

**SUSTAINING THE MASS COCOA SPRAYING PROGRAM IN THE AHAFO
ANO NORTH DISTRICT IN ASHANTI**

BY

SUGLO JOSEPH

(Bed AGRICULTURE SCIENCE)

KNUST

**A thesis submitted to the School of Graduate Studies,
Kwame Nkrumah University of Science and Technology,
in partial fulfillment of the Requirement for the Degree of**

**MASTER OF SCIENCE
DEVELOPMENT POLICY AND PLANNING**

**Department of Planning
College of Architecture and Planning**

October, 2012

DECLARATION

I hereby declare that this submission is my own work towards the MSc. Development Policy and Planning and, to the best of my knowledge, it contains no material previously published by another person or material which has been accepted for the award of any degree of the university, except where acknowledgement has been made in the text.

SUGLO JOSEPH (PG4391910)
(STUDENT NAME AND ID) SIGNATURE DATE

KNUST

Certified by:
DR. K.O. AGYEMAN
SUPERVISOR SIGNATURE DATE



Certified by:
DR. DANIEL K.B. INKOOM
HEAD OF DEPARTMENT SIGNATURE DATE

AKNOWLEDGEMENT

Dr. K. O. Agyeman has been the ideal thesis supervisor. His sage advice, insightful criticisms, and patient encouragement aided the writing of this thesis in innumerable ways; Dr, I appreciate all efforts you put in to get me through this task. I would also like to thank the following people; Dr. I.Y. Opoku and Dr. Richard Acheampong (both of CRIG, Tafo); Mr Charles Tetteh and Mr. T.K Wiredu (both of COCOBOD, A.A.N.D); Mr. Bismack Osae Addo and Nana Akua Achiaa Mensah (COCOBOD, Ashanti); Mr Bennette Owusu Aboagye, Ghana Health Service, Ahafo-Ano North District Health Directorate; Mr, Franklin Eddah, AANDA; Nana Asare Badiako Samuel, District Chief Cocoa Farmer, AAND; Nana Johnson Osei Kusi, Chief Cocoa Farmer, Brosankro; Mr Frimpong Kyeremeh, Chief Cocoa Farmer, Asushyiae ; Mr Daniel Antwi, Chief Cocoa Farmer, Dwaho; Mr Seth Acheampong and Mr Jacob Ayamba (both of Ayeduase), whose support of this project was greatly needed, offered handy and so deeply appreciated.



ABSTRACT

Cocoa has historically been a key economic sector and a major source of export and fiscal earnings to the Ghanaian economy (Bulir 1998; McKay and Arytee 2005). Cultivation of cocoa in large quantity started in 1900 in the country and by the mid 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 cocoa mass spraying programme is the current cocoa programme that was started in 2001 to provide free spraying of cocoa farms for the farmers in order to control capsids and black pod disease. It was on this basis that this study was undertaken to assess various ways that the cocoa mass spraying exercise can be sustained to benefit present and future generations in the Ahafo-Ano North District.

The survey research approach was used in undertaking this study. This was adopted to help acquire knowledge on the current situation with regards to the phenomenon under consideration. focusing on a scientifically selected sample while seeking to make generalisations that concern all cocoa farmers on the programme. Both primary and secondary data were collected and used for the study. Respondents were drawn from the farmers who are the beneficiaries of the programme, the spraying gangs, the District office of the Cocoa Diseases and Pesticides Committee, the District Health Directorate and COCOBOD, and the Cocoa Research Institute of Ghana (CRIG) for the purposes of this study.

It was found from the study that the programme is enjoying high levels of acceptance from the farmers in the District. Again, it has created employment for 1232 people on part-time basis, reduced capsid infestation and black pod infection by 50percent and 65percent respectively and as such contribute positively to the increasing output being experienced in the district. However there are certain challenges which threaten the continuity of the programme in the District. For instance, the supply of farming inputs for the programme was found to be woefully inadequate. Again farmers method of disposing of chemical containers and methods of spraying were not in accordance of the training guidelines. This is because

the education on the safe methods of disposal and wearing of protective clothing was not going down well with the people. As a result, the spraying activity was found to have negative impact on the respondents. Some of them have developed adverse health conditions such as rashes, cold and headaches.

It was therefore recommended that there should be intensification of the education on the cocoa mass spraying exercise to inculcate into the respondents the importance of adhering to the method of proper disposal of waste containers. Again the modalities for the distribution of chemicals used in the cocoa mass spraying should be changed to ensure that the distribution is fair.

