. The quality of Ghana's cocoa is the best on the world market and earns the country a premium. A system of forward sales is practiced by COCOBOD and this enables government to pre-finance cocoa production and price stabilization. The marketing system is such that private LBC's, rely on government licensing to operate. Currently, about 25 companies have registered with the Ghana Cocoa Board to partake in the internal marketing of cocoa (Anna Laven, AMIDst). Global buyers are guaranteed a good-quality product by the system as a result of the good works of the QCD of COCOBOD (odi.org.uk/resources). The partial system of marketing according to AMIDst do not benefit farmers as other stake holders (farmers are believed to be exposed to new risks such as rises in production cost and cost of living).

2.16. Cocoa Health and Extension Division Services

The Cocoa Health and Extension Division (CHED) under COCOBOD manage all organizational works with cocoa in Ghana (Agricultural Extension Policy, 2003). To provide a unified extension education to farmers the cocoa extension was merged with the Department of Agricultural Extension Services, of the Ministry of Food and Agriculture (MoFA) in 1998 (Agricultural Extension Policy, 2003). The responsibility to develop the capacity for cocoa extension was thus transferred to MOFA in collaboration with relevant agencies and private sector organizations in Ghana. However, in 2001, the Government of Ghana, in consultation with the World Bank and other stakeholders in the cocoa industry initiated a programme to review the unified extension policy in order to achieve its objectives (Agricultural Extension Policy, 2003). The aim of this policy is to effectively assist cocoa farmers to obtain sufficient cocoa farm management information from extension officers. Currently the unified extension under the CHED provides all the necessary cocoa extension education to cocoa farmers in the country. The unified extension also provides technical expertise on both the “CODAPEC” and “HITECH” programmes at no costs to cocoa farmers.

2.17. Project Financial Evaluation

A project financial evaluation tells whether a project will contribute to a company's overall goals or be a drain on resources. While complicated analysis techniques and computer programs can perform high-level calculations and provide the company with advanced financial ratios and rates of return, a few simple calculations can be carried out to determine whether the project makes financial sense.

2.18. Financial Analysis of Projects

The financial evaluation takes the perspective of the individual participator. In financial analysis taxes are treated as cost and subsidies as a return. Market prices are normally used in financial analysis and takes in account taxes and subsidies (Gittinger, 1984). The objective of financial analysis is to evaluate the commercial viability of a project from the view point of the project entity, that is, only expenditures incurred under the project and revenues resulting from it are taken into account (ADB, 2005 and AfDB, 2006). Financial analysis of projects as noted by AfDB (2006) appraises the profit of an investment and estimates the profit accruing to the project operating entity or to the project participants. Therefore, for a project to be financially profitable, it must be financially sustainable as well as financially viable. If a project is not financially sustainable, economic benefits will not be realised (ADB, 2002, 2004 and 2005). AfDB (2006) noted that the financial analysis is necessary to assess the degree to which a project will generate revenue sufficient to meet its obligation, assess the incentives for the producers and ensure demand or output forecasts on which the financial analysis is based are consistent with financial charges or available budget resources. Also related to financial analysis of project is partial budgeting. Partial budget assists the farmer to evaluate the financial effect of minor adjustment in the farm business and it is used to evaluate changes in resources that are not fixed (De Vries and Risco, 2005). Tigner (2006) points out that partial budget could eliminate or reduce costs; some returns; and cause additional cost to be incurred or returns to be received. The net effect would be the sum of positive financial effects minus the sum of negative financial effects. The main components of partial budget include additional costs, reduced returns, reduced costs, and additional returns, total of the first two and the second two, and a net difference. Government expenditure on

the mass spraying have cost components which could be captured with partial budgeting (Tigner, 2006). The net effect of the cocoa mass spraying programme for instance can be evaluated as the difference between the positive and the negative financial effects (Tigner, 2006). A positive difference indicates a potential increase in net returns and a negative difference is an estimate of the reduction in net returns of the introduction of the programme (Tigner, 2006).

2.19. Empirical Review

The effects of the cocoa mass spraying program on the production of cocoa in Ghana has been established in the somewhat scanty literature on the subject. According to Amoah (1995), a large-scale capsid control program implemented by the Ministry of Food and Agriculture led to the production of 580,000 metric tons of cocoa in the 1964/65 cocoa season alone. Asuming-Brempong et al. (2006) studied the impact of the cocoa mass spraying program on cocoa production in Ghana and found that the program had a positive effect on the production of cocoa at the national level. The authors provided evidence that the program resulted in excess production of about 700,000 metric tons of cocoa in the 2003/04 and 2005/06 cocoa seasons. Abankwah (2010) conducted a study on the socio-economic impact of government spraying program on farmers and found that the implementation of the program did not have any significant influence on the economic fortunes of farmers. Similarly, Anang et al. (2013) in a study on the assessment of the government mass spraying program by cocoa farmers found an ineffectiveness of the mass spraying program in the Wassa Amenfi West District of the Western Region of Ghana. Using the Kendall's Coefficient of Concordance test, they observed that inadequacy in chemicals supply and inadequate number of spraying officers were the main challenge in the area. Also,

the Ghana News Agency (2010) found that even years after implementing the mass spraying program, the central region witnessed a decline in cocoa production from 62,000MT in 2007/2008 to 56,000MT in 2008/2009 cocoa seasons. In a study conducted in the Upper Denkyira West District of Ghana, Naminse et al. (2011) found evidence of an improvement in the production of cocoa in the study area as a result of the implementation of the cocoa mass spraying program. The authors showed that cocoa yield in the area increased by 49.41% after implementing the program. Owusu-Achaw (2012) assessed the financial viability of the “HI-TECH” and “CODAPEC” programs in Ghana. He found that the introduction of these programs resulted in an increase in output levels of cocoa above the national average of 0.35mt/ha to 0.68mt/ha and 1.68mt/ha respectively. He further provided evidence that from the viewpoint of farmers, the two programs implemented were profitable and financially viable. Using intervention analysis, Omame-Adjepong (2012) estimated the effect of the cocoa mass spraying and Hi-tech program on the production of cocoa in Ghana and found evidence that the mass spraying program had a significant positive effect on cocoa production in Ghana. Specifically, the author showed that, the program led to an annual increase of 182,398.2 metric tons of cocoa. The Hi-tech program was also found to exert a significant positive effect on the production of cocoa and led to 266,515.1 metric tons of cocoa annually.

2.20. Theoretical Review

2.20.1. Cost Benefit Analysis

Cost-benefit analysis is the assessment of decisions in terms of their possible consequences or costs and benefits. Prest and Turvey (1965) also define the cost-benefit process as the maximization of all the present values of all benefits less costs,

subject to certain specified constraints. Cost Benefit Analysis helps decision makers to make informed decisions on whether or not to invest in a specific project. This process is widely used across various fields. According to Drze and Stern (1987), the main purpose of cost-benefit analysis is to provide a consistent procedure and criteria for evaluating projects in terms of their potential consequences. Cost-benefit analysis is best known and mostly applied in the evaluation of public sector projects. In the evaluation of projects, a cost-benefit analysis is a simple decision rule in which only projects with positive profits at shadow prices are accepted. Shadow price is the measurement of the net effect of on social welfare of a unit increase in the supply of a particular good or project by the public sector.

Drze and Stern (1987) argue that a major purpose for using cost-benefit tests and shadow prices is to allow decisions at the level of the enterprise in the public sector. There are two main reasons for estimating the costs and benefits of an investment in the cost-benefit analysis process. The first is the determination of whether the project is a viable one, thus, if it is a good investment. The second reason is to compare a particular project with other competing projects in order to determine the most feasible investment projects. This process of cost-benefit analysis helps decision makers to evaluate projects in a consistent and comparable manner. The cost-benefit analysis offers a clear guideline for evaluating government decisions in fields such as tax, income or trade policies, provision of public goods, rationed commodities distribution and private investments licensing. According to Brent (2006), for an activity to be worthy of subsidy, its benefits must be greater than the associated costs and for an activity to be restricted, the costs must be higher than the benefits

generated from the activity. This represents the basic decision rule for cost-benefit analysis.

Brent (2006) uses economic efficiency to represent the general model of cost-benefit analysis which aims at the maximization of the difference between Benefits, B and Costs, C. This model is given as: $B - C$

The difference from this model represents the efficiency effect of the project. It may also be taken as the extra resources available revealing an improvement in the size of the economic pie. The larger the difference, the greater the contribution of the project.

2.20.2. Transaction Cost Theory (TCT)

Transaction Cost Theory is widely used in strategy works among several disciplines in management. Transaction costs are very relevant in the economic activity of organizations. Coase (1988) emphasizes this by stating that without the idea of transaction costs which is largely missing from economic theory; it is not possible to comprehend the working of the economic system, in order to examine many of its challenges in a useful way, or to provide the basis for the determination of policies. Arrow (1969) defines transaction cost as the cost of running the economic system. He compares these costs to the frictions that slow the otherwise smooth implementation of the contract. Quite recently, one of the most common definitions given by Wang (2003) defines transaction cost as the difference between the prices paid by the buyer and received by the seller. The TCT is often used in the study of the boundaries of firms, integration decisions, reasons for undertaking acquisitions, among others.

According to Williamson (1985), transaction costs are mostly identified with three dimensions. These dimensions are frequency, asset specificity and uncertainty. The asset specificity helps a company to fully understand whether a contract needs tailored solutions or standardized investments. Williamson identifies frequency as the contracted sales volume of goods and services. Also, uncertainty presents itself in the form of imperfect information and the possibility that the behavior of partners will cause parties to take decisions unknown to the activities of other market participants. The transaction cost theory argues that in conducting transactions through the market, there are costs to be incurred but these costs can be reduced without using the market. Specifically, in public policies, there are negotiating, drafting and safeguarding costs that are considered as frictions and hinder the smooth transactions.

2.20.3. Stakeholder Theory

Stakeholder theory is a management theory concerned with matters that are related to morals and ethics in the running of businesses. The theory accounts for employees, communities, suppliers among others who are affected by the activities of businesses. Freeman (2010) defines a stakeholder as any group or individual who can affect or is affected by the achievement of the firm's objectives. The expectations of each stakeholder can be different, so corporate management must best match corporate resources and policies with the stakeholders' interests. The basic principle underlying the stakeholder theory is that a party, for instance the government, must act in the best interest of all of its stakeholders.

Mitchell et al. (1997) proposed that the impact of stakeholders depends on three attributes: power, which relates to the ability of the stakeholder to impose its will on

others despite resistance to do something they would not ordinarily do; legitimacy, which also relates to the mandate of the stakeholder and the rights to use power with regard to a claim made upon the firm; and urgency, the degree to which 'stakeholder claims call for immediate attention'. For instance, under power a government will impose projects on all other stakeholders whereas legitimacy may grant rights to the government to exercise the power of implementing a particular project. Under urgency, stakeholder claims may compel the government to undertake a project. A typical example of this being the government embarking on a mass spraying program as a result of infestations reported by farmers.

Researchers have advanced different explanations and classifications of stakeholder theory but arguably the main distinction made was between descriptive and normative perspectives (Donaldson & Preston, 1995; Gray et al., 1996). The normative variant assumes that the legitimate interests of all the stakeholders should be taken into account by organizations (this variant can also be labelled as 'ethical'). The government and organizations have a responsibility to all stakeholders under this variant. The descriptive variant on the other hand assumes that the stakeholder model describes what the corporation actually is, 'a constellation of co-operative and competitive interests' (Donaldson & Preston, 1995). This variant can also be labelled as 'empirical' as it lends itself to empirical testing. In the descriptive variant, the organization identifies which stakeholder interests are important. According to the descriptive variant of stakeholder theory, the selective nature of government and its agencies determine the type of projects to undertake.

2.21. Conceptual Framework

The conceptual structure helps to define the variables used in the analysis process and provides a description of how the various variables are related to each other in the study (Berhe & Kaur, 2011).



Figure 2.1: The Relationship between the Dependent Variable Revenue Generation and the Independent Variable Cocoa Mass Spraying (CODAPEC).

The conceptual structure as seen in the figure above is derived from the study of previously discussed literature. This illustrates the relationship between the dependent Revenue Generation variable and the independent Cocoa Mass Spraying (CODAPEC) variable.



CHAPTER THREE

METHODOLOGY

3.1 Introduction

Research methodology can simply be seen as the process of gathering information and interpreting data for the purpose of making a meaningful analysis from the collected data. This chapter consists of the type of study; method of data collection; data analysis and estimation techniques. It focuses on the methods and techniques used in gathering the data needed to fulfil the objectives of the study.

3.2 Research Design and Approach

This study adopts quantitative research approaches. However, Mark et al (2003) opined that quantitative research provides statistical data which is obtained from public data. These approaches that was applied are contingent on the objectives of the study. According to Saunders, Lewis and Thornhill (2007), the research method is divided into two parts: research design and data collection. For the research design section, the study is to assess the financial viability of cocoa mass spraying programme.

This design part offered the overall view of the method chosen and the reason for the choice (Saunders, Lewis and Thornhill 2007). The success of this research depended on the methodology used. However, Mark et al (2003) contended that quantitative research provides statistical data which is obtained from existence data. This study was aimed at ascertaining the the financial viability of cocoa mass spraying programme.

3.3 The Study Area

The Cocoa Mass Spraying Programme is an area that demands technical expertise to handle it. In light of the above, the study area shall focus areas like operational cost of activities, revenue generation, as well as financial viability on the Cocoa Mass Spraying Programme. The study gathers information from respondents including National Coordinator for the Cocoa Mass Spraying Programme (Cocoa Health and Extension Division (CHED) Accra and the Finance Department of Ghana Cocoa Board-Accra.

3.4 Target Population

The population of the study involves three main departments of the Cocoa Mass spraying programme in Ghana Cocoa Board, namely; Cocoa Health and Extension Division (CHED) Head office, CODAPEC Department and Finance Department of Ghana Cocoa Board Head office. The choice of focusing of institutions that are major stakeholders which are adversely affected by the Cocoa Mass spraying programme in Ghana is in relation to the objective of the study. This makes it more representative and appropriate for the study.

3.5 Sample and Sampling Technique and Procedures

This research employed purposive sampling technique which is a non-probability sampling technique in the selection of top institutions in Ghana in order to obtain data for this study. The rationale was to select institutions that have great understanding of the Cocoa Mass spraying programme in Ghana issues. Also, the reason for using these criteria was to select institutions that are in a position to offer truthful information based on the research objectives. The study covered data spanning a period of 20

years from 1990/1991 to 1999/2000 and 2006/2007 to 2015/2016 cocoa seasons. Due to the small number of years under study, and the study would use secondary data which is fit the selection criteria selected. These sample sizes reflect the number of obtained public data. The sampling technique used to cover period from 1990/1991 to 1999/2000 and 2006/2007 to 2015/2016 cocoa seasons excluding 2000/2001 to 2005/2006 and 2017 because the researcher couldn't get access to adequate data.

3.6 Source of Data

For the analysis, secondary data was used. From secondary sources, appropriate literature was reviewed to support and refute the claims and conclusions posed by the report. Information were gathered from the following organizations Departments of the Cocoa Mass spraying programme in Ghana Cocoa Board, namely; Cocoa Health and Extension Division (CHED) Head office, CODAPEC Department and Finance Department of Ghana Cocoa Board Head office for the study.

3.7 Data Collection Tools/ Procedures

Secondary data collection methods were employed. The secondary method consists of references into previous scholarly works on Cocoa Mass spraying programme in Ghana. The data of this thesis was time series and taken from 1990/1991 to 1999/2000 and 2006/2007 to 2015/2016 cocoa seasons, so there were total 20 years data which was obtained to conduct the study. A generated secondary data from the departments of the Cocoa Mass spraying programme in Ghana Cocoa Board, namely; Cocoa Health and Extension Division (CHED) Head office, CODAPEC Department and Finance Department of Ghana Cocoa Board Head office are used to conduct this study. The thesis was designed to contain issues relating to the objectives of the study,

especially to examine the financial viability of cocoa mass spraying programme in Ghana. The data collection is the evidence that the researcher would use to support the specific objective for the research (Bell 1998). The data gathered from the secondary sources were analysed quantitatively, and results presented in tables showing the various results of the cocoa mass spraying programme over the respective periods from 1990/1991 to 1999/2000 and 2006/2007 to 2015/2016 cocoa seasons. The data was collected from the period from 1990/1991 to 1999/2000 and 2006/2007 to 2015/2016 cocoa seasons and care was taken to enter the data accurately so that to have reliable results.

3.8 Data Analysis/Procedures

The research involved the analysis of quantitative data gathered from the institutions, with a view to determining the appropriate strategic debt management option for Ghana. Therefore, content analysis was done based on the data collected. Collis and Hussey (2009) believed in the use of content analysis as a method for quantifying quantitative data. Satu and Helvi (2007) agreed that content analysis can either be used with qualitative or quantitative data with the adoption of either the inductive or deductive approach. Berelson and Holsti (cited in Asekomeh et al., 2006), further justified the use of content analysis for analysing quantitative data. As it facilitates inferential interpretation of communication or message (textual in this case) following an unbiased and systematic identification of specified characteristics.

The data and information obtained through the data collection exercise will first be checked for accuracy and completeness. The thesis involved the analysis of quantitative data gathered from departments of the Cocoa Mass spraying programme

in Ghana Cocoa Board, namely; Cocoa Health and Extension Division (CHED) Head office, CODAPEC Department and Finance Department of Ghana Cocoa Board Head office are used to conduct this study. Therefore, content analysis was done based on the thesis results. Data collected were coded and entered using Microsoft office and excel. In order to achieve the fourth objective of this study, regression analysis will be conducted using the STATA 13 software to help determine the financial viability of the programme. A univariate regression will be conducted using revenue generated as the dependent variable and the total cost incurred on the programme as the independent variable. The data collected was evaluated, cross checked, compared, and also critically analyse. The essence of this analysis was to transform the raw data into a more meaningful and acceptable form. The analysis of data collected for this study was done using quantitative techniques. Descriptive statistics such as percentages, figures and tables were employed in the study to measure the data. Tables were further used to present results.

3.8.1 Model Specification

The univariate regression model of the study is specified below;

$$\text{TOTREV} = \alpha + \beta \text{TCOST} + \mu$$

Where;

TOTREV = Total revenue generated after the programme

TCOST = Total cost incurred from the programme

α = intercept

β = coefficient

μ = error term

3.9 Ethical Considerations

The researcher in collecting data stated as a matter of importance protecting the identity and personality of respondents in this study. Due diligence on the topic of the research and purpose were highlighted in approaching respondents to seek their consent. Finally, Confidentiality and anonymity were held in high esteem as indications of same was indicated on interview guide as well as mentioned verbally for the express approval by respondents.



CHAPTER FOUR

DATA ANALYSIS AND INTERPRETATION

4.1. Introduction

This chapter deals with the analysis and interpretation of the yearly data on cocoa output, operational cost and revenue available at the Ghana Cocoa Board for the period 1990/1991 to 1999/2000 cocoa seasons (the period before the cocoa mass spraying programme) and from 2006/2007 to 2015/2016 cocoa seasons (periods during the cocoa mass spraying programme) have been compiled for analysis. These aimed to answer the research questions vis-à-vis the study objectives outlined in chapter one.

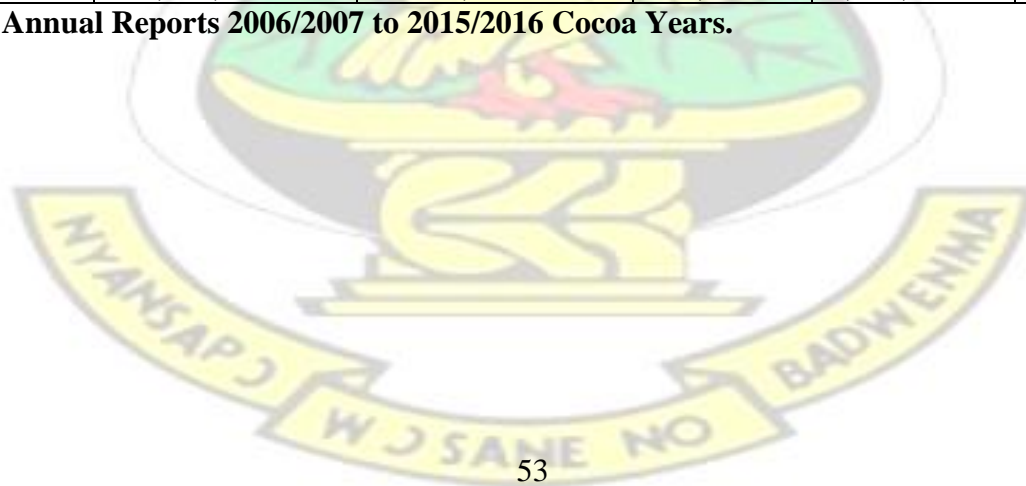
4.2. A Ten-Year Operational Cost of the Cocoa Mass Spraying Programme and Corresponding Cocoa Output.

This chapter sought to examine the operational cost related to the Cocoa Mass Spraying Programme over a ten-year period. Data available at COCOBOD on the cost of chemicals, labour and other inputs, and cocoa production figures are summarized in Table 4.1. The data has not taken into account the effect of rainfall and other climatic variables and fertilizers.

Table 4.1. The cost of fungicides, pesticides, labour and other logistics, cocoa production for the period 2006/2007 to 2015/2016

NO.	YEARS	COST CENTRES				TOTAL COST	TOTAL COCOA BEANS PRODUCED IN METRIC TONNES
		FUNGICIDES	INSECTICIDE	OTHER LOGISTICS	LABOUR COST		
		GH¢, 000	GH¢, 000	GH¢, 000	GH¢, 000	GH¢, 000	
1	2006/2007	14,019.51	33,513.33	-	12,221.12	59,753.95	614,532
2	2007/2008	28,039.01	67,026.65	-	12,864.34	107,930.01	680,781
3	2008/2009	35,048.77	83,783.32	-	17,410.01	136,242.10	710,642
4	2009/2010	43,810.96	104,729.15	-	18,626.45	167,166.55	632,024
5	2010/2011	141,772.51	156,129.24	-	21,254.50	319,156.25	1,024,553
6	2011/2012	141,075.06	354,060.60	-	23,055.74	518,191.39	879,348
7	2012/2013	100,864.46	154,098.15	967.52	15,219.86	271,150.00	835,466
8	2013/2014	174,921.86	226,254.07	44,631.14	21,570.93	467,378.00	896,883
9	2014/2015	195,633.38	327,047.81	3,143.14	19,256.66	545,081.00	740,524
10	2015/2016	111,125.63	151,277.49	9,027.24	23,194.64	294,625.00	778,043
	TOTAL	986,311.15	1,657,919.80	57,769.05	184,674.25	2,886,674.26	7,792,796

Source: Ghana Cocoa Board Annual Reports 2006/2007 to 2015/2016 Cocoa Years.