KNUST



TABLE OF CONTENTS

DECLARATION	ii
ACKNOWLEDGEMENT	iii
ABSTRACT	iv
TABLE OF CONTENTS	vi
LIST OF TABLES	xi
LIST OF FIGURES	xii
LIST OF ACCRONYMS	xiii
CHAPTER ONE	1
GENERAL INTRODUCTION	1
1.1 Background of the study	1
1.2 Problem statement	2
1.3 Research questions	3
1.4 Research objectives	3
1.5 Scope of research	4
1.6 Justification of the research.....	4
1.7 Organization of the research report.....	5
CHAPTER TWO	6
REVIEW OF RELATED LITERATURE	6
2.1 Introduction	6
2.2 Definition of Concepts and Terms	6
2.2.1 Cocoa Diseases and Pests Control Programme (CODAPEC).....	6
2.2.2 Sustainability	6

2.3 World Cocoa Industry	8
2.3.1 Cocoa in Developing Countries.....	9
2.4 Ghana’s cocoa	9
2.5. Major pests and diseases of cocoa.....	10
2.6. Cocoa policy interventions.....	11
2.7. The Project (Cocoa Rehabilitation Project) 1990	13
2.7.1 Funding of the project.....	13
2.7.2 Implementation of the project.....	14
2.7.3 Evaluation of the project.....	14
2.8. The Current Mass Cocoa Spraying Programme in Ghana	16
2.8.1 Institutional framework of the ‘Mass Spraying’ programme in Ghana.....	16
2.8.2 Training	17
2.8.3 Insecticides	17
2.8.4 Achievements of CODAPEC	17
2.8.5 Challenges	18
2.9. Indicators for measuring the Sustenance of the Mass Cocoa Spraying Programme.....	18
2.9.1 Economic Sector.....	19
2.9.2 Social Sector	20
2.9.3 Environment	20
2.10 Other Issues Relating to Mass Spraying Programmes in Ghana.....	20
2.11. SUMMARY/KEY OUTCOMES OF THE REVIEW OF LITERATURE.....	23
2.13. Conceptual framework	24

CHAPTER THREE	26
RESEARCH METHODOLOGY AND PROFILE OF STUDY DISTRICT	26
3.1 Introduction	26
3.2 Research Design	26
3.3 Data Requirements and Sources	26
3.4 Sampling Techniques	28
3.4.1 Sample size determination	28
3.4.2 Sample Size Distribution	29
3.5 Field Work	29
3.6 Data Collection and Analytical Methods	30
3.7 Profile of the Ahafo Ano North District	30
3.7.1 Location and size	31
3.7.2 Physical Characteristics of Ahafo Ano North District	32
3.7.3 Demographic characteristics	34
3.7.4 Land Tenure System	34
3.7.5 Other Interventions in the Cocoa Sector in the District	35
3.7.5.1 COCOA HI-TECH	35
CHAPTER FOUR	37
THE SUSTAINANCE OF THE COCOA MASS SPRAYING EXERCISE IN THE AHAFO-ANO NORTH DISTRICT OF THE ASHANTI REGION ANALYSIS AND DISCUSSION	37
4.0 Introduction	37
4.1 Background of Respondents	37

4.1.1 Sex of Respondents	37
4.1.2 Age Composition of Respondents	38
4.1.3 Educational Level of Respondents	38
4.2 Potentials of the Mass Cocoa Spraying Exercise	39
4.2.1 Economic Potentials	39
4.2.1.1 Reduction in Losses due to Pest and Disease (Capsid and Black pod)	39
4.2.1.2 Employment Generation	41
4.2.1.3 Sources of Funding	41
4.2.2 Social Potentials	42
4.2.2.1 High Level of Acceptance	42
4.2.2.2 Level of Participation	43
4.2.3 Environmental Potentials.....	44
4.3 Challenges of the Mass Cocoa Spraying Programme in the Ahafo- Ano North District	44
4.3.1 Economic Challenges	44
4.3.1.1 Supply of inputs (pesticides, fungicides, spraying machines, and protective clothing)	44
4.3.1.2 Creation of Spraying Gangs	53
4.3.1.3 Employment of workers on part-time.....	53
4.3.1.4 Lack of Reliable Data on Farm Sizes	54
4.3.2 Social Challenges	55
4.3.2.1 Effects of Chemicals on Respondents	55
4.3.3 Environmental Challenges.....	56

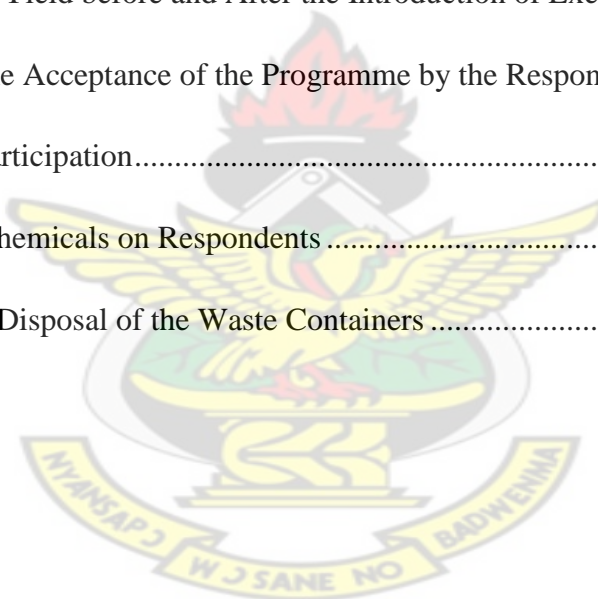
4.3.3.1 Disposal of Used Pesticides Containers	56
4.3.3.2 Use of unapproved Chemicals	57
4.4 Institutions involved in the Mass Spraying Exercise in the District	57
4.5 Period that the Programme is undertaken and how Communities are selected.....	58
4.4.2 Monitoring of the Programme	58
CHAPTER FIVE	60
SUMMARY OF KEY FINDINGS, RECOMMENDATIONS AND CONCLUSIONS ..	60
5.1 Introduction	60
5.2 Summary of Key Findings	60
5.2.1. Ages of Farmers and Educational Levels of Respondents	60
5.2.2 Supply of Farming Inputs for the Cocoa Mass Spraying Exercise.....	61
5.2.3. Level of Acceptance	61
5.2.4 Disposal of Waste and Effects of Chemicals Used on Respondents.....	61
5.2.5 Employment Generation.....	62
5.2.6 Use of Unapproved Chemicals	62
5.3 Recommendations	62
5.4 General Conclusion	65
REFERENCES	66
APPENDICES	70

LIST OF TABLES

Tables	Pages
Table 2.1.Quantity of Gamalin”20” Distributed to Farmers (1959-1978).....	21
Table 3.1: Major Types and Sources of Information Collected for the Study.....	27
Table 3.2 District Cocoa Production Figures: (2002 – 2009).....	35
Table 4.1 Sex Composition of Respondents	37
Table 4.2 Age Composition of Respondents	38
Table 4.3:Educational Level of Respondent.....	39
Table 4.4: showing the Supply of Inputs (Clothing).....	45
Table 4.5: Showing the Supply of Inputs (Fungicides)	46
Table 4.6: Showing the Supply of Inputs (Pesticide)	47
Table 4.7: Showing the Supply of Inputs (Spray Machines).....	48
Table 4.8: Study communities’ Share of Inputs Between 2002 and 2011.....	49
Table 4.9: Gaps in Supply of Protective Clothing to the Study communities	50
Table 4.10:Supply of Spray Machines Between 2002 and 2011	51
Table 4.11: Community’s Share of Pesticides.....	52

LIST OF FIGURES

Figures	Pages
Figure 2.1 Brundtland Development Framework (Theoretical Framework for Measuring the Mass Spraying Programme)	8
Figure 2.2: Indicators for measuring the Mass Spraying Programme in the Ahafo-Ano North District	19
Figure 2.3: conceptual framework of the principles and concept of sustenance and the mass cocoa spraying programme.	24
Figure 3.1 Location of Study Area in Ahafo-Ano North.....	32
Figure 4.1 The Loss of Yield before and After the Introduction of Exercise	40
Figure 4.2 Illustrates the Acceptance of the Programme by the Respondents.....	42
Figure 4.3 Levels of Participation.....	43
Figure 4.4 Effects of Chemicals on Respondents	55
Figure 4.5 Methods of Disposal of the Waste Containers	56