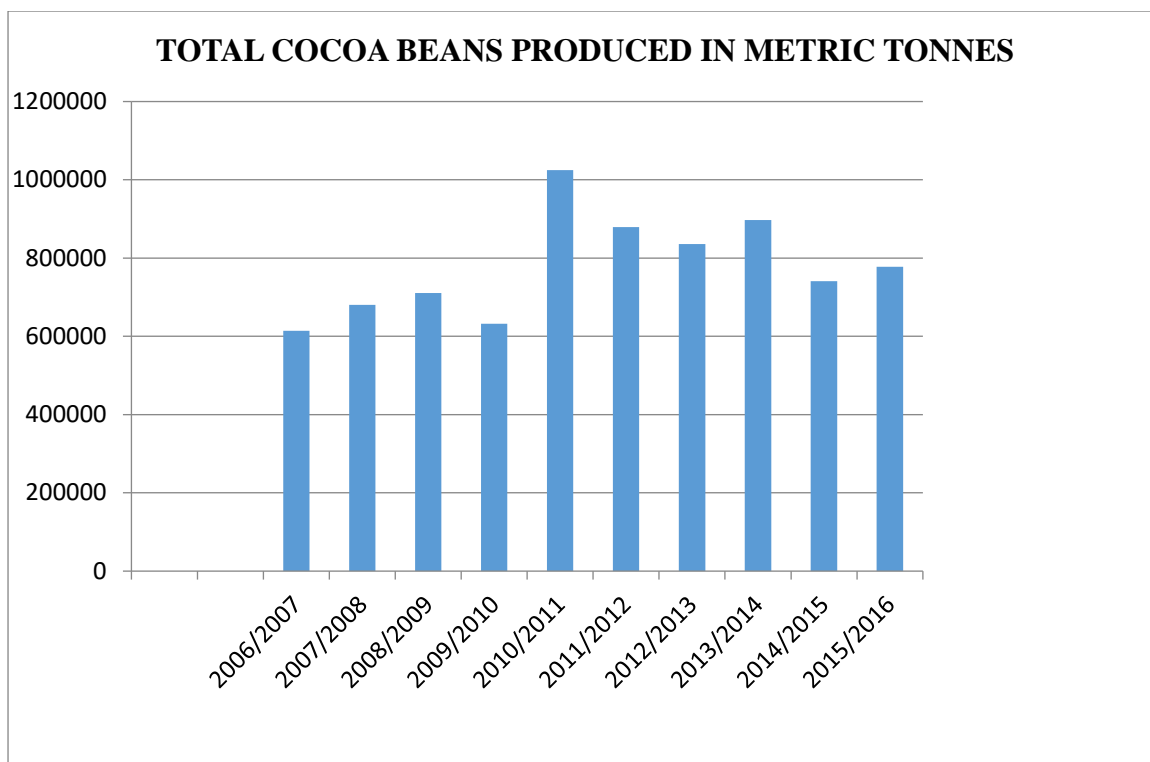


Figure 4.1: Ghana’s Annual Cocoa Production Time Plot from 2006/2007 to 2015/2016 Cocoa Seasons.

Even though the programme began in 2000/2001, the research examined data from 2006/2007 to 2015/2016 cocoa years. A total cost of fungicides, insecticides and labour in the 2006/2007 cocoa year was GH¢ 59,753,960.00. The total cocoa production for the same period was 614,532 metric tonnes.

The total operational cost for the 2007/2008 cocoa season was GH¢ 107,930,010.00 which means the total operational cost incurred increased by GH¢ 48,176,050.00 representing 44.6% as compared to that of 2006/2007 as shown in figure 4.2. Total cocoa production for the same period (2007/2008) was 680,781 metric tonnes indicating an increase of 66,249 metric tonnes as shown in Figure 4.1.

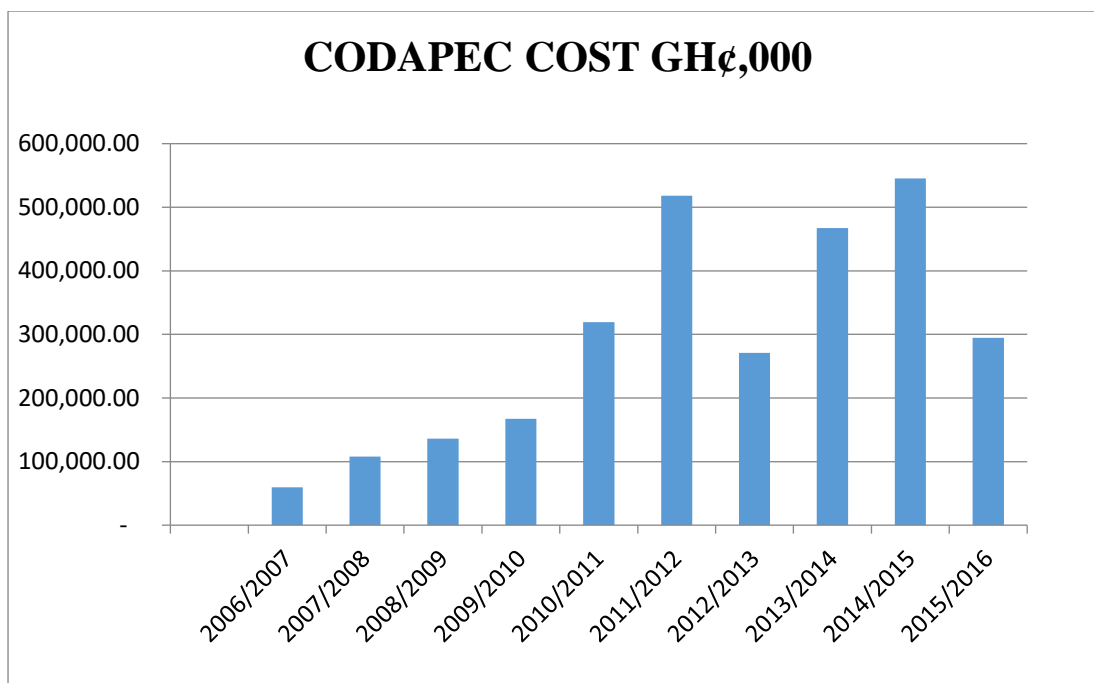


Figure 4.2: Operational Cost for Cocoa Mass Spraying Programme Plot Graph from 2006/2007 to 2015/2016 Cocoa Seasons.

The operational costs of the programme for 2008/2009 through 2012/2013 in Ghana cedis were 136,242,100.00, 167,166,550.00, 319,156,250.00, 518,191,390.00 and 271,150,000.00, respectively. Operating costs dramatically increased from GH 136,242,100.00 in the 2008/2009 season to GH 518,191,390.00 in the 2012/2013 season, partly on account of higher input prices and wage bills, and partly as a result of increased coverage in other regions. The latter point may have been as a result of the taskforces and farmers alike calling for expansion because many farmers were not benefiting from the programme.

In 2010/2011, even though operational cost was very high thus (GH¢ 319,156,250.00), cocoa production for the same period (2010/2011) reached an all-time high of 1,024,553 metric tonnes which was the highest the programme has ever achieved. In 2013/2014 season, operational cost was GH¢ 467,378,000.00 whereas in

2014/2015 the cost increased by approximately 14.26% to GH¢ 545,081,000.00 over the previous years. An operational cost of GH¢ 294,625,000.00 was incurred during the 2015/2016 cocoa season which is a reduction of GH¢ 250,456,000.00 in the operational cost. This was partly as a result of the efficient and effective management of resource used for the programme.

Cocoa production in 2013/2014 declined to 896,883 metric tonnes whereas in 2014/2015 it reduced slightly by 156,359 metric tonnes to 740,524 metric tonnes. This may be due to the cocoa rehabilitation programme which involves the cutting out of over-aged cocoa trees and diseased. In 2015/2016, 778,043 metric tonnes of cocoa was recorded while the operational cost was GH¢ 294,625,000.00.

The research concludes that pests and diseases are a constraint to cocoa productivity. The programme was introduced to address this limitation as it is evidence in the summarized Table 4.2 which illustrate cocoa production figures from 1990/1991 to 1999/2000 (periods before the introduction of the programme). The findings show that the programme has by and large been successful since cocoa production levels increased with intensification of the programme. What needs to be done is ensuring a more efficient input delivery system and a way to cut on the operational costs both at the national and district levels.

Table 4.2. Total Cocoa Beans produced before the introduction of the Cocoa Mass Spraying Programme from 1990/1991 to 1999/2000 Cocoa Years.

NO.	YEARS	TOTAL COCOA BEANS PRODUCED IN METRIC TONNES	F.O.B (US\$) PER TONNE OF COCOA	CODAPEC COST
				GH¢, 000
1	1990/1991	293,352		-
2	1991/1992	242,817		-
3	1992/1993	312,123	938.79	-
4	1993/1994	254,665	1,145.00	-
5	1994/1995	309,456	1,519.51	-
6	1995/1996	403,843	1,365.00	-
7	1996/1997	322,488	1,466.00	-
8	1997/1998	409,382	1,662.00	-
9	1998/1999	397,686	1,490.00	-
10	1999/2000	436,946	1,127.00	-
	TOTAL	3,382,758		

Source: Ghana Cocoa Board Annual Reports 1990/1991 to 1999/2000 Cocoa Years.

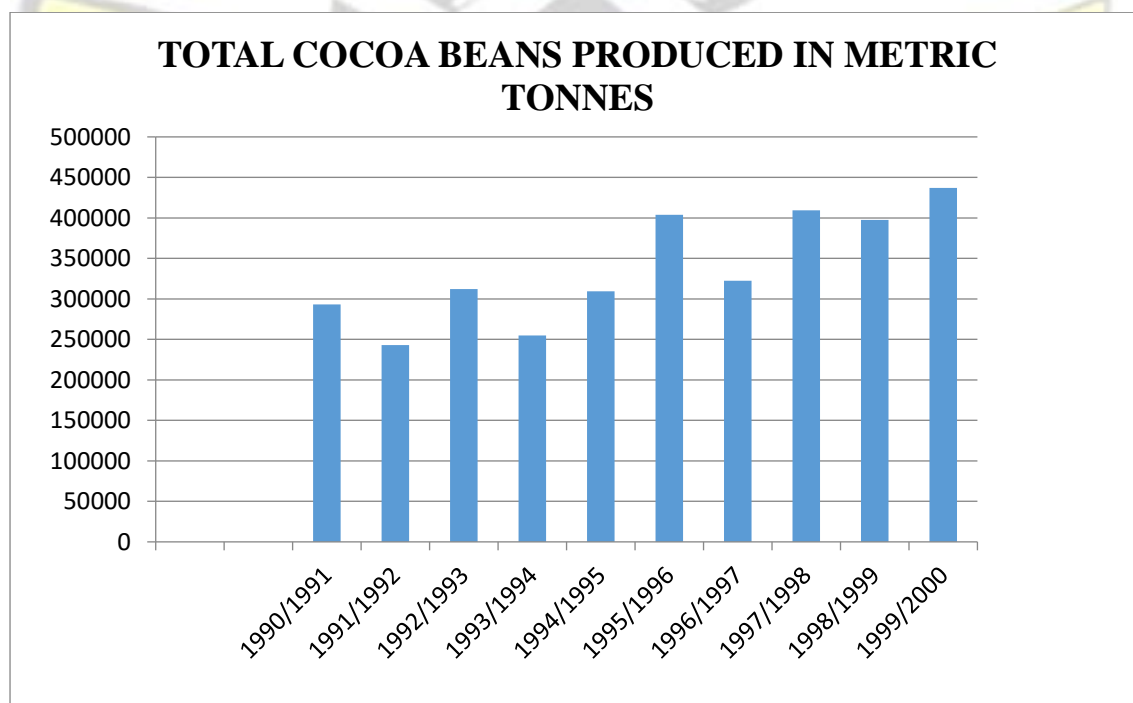


Figure 4.3: Ghana's Annual Cocoa Production Time Plot from 1990/1991 to 1999/2000 Cocoa Seasons.

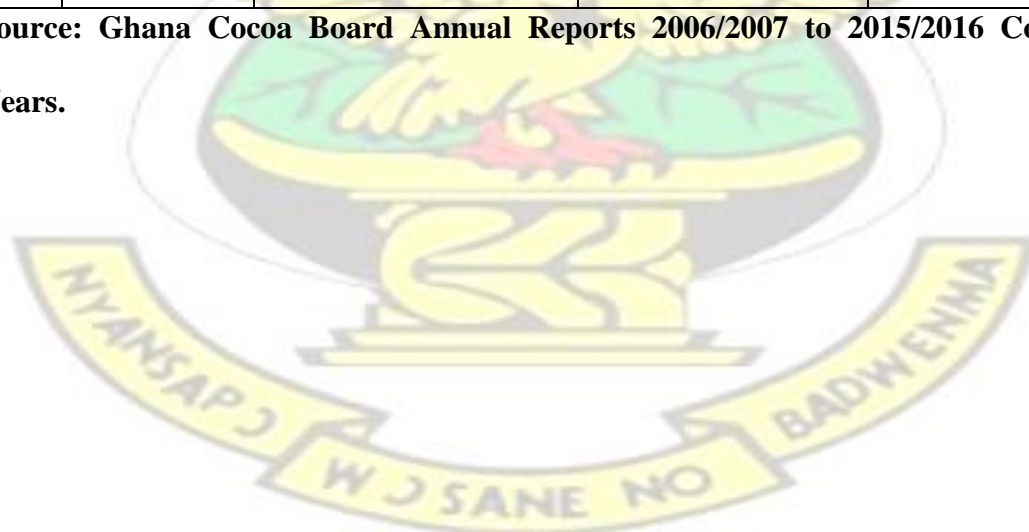
4.3. Revenues from cocoa production under cocoa mass spraying programme

The study sought also to assess the revenues generated from cocoa exports under the Cocoa Mass Spraying Programme from 2006/2007 to 2015/2016 cocoa year. This is presented in Table 4.3 and Figure 4.4 below.

Table 4.3. The Revenues Generated from Cocoa export under the Cocoa Mass Spraying Programme from 2006/2007 to 2015/2016 Cocoa Years.

NO.	YEARS	TOTAL COCOA BEANS PRODUCED IN METRIC TONNES	F.O.B (US\$) PER TONNE OF COCOA	REVENUES GENERATED GH¢, 000
1	2006/2007	614,532	1,668.00	1,076,000.39
2	2007/2008	680,781	2,103.69	1,411,702.32
3	2008/2009	710,642	2,687.96	2,464,455.04
4	2009/2010	632,024	2,927.50	2,790,149.44
5	2010/2011	1,024,553	3,294.00	4,754,198.21
6	2011/2012	879,348	2,918.00	4,546,890.00
7	2012/2013	835,466	2,360.00	3,753,856.00
8	2013/2014	896,883	2,434.91	6,030,610.00
9	2014/2015	740,524	2,810.00	7,533,890.00
10	2015/2016	778,043	3,015.00	9,145,815.00
	TOTAL	7,792,796		43,507,566.40

Source: Ghana Cocoa Board Annual Reports 2006/2007 to 2015/2016 Cocoa Years.



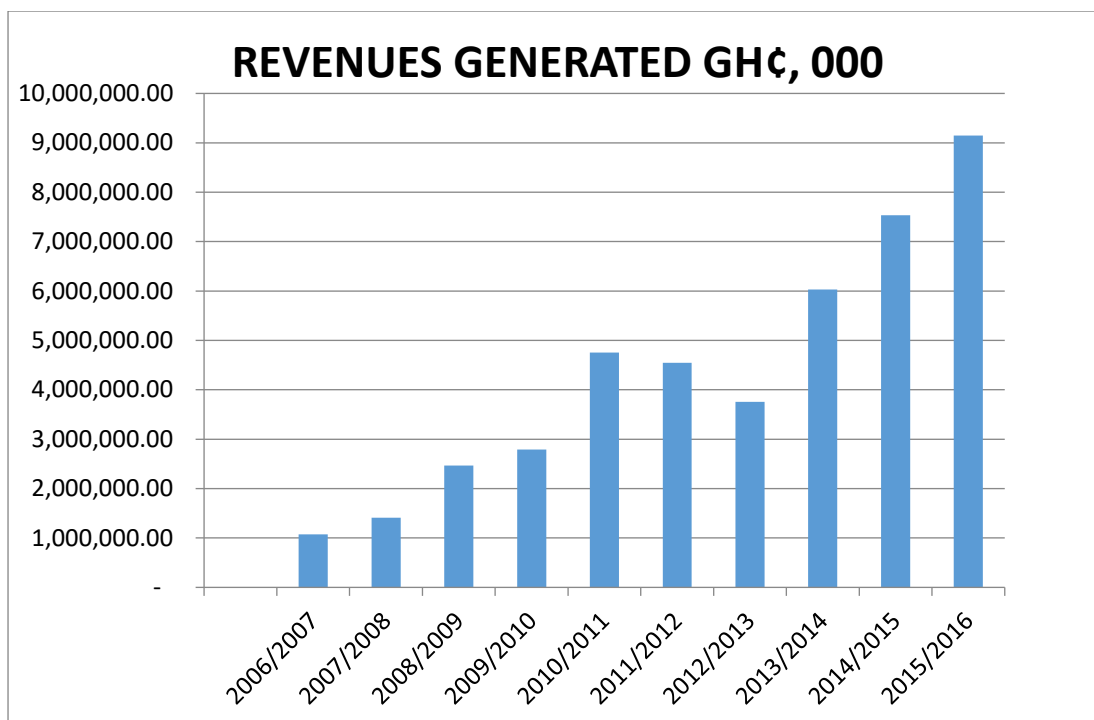


Figure 4.4: The Revenues Generated under the Cocoa Mass Spraying Programme Plot Graph from 2006/2007 to 2015/2016 Cocoa Years.

In 2006/2007 cocoa year an amount of GH¢ 1,076,000,390.00 was raised as revenue. The total operational cost was GH¢ 59,753,950.00. This means that the operational cost is 6% of the total revenue generated for the same period. The revenue generated for 2007/2008 increased by 24% over the 2006/2007 cocoa year amounting to GH¢ 1,411,702,320.00. This came about as result of significant increase cocoa production from 614,532 metric tonnes in 2006/2007 to 680,781 metric tonnes in 2007/2008 cocoa season, and also as a result of an increased exchange rate.

In 2008/2009 and 2009/2010, revenues generated were GH¢ 2,464,455,040.00 and GH¢ 2,790,149,440.00, respectively. These were 1.7 times and 2 times increase for 2008/2009 and 2009/2010 over respectively during that same cocoa season as in revenue. These can also be attributed to the increase in the cocoa production and efficient management of the CODAPEC programme. The total revenue recorded in

2010/2011 cocoa season was GH¢ 4,754,198,210.00 which was very significant for the 1,024,553 metric tonnes of cocoa produced during the period. This is the all-time highest cocoa production Ghana has recorded in history.

The Revenue from cocoa sales during the 2011/2012 reduced slightly to GH¢ 4,546,890,000.00. Perhaps as a result of the rehabilitation programme embark upon by the government through the Ghana Cocoa Board. The revenue recorded for 2012/2013 and 2013/2014 were GH¢ 3,753,856,000.00 and GH¢ 6,030,610,000.00 respectively. There was a very sharp decline in 2012/2013 season because of the intensive nature of the rehabilitation programme which involves the cutting of over-age cocoa trees. The other factor was the price at which cocoa beans were bought on the international market as depicted in Table 4.3.

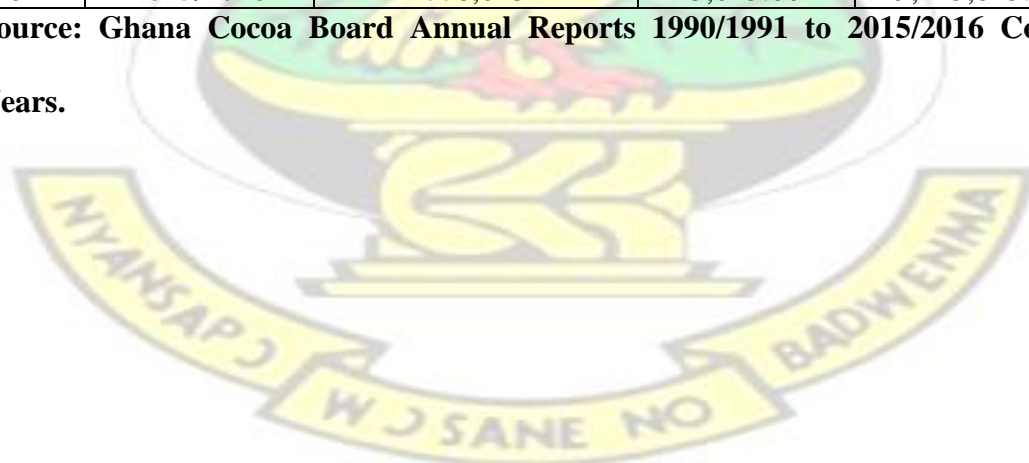
The 2013/2014 revenue was GH¢ 6,030,610,000.00. This figure increased to GH¢ 7,533,890,000.00 in 2014/2015 representing 20% over the previous year's revenue. The revenue for the 2015/2016 cocoa season went up by 18% over the 2014/2015 revenue. This represent an increase of GH¢ 1,611,925,600.00.

In conclusion, cocoa production and revenue generated were higher under the Cocoa Mass Spraying Programme compared to production and revenues generated before the programme as shown in the Table 4.4 and Figure 4.5 below. World market prices of the commodity has not been stable over the study period, and this was partly have accounted for the fluctuations in the revenue figures observed over the years.

Table 4.4. The cocoa production, F.O.B price (US\$) per metric tonne and Revenue generated from Cocoa export before and during the Cocoa Mass Spraying Programme from 2006/2007 to 2015/2016 Cocoa Years.

NO.	YEARS	TOTAL COCOA BEANS PRODUCED IN METRIC TONNES	F.O.B (US\$) PER TONNE OF COCOA	REVENUES GENERATED
				GH¢, 000
1	1990/1991	293,352		10,280.30
2	1991/1992	242,817		11,551.73
3	1992/1993	312,123	938.79	15,816.82
4	1993/1994	254,665	1,145.00	32,982.69
5	1994/1995	309,456	1,519.51	54,152.93
6	1995/1996	403,843	1,365.00	89,072.63
7	1996/1997	322,488	1,466.00	92,332.60
8	1997/1998	409,382	1,662.00	147,654.00
9	1998/1999	397,686	1,490.00	141,857.30
10	1999/2000	436,946	1,127.00	228,991.50
11	2006/2007	614,532	1,668.00	1,076,000.39
12	2007/2008	680,781	2,103.69	1,411,702.32
13	2008/2009	710,642	2,687.96	2,464,455.04
14	2009/2010	632,024	2,927.50	2,790,149.44
15	2010/2011	1,024,553	3,294.00	4,754,198.21
16	2011/2012	879,348	2,918.00	4,546,890.00
17	2012/2013	835,466	2,360.00	3,753,856.00
18	2013/2014	896,883	2,434.91	6,030,610.00
19	2014/2015	740,524	2,810.00	7,533,890.00
20	2015/2016	778,043	3,015.00	9,145,815.00

Source: Ghana Cocoa Board Annual Reports 1990/1991 to 2015/2016 Cocoa Years.



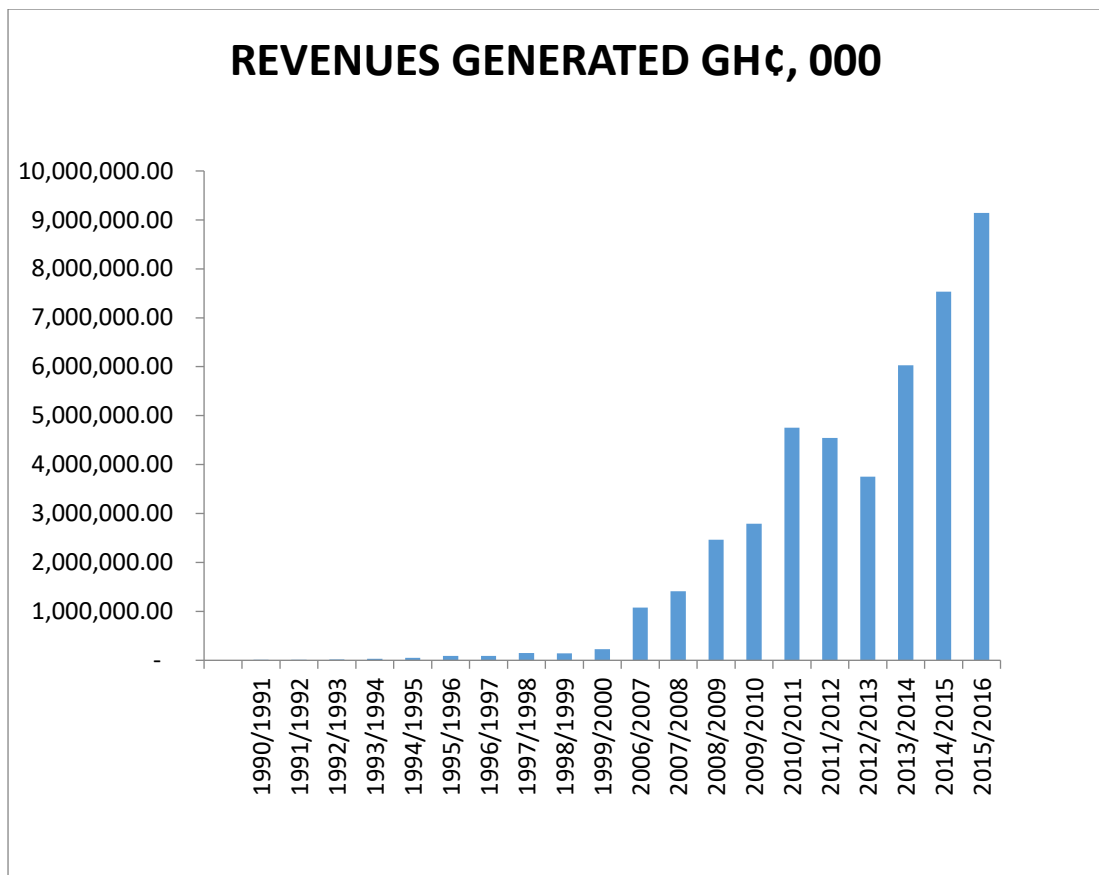


Figure 4.5: The Revenues Generated before and After the Introduction of Cocoa Mass Spraying Programme Plot Graph from 1990/1991 to 2015/2016 Cocoa Years.

4.4. Revenues from cocoa production before the introduction cocoa mass spraying programme

This part of the research examined the revenue that was from cocoa exports before the implementation of the cocoa mass spraying programme in 2001. Cocoa production levels and revenues generated were extremely low before the implementation of the programme compared to the years after as depicted in Table 4.5.

Table 4.5. The Revenues Generated Before and After the Introduction of Cocoa Mass Spraying Programme from 1990/1991 to 2015/2016 Cocoa Years.

BEFORE CODAPEC				AFTER CODAPEC		
NO.	YEARS	TOTAL COCOA BEANS PRODUCE D IN METRIC TONNES	REVENUES GENERATED GH¢, 000	YEARS	TOTAL COCOA BEANS PRODUCED IN METRIC TONNES	REVENUES GENERATED GH¢, 000
1	1990/1991	293,352	10,280.30	2006/2007	614,532	1,076,000.39
2	1991/1992	242,817	11,551.73	2007/2008	680,781	1,411,702.32
3	1992/1993	312,123	15,816.82	2008/2009	710,642	2,464,455.04
4	1993/1994	254,665	32,982.69	2009/2010	632,024	2,790,149.44
5	1994/1995	309,456	54,152.93	2010/2011	1,024,553	4,754,198.21
6	1995/1996	403,843	89,072.63	2011/2012	879,348	4,546,890.00
7	1996/1997	322,488	92,332.60	2012/2013	835,466	3,753,856.00
8	1997/1998	409,382	147,654.00	2013/2014	896,883	6,030,610.00
9	1998/1999	397,686	141,857.30	2014/2015	740,524	7,533,890.00
10	1999/2000	436,946	228,991.50	2015/2016	778,043	9,145,815.00
	TOTAL	3,382,758	824,692.50		7,792,796	43,507,566.40

The Revenues Generated Before and After the Introduction of Cocoa Mass Spraying Programme from 1990/1991 to 2015/2016 Cocoa Years.

Source: Ghana Cocoa Board Annual Reports 1990/1991 to 2015/2016 Cocoa Years.

4.5. Financial evaluation of cocoa mass spraying programme

The study sought to highlight the gains of the cocoa mass spraying programme on the Ghanaian economy. The Table 4.6 and Figure 4.6 depicts the revenues, direct costs and net profit or loss before and during the programme.

Table 4.6. The Revenues Generated, Direct Cost of Sale And Profit or Loss Before and During Cocoa Mass Spraying Programme from 1990/1991 to 2015/2016 Cocoa Years.

NO.	YEARS	REVENUES GENERATED	DIRECT COST OF SALES	NET ROFIT
		GH¢, 000	GH¢, 000	GH¢, 000
1	1990/1991	10,280.30	6,520.56	3,759.74
2	1991/1992	11,551.73	6,947.26	4,604.47
3	1992/1993	15,816.82	6,923.00	8,893.82
4	1993/1994	32,982.69	14,884.99	18,097.71
5	1994/1995	54,152.93	30,189.45	23,963.48
6	1995/1996	89,072.63	54,085.42	34,987.21
7	1996/1997	92,332.60	60,567.70	31,764.90
8	1997/1998	147,654.00	100,825.00	46,829.00
9	1998/1999	141,857.30	115,489.10	26,368.20
10	1999/2000	228,991.50	135,945.10	93,046.40
11	2006/2007	1,076,000.39	915,860.45	160,139.95
12	2007/2008	1,411,702.32	1,161,151.79	250,550.53
13	2008/2009	2,464,455.04	2,259,604.63	204,850.40
14	2009/2010	2,790,149.44	2,319,445.70	470,703.74
15	2010/2011	4,754,198.21	4,407,622.20	346,576.01
16	2011/2012	4,546,890.00	3,813,691.00	733,199.00
17	2012/2013	3,753,856.00	3,755,576.00	(1,720.00)
18	2013/2014	6,030,610.00	4,919,081.00	1,111,529.00
19	2014/2015	7,533,890.00	6,153,980.00	1,379,910.00
20	2015/2016	9,145,815.00	8,069,365.00	1,076,450.00
TOTAL		44,332,258.90	38,307,755.34	6,024,503.56

Source: Ghana Cocoa Board Annual Reports 1990/1991 to 2015/2016 Cocoa Years.

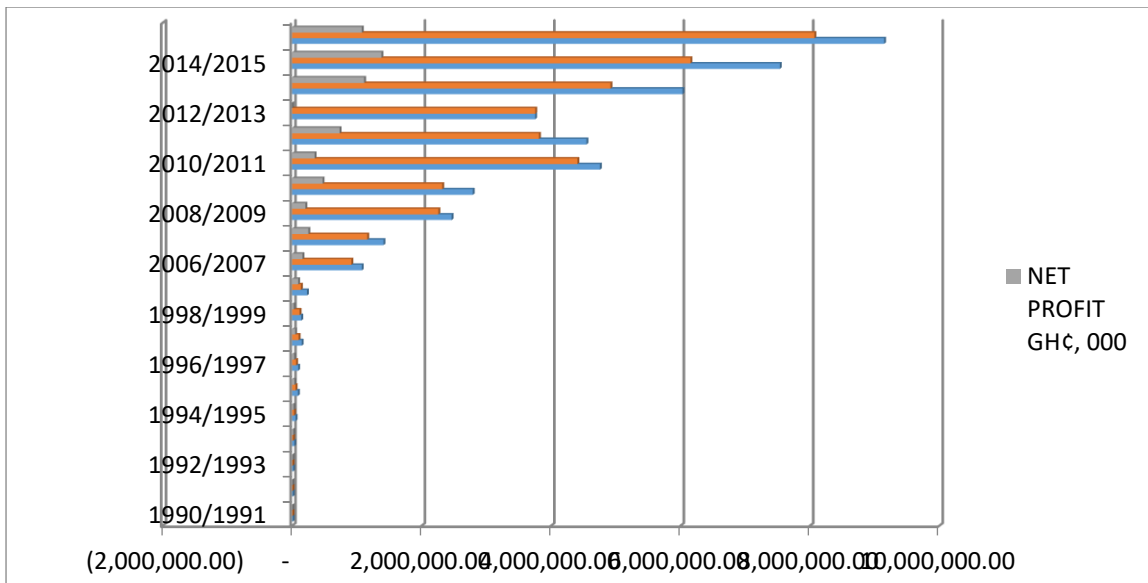


Figure 4.6: The Revenues Generated, Direct Cost of Sale And Profit or Loss Before and During Cocoa Mass Spraying Programme Plot Graph from 1990/1991 to 2015/2016 Cocoa Years.

The data indicate that before the start of the mass spraying program, revenue generated was not low, but increased marginally from 1990/1991 to 1999/2000. In the 1990/1991 cocoa season, an amount of GH¢ 6,520,560.00 was incurred as total direct cost while GH¢ 10,280,300.00 was raised as revenue from cocoa sales. A net profit of GH¢ 3,759,740.00 was earned during the same period. The revenue increased slightly to GH¢ 11,551,730.00 in the 1991/1992 cocoa season.

The direct cost also increased slightly to GH¢ 6,947,760.00 leading to a marginal increase in profit amounting to GH¢ 4,604,470.00. The revenue generation prior to the commencement of the cocoa mass spraying programme had a continued growth from 1990/1991 through to 1999/2000. A net profit of GH¢ 46,829,000.00 was realised during the 1997/1998 cocoa season. There was a significant decline in net profit in the 1998/1999 cocoa season which amounted to GH¢ 26,368,200.00. This is partly as a result of the huge direct cost of GH¢ 115,489,100.00 incurred during the same period. This was one of the reasons that prompted the management of the cocoa

industry to come up with an intervention to boost productivity of crop at the farmer level.

Total revenue from cocoa was GH¢ 228,991,500.00 in the 1999/2000 cocoa season with a corresponding direct cost of GH¢ 135,945,100.00. This raised the net profit to GH¢ 93,046,400.00 during the 1999/2000 cocoa season. It was the highest net profit cocoa had ever raised before the cocoa mass spraying programme intervention. Interestingly, the net profit earned in the cocoa year 2006/2007 of implementation of the cocoa mass spraying programme was GH¢ 160,139,950.00. The all-time highest net profit was 1.67 times over that of the 1999/2000 cocoa season. This was clear indication that implementing the cocoa mass spraying programme to address pest and disease problems has had positive contribution to the economy of Ghana.

The total revenue for the 2006/2007 cocoa season was GH¢ 1,076,000,390.00 whereas that for the 1999/2000 season was GH¢ 228,991,500.00. Even though the total direct cost for 2006/2007 was GH¢ 915,860,450.00, it was still worthwhile implementing the programme in terms of the overall revenue contributed to the economy of Ghana. Figure 4.7 shows revenue from cocoa, direct costs and net profits or loss from 2006/2007 to 2015/2016 cocoa seasons during which time the spraying programme had been running for close to ten years.

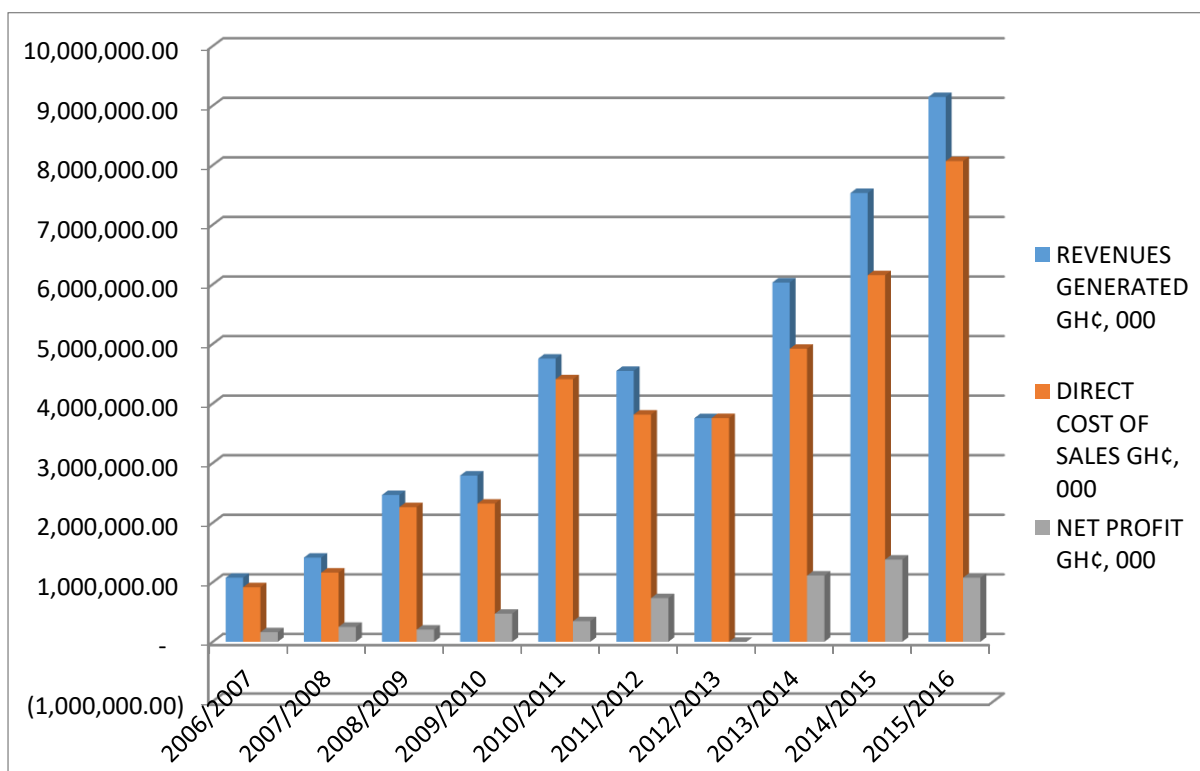


Figure 4.7: The Revenues Generated, Direct Cost of Sale And Profit or Loss During Cocoa Mass Spraying Programme Plot Graph from 2006/2007 to 2015/2016 Cocoa Years.

Revenue from cocoa increased in subsequent years. For instance an amount of GH¢ 1,411,702,320.00 was earned as total revenue in the 2007/2008 cocoa season, increasing significantly to GH¢ 2,464,455,040.00 in the 2008/2009 season. The total direct costs were GH¢ 1,161,151,790.00 and GH¢ 2,259,604,630.00 for the 2007/2008 and 2008/2009 cocoa seasons, respectively. The net profits during the two seasons were GH¢ 250,550,530.00 and GH¢ 204,850,410.00 for the 2007/2008 and 2008/2009 respectively. The direct cost for the 2009/2010 cocoa season was GH¢ 2,319,445,700.00, increasing significantly to GH¢ 4,407,622,200.0 in 2010/2011. Revenue generated were GH¢ 2,790,149,440.00 and GH¢ 4,407,622,200.00 for the 2009/2010 and 2010/2011 cocoa seasons, respectively. These were very significant because substantial net profit of GH¢ 470,703,740.00 and GH¢ 346,576,010.00 were

gained in 2009/2010 and 2010/2011, respectively. All these revenues were earned and invested into the economy of Ghana. In the 2011/2012 cocoa season, a net profit of GH¢ 733,199,000.00 was earned. This was almost twice the GH¢ 346,576,010.00 which was earned in the 2010/2011 season. This came about possibly as a result of the large cocoa production and increase in the international price of cocoa. Nevertheless a net loss of GH¢ 1,720,000.00 was recorded in 2012/2013 cocoa season as a result of the sharp decline in the price of cocoa beans on the international commodity market which resulted in decline in revenue from GH¢ 4,546,890,000.00 in 2011/2012 to GH¢ 3,753,856,000.00 in 2012/2013 cocoa season. Cocoa production in 2013/2014 season increased which saw the total revenue grow from GH¢ 3,753,856,000.00 in 2012/2013 to GH¢ 6,030,610,000.00 in the 2013/2014 cocoa season. The total direct cost unfortunately increased from GH¢ 3,755,576,000.00 to GH¢ 4,919,081,000.00 in the 2013/2014.

But this resulted in the change in the net loss of GH¢ 1,720,000.00 in 2012/2013 season to a huge net profit of GH¢ 1,111,529,000.00 in 2013/2014. This accounted for over 100% increase in net profit over the previous years. There was approximately GH¢ 200,000,000.00 increase in net profit to GH¢ 1,379,910,000.00 in the 2014/2015 season as a result of the marginal increase in revenue to GH¢ 7,533,890,000.00 over the previous year's revenue of GH¢ 6,030,610,000.00 in the 2013/2014. The total revenue for 2015/2016 was GH¢ 9,145,815,000.00 while direct cost increase significant from GH¢ 6,153,980,000.00 in 2014/2015 to GH¢ 8,069,365,000.00 in 2015/2016. This resulted in the decline in net profit from GH¢ 1,379,910,000.00 in 2014/2015 to GH¢ 1,076,450,000.00 in 2015/2016 cocoa season.

The cocoa mass spraying programme has certainly boosted cocoa production. It has assisted in increasing productivity at the farmer level and overall output. This resulted in huge profits which were invested in different sectors of the economy of Ghana. The total operating cost incurred for the entire programme from 2006/2007 to 2015/2016 cocoa season was GH¢ 2,886,674,260.00 which were made up of fungicides, insecticides, protective and spraying items and labour cost. This operational cost was incurred to generate a total cocoa production of 7,792,796 metric tonnes which accounted for a total revenue of GH¢ 43,507,566,400.00. The total revenue generated from 1990/1991 to 1999/2000 cocoa seasons was GH¢ 824,692,500.00. This clearly indicates that, the inception or implementation of the coca mass spraying programme was very effective.

4.6. Financial evaluation of cocoa mass spraying programme using regression analysis

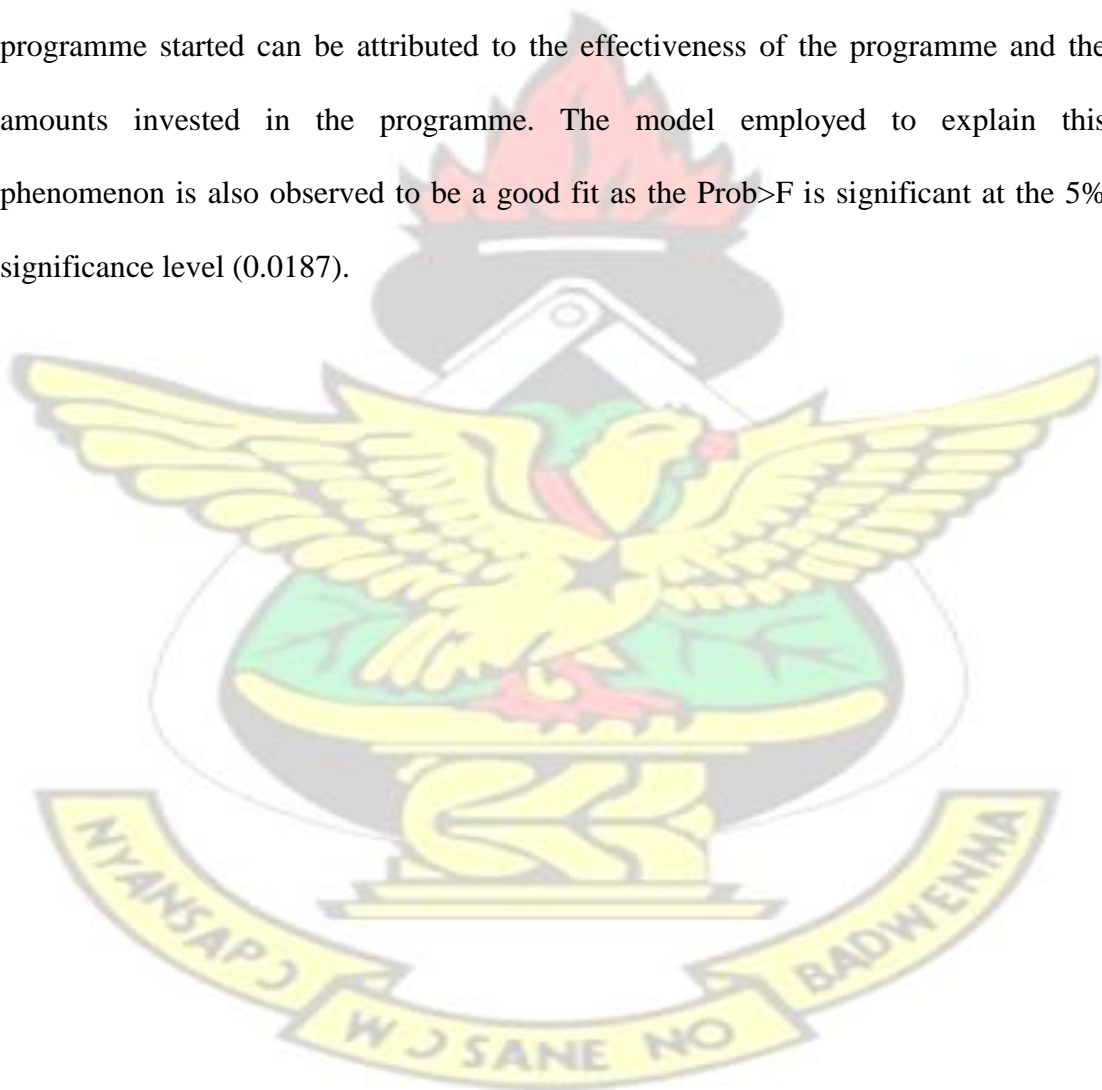
Table 4.7 Regression results for Total Revenue as Dependent Variable

VARIABLE NAME	COEFFICIENT	T-STATISTIC	P-VALUE
TCOST	10.81432	2.94	0.019
CONSTANT	1229014	1.00	0.345
R-SQUARED	0.5193		
PROB>F	0.0187		

Source: Research Data (2019)

The Table above presents the regression results of the study. The total revenue generated from the programme is used as the dependent variable with the total cost incurred from the programme as the independent variable to empirically test the viability of the programme. From the Table, the total cost of the programme (TCOST) is found to be significant at the 5% significance level and positively related to the total revenue (TREV) of the programme. This suggests that an increase in the cost of

the programme is associated with an increase in the revenue generated from the programme. It can be inferred that, a GH¢1.00 increase in the cost of the programme will lead to about GH¢10.8 increase in the revenue generated from the programme. The programme can therefore be deemed viable as it yields about 10 times the investment made. This finding confirms Figure 4.5 which indicates massive increment in revenues after the programme began in 2006/2007. The R-squared of 0.5193 also suggests that, about 51.93% of the variability in total revenue generated since the programme started can be attributed to the effectiveness of the programme and the amounts invested in the programme. The model employed to explain this phenomenon is also observed to be a good fit as the Prob>F is significant at the 5% significance level (0.0187).



CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATION

5.1. Introduction

A description of the entire research results and conclusions that can be drawn from the study is presented in this chapter. Also illustrated is a review of the study's recommendations and limitations for further research work.

5.2 Summary of Findings

The general objective of the study was to assess the financial evaluations of cocoa mass spraying programme. These are the specific objectives that the researcher would like to achieve:

1. To assess the operational cost relating to the cocoa mass spraying programme from 2006/2007 to 2015/2016 cocoa seasons.
2. To examine the revenues from cocoa production under the cocoa mass spraying programme from 2006/2007 to 2015/2016 cocoa seasons.
3. To examine the revenue from cocoa production before the cocoa mass spraying programme from 1990/1991 to 1999/2000 cocoa seasons.
4. To assess the financial viability of the cocoa mass spraying programme in Ghana from 1990/1991 to 1999/2000 and 2006/2007 to 2015/2016.

The literature relevant to the topic of study has been reviewed. The study used quantitative data analysis. The data used for analysis in this research was collected from secondary source. Data collected were coded and entered using Microsoft office and excel. Also a regression analysis was conducted using the STATA 13 software.

The findings of the study are summarised as follows:

5.2.1 Operational Cost

The study sought to find out the operational cost of the cocoa mass spraying programme from 2006/2007 to 2015/2016. The programme chalked enormous gains which came with its own operational cost. The study discovered that a total cost of GH¢ 2,886,674,260.00 was incurred during the implementation of the programme from 2006/2007 to 2015/2016. This operational cost incurred during the period was used to produce a total of 7,792,796 metric tonnes during the same period. Even though the operational cost was high, the cocoa produced as a result was also very significant.

5.2.2 Revenue Generated During the Programme

The findings from the research indicate that, a total amount of GH¢ 43,507,566,400.00 was earned from the sale of cocoa during the implementation of the cocoa mass spraying exercise from 2006/2007 to 2015/2016. The volumes of cocoa produced and the revenues generated were very huge when the programme took off. Even though successes had already been made before the implementation of the programme, revenues recorded were all time high when the programme took off.

5.2.3 Revenue Generated Before the Programme

The study further sought to identify the revenue which was generated before the implementation of the cocoa mass spraying programme. The research found out that a total amount of GH¢ 824,692,500.00 was earned as income from 1990/1991 to 1999/2000 cocoa seasons. This was extremely low as compared to the revenue generated for 2006/2007 cocoa season amounting to GH¢ 1,076,000,390.00. This was just the one year revenue after the implementation of the programme.

5.2.4 Financial Viability of the Programme

The study sought to identify whether it was worth implementing the cocoa mass spraying programme. The total cocoa production before the programme from 1990/1991 to 1999/2000 were 3,382,753 metric tonnes which yielded a total revenue of GH¢ 824,692,500.00. A net profit of GH¢ 292,314,930.00 was attained. A total of 7,792,796 metric tonnes of cocoa was produced from 2006/2007 to 2015/2016 thus during the implementation of the programme. A total revenue of GH¢ 43,507,566,400.00 was also generated during the same period resulting in a total net profit of GH¢ 5,732,188,630.00. These monies were invested in the Ghanaian economy. It can therefore be concluded that the cocoa mass spraying programme implemented by the government through the Ghana Cocoa Board has been very successful and viable to the economy. Based on the regression results also, the study found a significant positive effect of total cost of the programme on the revenue generated which indicated that the programme was financially viable.

5.3 Recommendations

The Cocoa Mass Spraying Programme was first introduced in the early 1960's. This was however discontinued in the late 1960's for one reason or the other (Nyanteng, 1980).

From the analysis conducted, the cocoa mass spraying programme is found to be a financially viable programme as it contributes significantly to the total revenue generated. The study therefore recommends a continuation of the programme to help boost revenue generation based on the outcome of the study.

The Cocoa Mass Spraying Programme is still on going with massive production and revenue generated. The study found a much higher increase in revenue with every cedi of investment in the programme. It is therefore recommended that Ghana Cocoa Board increases their investment capital in the cocoa mass spraying programme for a higher returns in revenue generation since the programme has not peaked.



REFERENCES

- Abankwah, V., Aidoo, R. and Osei, R.K., 2010.** *Socio-economic impact of government spraying programme on cocoa farmers in Ghana.* Journal of Sustainable Development in Africa, 12(4), pp.116-126.
- Acquaah B. (1999).** *Cocoa Development in West Africa. The Early Period with Particular Reference to Ghana.* Ghana University Press
- ADB (2002).** Asian Development Bank's Guidelines for the Economic Analysis of Project. Analysis.
- ADB (2004).** *Asian Development Bank's Guidelines for the Economic Analysis of Project. Analysis.*
- ADB (2005).** *Asian Development Bank's Guidelines for the Economic Analysis of Project Analysis* (Reviewed by Anand P. B, 30 November, 2004 Review No 27).
- Adjinah, K.O. and Opoku, I.Y. (2010).** The National Cocoa Diseases and Pest Control (CODAPEC): Achievement and Challenges. Accessed on May 5, 2012. Available at <http://news.myjoyonline.com/features/201004/45375.asp>
- AfDB (2006),** *The African Development Bank Group's Guidelines for Financial Management and Financial Analysis of Project Analysis* (C.K. Muthuthi, O. Fajana and G. Negatu (Acting Manager of POPR.3 after July 2005), under the overall guidance of P. Afrika.(Director of the Department).
- Agricultural Extension Policy (2003 and 2005).** Directorate of Agricultural Extension Services, Ministry of Food and Agriculture. ISU/ DAES/MOFA. Accra, Ghana.
- Amoah, J.E.K., 1995.** Development of consumption, commercial production and marketing. Jemre Enterprises. Accra, Ghana.
- Amoah, J.E.K. (1998).** Marketing of Cocoa in Ghana 1885 -1992. Cocoa outlines Series No.2. Jemre Enterprises Ltd. Accra, Ghana.
- Amoah, J.E.K. (2000).** The Story of Cocoa, Coffee and Sheabulter. Environmental, Issues and food values. Cocoa Outline Series No. 3 Jemre Enterprises Ltd., Accra, Ghana.
- Anang T. (2015).** Key facts about the Ghana Cocoa industry: GDP contribution. Retrieved June, 2016, from <http://www.modernghana.com/news>
- Anang, B.T., Mensah, F. and Asamoah, A., 2013.** Farmers' assessment of the government spraying program in Ghana. Journal of Economics and Sustainable Development, 4(7), pp.92-99.

- Anim-Kwapong G. J. and Frimpong E. B. (2008).** *Impact of Climate Change on Cocoa Yield in Ghana Using Vector Autoregressive Model (PDF Download Available).* Available from: https://www.researchgate.net/publication/325069277_Impact_of_Climate_Change_on_Cocoa_Yield_in_Ghana_Using_Vector_Autoregressive_Model [accessed Jun 10 2018].
- Anna Laven,** “*Amsterdam Research Institute of Metropolitan and International Development*”
- Appiah, M. R. (2000).** Alleviating Rural Poverty in Cocoa Producing Areas of Ghana through Sustainable Cocoa Production. Cocoa Research of Ghana. New Tafo Akim
- Appiah, M. R. (2004).** Impact of Cocoa Research Innovations on Poverty Alleviation in Ghana. Ghana. Academy of Arts and Sciences. Liberation Link, Accra, Ghana.
- Arrow, K.J., 1969.** The organization of economic activity: issues pertinent to the choice of market versus nonmarket allocation. The analysis and evaluation of public expenditure: the PPB system, 1, pp.59-73.
- Aryeetey, F. and Fosu, A. K. (2005).** Economic Growth in Ghana: 1960-2000. AERC. Growth Project Workshop. Cambridge, MARCH, 2005.
- Asuming-Brempong, S. and K. Asafu-Adjei. 1997.** Estimates of food production and food availability in Ghana: the case of year 2000. *World, Vol. 5.* 3-3. Baker, G. P. et al. 125
- Asuming-Brempong, S., Sarpong, D.B., Asenso-Okyere, K. and Amoo, P., 2007.** Labor practices in cocoa production in Ghana (Pilot survey): National programme for the elimination of worst forms of child labor in cocoa (NPECLC).
- BELL, J., (1999).** Doing your research project: A Guide for First-Time Researchers in Education and Social Science. 3rd ed. Buckingham: Open University Press.
- Breisinger. C., Diao.X., Kolavalli.S., Thurlow.J.(2008),** “The Role of Cocoa in Ghana’s Future Development”, *International Food Research Policy, IFPRI-Background Paper No. GSSP 0011.*
- Brent, R.J., 2006.** Applied cost-benefit analysis. Edward Elgar Publishing.
- Bryman, A. (2008).** Social research methods (3rd ed.). Oxford: Oxford University Press
- Coase, R.H., 1988.** The nature of the firm: influence. *Journal of Law, Economics, & Organization*, 4(1), pp.33-47.
- COCOBOD. (1994, 1998, 1999, 2002-2006).** Ghana Cocoa Board Annual Report 1999- 2010. Available at; www.cocobod@ghana.com.

- COCOBOD. (2000).** Ghana Cocoa Board Handbook 8th Edition. Jamienson's, Cambridge Fax Book Ltd. Accra. Available at; www.cocobod@ghana.com.
- COLLIS, J. and HUSSEY, R., (2009).** Business Research: A Practical Guild for Undergraduate and Postgraduate Students. 3rd ed. Palgrave Macmillan.
- Dand, R. 1997.** *The International Cocoa Trade*. John Wiley and Sons. New York.
- De Vries, A. and Risco, C.A. (2005).** Trend and Seasonality of Reproductive Performance in Florida and Georgia Dairy Herds Fro 1976-2002. *Journal of Science* 88(9) 3155-3165
- Donaldson, T. and Preston, L.E., 1995.** The stakeholder theory of the corporation: Concepts, evidence, and implications. *Academy of management Review*, 20(1), pp.65-91.
- Drèze, J. and Stern, N., 1987.** The theory of cost-benefit analysis. In *Handbook of public economics* (Vol. 2, pp. 909-989). Elsevier.
- Dwinger, F. (2010).** Infrastructure for Cocoa: The story of Ghana's Trade Relationship with China. Retrieved on November 4, 2010, from [http:// www.consultancyafrica. com/index.php? https://www.ghanaweb.com/ Ghana Home Page/business/Mass-cocoa-spraying-exercise-dwindles-Dr-Baah-311545](http://www.consultancyafrica.com/index.php?https://www.ghanaweb.com/GhanaHomePage/business/Mass-cocoa-spraying-exercise-dwindles-Dr-Baah-311545)
- Freeman, R.E., 2010.** Strategic management: A stakeholder approach. Cambridge university press.
- G8 Africa Infrastructure Investment Conference, 6th -8th January 2010, ISSER. (1990–2006).** The State of Ghanaian Economy, University of Ghana Legon. Assemblies of God Literature Centre Accra.
- Ghana Cocoa Board 2011.** *Summary of decisions of the producer price review commission (PPRC) on the 2011/12 cocoa season. Producer price, buyers' margin and other rates/fees.* 17th October 2011.
- Ghana Cocoa Board. (1998).** Socio-economic Study. Final Report, Cocoa Board, Ghana; MASDAR.
- Ghana News Agency 2005.** Ghana Achieves Highest Cocoa Revenue. Retrieved on June 10, 2011, from <http://www.modernghana.com/news/71649/1/ghana-achieves-highest-cocoa-revenue.html>.
- Gittinger J .P. (1984).** Economic Analysis of Agricultural Projects. 2nd Edition, Completely Revised and Expanded. EDI Series in Economic Development. The Johns Hopkins University Press.
- Gray, R., Owen, D. and Adams, C., 1996.** Accounting & accountability: changes and challenges in corporate social and environmental reporting. Prentice Hall.
- Grossman-Green and Bayer. C. (2009),** "A Brief History of Cocoa in Ghana and Cote d'ivoire", Tulane University-Payson Centre for International Development.

- Kitchenham, B. (2002).** Principles of survey research. Software Engineering Notes. 27 (5).
- Manu J. E. A. (1973),** Cocoa in the Ghana economy. In proceedings of Cocoa economic Resources Conference, 1973, Legon pp 265-267
- MILES, M.B. and HUBERMAN, A.M., (1994).** Qualitative Data Analysis. 2nd ed. Thousand Oaks, CA: Sage.
- Mitchell, R.K., Agle, B.R. and Wood, D.J., 1997.** Toward a theory of stakeholder identification and salience: Defining the principle of who and what really counts. Academy of management review, 22(4), pp.853-886.
- Naminse, E.Y, Fosu, M, Nongyenge Y, 2012:** The Impact of Mass Spraying Programme on Cocoa Production in Ghana, page 3.
- Naminse, E.Y., Fosu, M. and Nongyenge, Y., 2011.** The impact of mass spraying programme on cocoa production in Ghana. Report on Field Survey.
- Nyanteng V.K.(1980);** *The Declining Ghana Cocoa Industry; An Analysis of some Fundamental Problems;* Technical Publication Series No. 40, Institute of Statistical , Social and Economic Research
- Nyanteng, V.K., 1980.** The declining Ghana cocoa industry: an analysis of some fundamental problems. Technical Publications Series Inst. of Statistical, Social and Economic Research, Univ. Ghana (Ghana)., (40).
- Obeng .K.A. and Opoku I.Y. (2008):** The National Cocoa Diseases and Pests Control (CODAPEC): Achievements and Challenges
- Omane-Adjepong, M., 2012.** Estimating the Impact of the Cocoa Hi-Tech and Mass Spraying Programmes on Cocoa Production in Ghana: An Application of Intervention Analysis (Doctoral dissertation).
- Owusu-Achaw, K.B., 2012.** Assessing the financial viability of the cocoa “Hi-Tech” and the “Codapec” Programmes in Ghana (Doctoral dissertation).
- Pickard, A. J. (2007).** Research methods in information. London: Facet.
- Prest, A.R. and Turvey, R., 1966.** Cost-benefit analysis: a survey. In Surveys of economic theory (pp. 155-207). Palgrave Macmillan, London.
- SATU, E. and HELVI, K. (2007),** JAN Research Methodology [online]. The Qualitative Content Analysis Process. Available from: www.academic.csuohio.edu/kneendorf/c63309/Articlesfromclassmember/Amy.pdf. [Accessed 20th June, 2012].
- Sarpong, K. (2005).** Ghana Cocoa Board, Economic Issue-Press Statement. *studies*“ (AMIDst)
- Saunders, M., Lewis, P. and THOrnhill, A., (2003).** Research Methods for Business Students. 3rd ed. Essex: Prentice Hall/ Financial Times.

Suglo Joseph (2012). Sustaining the Mass Cocoa Spraying Program in the Ahafo Ano North District in Ashanti

Tigner, R. (2006). Partial Budget. A Tool to Analyse Farm Business. Available at <http://www.extension.iastate.edu>. Accessed: 5/5/2009

Vigneri M. (2008), “Drivers of change in Ghana’s cocoa sector”. IFPRI-GSSP Background Paper n. 13. International Food Policy Research Institute.

Wang, N., 2003. Measuring Transaction Costs: An Incomplete Survey, Ronald Coase Institute Working Papers, no. 2, <http://www.coase.org/workingpapers/wp-2.pdf>.

Williamson, O.E., 1985. The Economic Institutions of Capitalism: Firms, Markets, Relational Contracting, Free Press; Collier Macmillan, London.

Wood G. A. R. and Lass R.A., (1998). “Cocoa” (4th Edition) Longmans Scientific and Technical, London.620 pp

www.cocobod.gh/capsid_control.php

www.gprg.org/pubs/reports/pdfs/2004

www.kisaso.com/freepedia/cocoa

www.kuapakooko.com/index

www.mbendi.com/indy/agff/cocoa

Young, A. (1994). The Chocolate Tree. Smithsonian Institution Press, Washington D.C. USA.

Zeitlin, A. and (2006), “Ghana Cocoa Farmers Survey, 2004: Report to Ghana Cocoa Board”.



APPENDIX 1

REGIONAL COCOA PRODUCTION DATA FROM 1947/1948 TO 2016/2017

CROP YEAR	ASHANTI	BRONG-AHAFO	EASTERN	CENTRAL	WESTERN	VOLTA	TOTAL
1947/48	107,630		56,000		27,970	20,279	211,879
1948/49	127,880		81,003		47,062	26,881	282,826
1949/50	117,875		68,161		41,146	24,617	251,799
1950/51	124,630		70,643		46,116	25,029	266,418
1951/52	99,231		60,679		31,194	23,945	215,049
1952/53	120,190		62,526		39,863	28,356	279,291
1953/54	103,322		52,036		35,676	22,206	213,240
1954/55	111,063		53,641		33,727	22,388	220,819
1955/56	120,940		50,743		32,666	28,100	232,449
1956/57	134,929		55,893		44,804	32,288	267,914
1957/58	106,597		42,637		38,942	21,575	209,751
1958/59	146,247		37,807		40,322	25,039	249,415
1959/60	182,775		58,820		57,285	23,342	322,222
1960/61	152,754	92,552	75,082	46,821	39,318	30,777	437,304
1961/62	151,646	71,245	81,112	61,748	21,176	29,034	415,961
1962/63	150,200	83,156	85,907	64,889	23,278	21,054	428,484
1963/64	156,586	90,379	76,911	57,421	21,871	24,614	427,782
1964/65	204,427	130,245	107,820	75,697	34,935	27,745	580,869
1965/66	155,816	101,790	72,149	41,587	23,800	20,620	415,762
1966/67	130,220	87,698	69,511	50,125	25,040	18,759	381,353
1967/68	140,844	109,060	71,323	52,790	32,329	24,319	430,665
1968/69	124,903	85,336	58,733	43,845	23,282	19,489	355,588
1969/70	125,406	115,393	69,431	55,236	31,113	20,878	417,457
1970/71	130,434	112,076	73,805	59,813	36,153	15,348	427,629
1971/72	148,935	116,916	76,224	62,762	47,516	10,107	462,460
1972/73	125,649	112,754	74,578	43,469	43,129	22,118	421,697
1973/74	106,977	78,502	65,617	47,707	41,338	14,489	354,630
1974/75	109,802	81,533	73,393	50,766	52,106	14,009	381,609
1975/76	124,334	88,480	69,201	38,547	40,343	9,228	370,133
1977/78	89,619	69,541	41,289	21,553	41,968	7,369	271,339
1978/79	86,913	50,408	50,200	25,700	45,873	5,980	265,074
1979/80	100,363	74,894	45,051	19,034	52,301	4,776	296,419
1980/81	91,537	47,598	46,632	25,563	45,148	1,496	257,974
1981/82	70,790	49,747	36,890	22,069	43,703	1,683	224,882
1982/83	55,310	35,174	31,254	17,604	35,109	3,776	178,227
1983/84	47,059	29,685	25,504	13,818	40,161	2,659	158,886
1984/85	44,692	28,629	28,009	18,754	51,412	1,018	172,514

CROP YEAR	ASHANTI	BRONG-AHAFO	EASTERN	CENTRAL	WESTERN	VOLTA	TOTAL
1985/86	54,466	36,474	34,612	27,636	64,731	1,115	219,034
1986/87	56,870	32,643	33,399	26,912	76,038	1,903	227,765
1987/88	49,766	28,796	29,951	19,115	58,738	1,805	188,171
1988/89	76,268	48,647	39,193	28,423	105,894	1,676	300,101
1989/90	72,124	45,126	33,296	31,208	111,513	1,785	295,052
1990/91	60,958	42,016	32,261	26,517	128,955	2,645	293,352
1991/92	52,467	33,734	26,196	19,356	109,469	1,595	242,817
1992/93	65,353	37,014	34,608	29,587	143,288	2,273	312,123
1993/94	47,172	30,927	25,372	21,936	128,323	924	254,654
1994/95	64,026	37,014	33,667	20,518	153,162	1,068	309,455
1995/96	81,977	39,048	38,932	36,410	206,570	906	403,843
1996/97	64,534	34,195	34,306	22,415	165,361	1,678	322,489
1997/98	78,909	39,898	29,468	29,468	216,955	976	395,674
1998/99	74,390	40,212	40,503	29,653	210,545	2,060	397,363
1999/00	82,068	39,310	41,526	31,360	240,331	2,351	436,946
2000/01	72,993	33,110	46,226	32,136	203,626	1,681	389,772
2001/02	56,983	31,354	39,348	29,992	181,865	1,021	340,563
2002/03	82,445	45,308	51,604	39,989	276,587	913	496,846
2003/04	121,269	69,695	68,634	55,819	419,650	1,909	736,976
2004/05	90,535	55,025	48,868	59,308	344,246	1,336	599,318
2005/06	133,026	72,766	55,871	55,497	422,223	1,075	740,458
2006/07	95,427	65,629	51,132	43,757	357,827	761	614,533
2007/08	125,270	66,921	55,916	62,378	369,458	838	680,781
2008/09	110,643	61,562	63,405	60,686	413,395	951	710,642
2009/10	116,538	60,600	55,736	57,562	359,910	595	650,941
2010/11	168,916	101,302	78,928	76,863	583,589	3,241	1,012,839
2011/12	134,295	76,511	67,713	71,760	525,237	3,833	879,349
2012/13	137,379	88,034	75,912	71,540	458,107	4,495	835,467
2013/14	156,902	87,116	80,692	85,446	483,279	3,481	896,916
2014/15	136,134	81,896	68,415	70,690	380,469	2,650	740,254
2015/16	133,462	74,943	75,787	75,870	415,302	2,680	778,044
2016/17	173,328	101,058	96,639	95,588	496,475	6,422	969,511

Source: Ghana Cocoa Board Annual Reports 1947/1948 to 2016/2017 Cocoa Years.