LIST OF ACCRONYMS

AANDA	Ahafo-Ano North District Assembly
ADB	African Development Bank
ADF	Agricultural Development Fund
CODAPEC	Cocoa Diseases and Pesticides Committee
DADU	District Agriculture Development Unit
DHD	District Health Directorate
COCOBOD	Ghana Cocoa Board
CMB	Cocoa Marketing Board
CRIG	Cocoa Research Institute of Ghana
CSSV	Cocoa swollen shoot virus
MMYE	Ministry of Manpower, Youth and Employment
EU	European Commission
CRP	Cocoa Rehabilitation Project
ERP	Economic Recovery Programme
GOG	Government of Ghana
MOFA	Ministry of Food and Agriculture
LBC	Licensed Buying Companies
EPA	Environmental Protection Agency
PCR	Project Completion Report
GLSS	Ghana Living Standards Survey
UNICEF	United Nations Children Fund

CHAPTER ONE

GENERAL INTRODUCTION

1.1 Background of the study

Cocoa holds a unique position in Ghana's economy. It has long played a crucial role in Ghana's economic development and remains an important source of rural employment. It also remains the country's most important agricultural export crop. As a result, various interventions have been undertaken to improve cocoa production. These initiatives have paid dividends in recent years, with significant gains in national output in the most recent decade along with surging export revenues. In 2009-10, Ghana exported more than half a million tons of cocoa beans; this shot up to 1 million tons in 2011 generating over US\$1.6 billion in foreign exchange (COCOBOD, 2011).

No other country comes to mind more than Ghana when one speaks of quality cocoa beans. And Ghana cannot be thought of without reference to its cocoa sector, which offers livelihoods for over 700,000 farmers (Breisinger et al, 2008) in the southern tropical belt of the country. The saying 'Cocoa is Ghana, Ghana is Cocoa' as stated by Ghana Cocoa Board (COCOBOD (2000) portrays the important role cocoa plays in the economy of Ghana. Cocoa is the second highest foreign exchange earner in Ghana and the lives of many farmers and their families depend on it.

Cocoa cultivation assumed commercial dimensions after its introduction by Tetteh Quarshie in the 19th C from Fernando Po, which began in the Eastern region and spread to other forest areas of the country. Currently, there are six cocoa growing regions namely: Ashanti, Brong Ahafo, Eastern, Volta, Central and Western regions. In recognition of the contribution of cocoa to the development of Ghana, the colonial government in 1947 established the Ghana Cocoa Board (COCOBOD), an enhanced form of the then Cocoa Marketing Board (CMB), as the main government agency responsible for the development of the industry.

Ghana's cocoa sector has suffered a number of drawbacks and challenges and this has affected output from 1964/65 to 1983/84 when production declined from as high as 500,000 tons to about 159,000 tons (Breisinger et al, 2008) respectively. Governments have implemented several policies to improve the production of cocoa in Ghana. To mention a few of such policies are the cocoa swollen shoot virus control project under the cocoa

rehabilitation project and the National Cocoa Diseases and Pests Control (CODAPEC)'s Mass Cocoa Spraying Exercise; one of the most recent such policies implemented in Ghana in 2001 to help fight against pests(Capsids) and diseases(Black pod). Many of such policies in the sector, though good, could not be sustained denying the sector of the full benefit of such policies as the 1956 mass spraying (Nyangteng, 1980; CMB,1979). A number of positives have been associated with the current spraying programme by various groups of people including politicians. There is however the need to assess the ways to sustain the programme and how future generations can also take advantage of the programme and improve upon production in the country.

1.2 Problem statement

The current Mass Cocoa Spraying Programme is not the first to be implemented in the country and also in the Ahafo Ano North District . There have been mass sprayings in the 1950s, 1960s, and 1980s(Nyangteng, 1980). These spraying programmes according to the same writer had contributed to increases in production but could not be sustained due largely to irregular and inadequate supply of inputs, mainly chemicals and spraying machines, leading to declines.

These challenges are emerging in the Ahafo Ano North district raising concerns about sustenance of the mass spraying programme. During a familiarisation visit to the study area(to see whether there was a problem worth studying), farmers(a few I interacted with) gave gory testimonies of crop losses due to pest(mainly capsid) and disease((mainly black pod) before the introduction of the Mass Spraying Exercise. Some intimated that there were years when crop losses due to capsid and black pod could reach 100percent. The spraying exercise was thus seen by these farmers as “saviour” that must be sustained; “en ma yeng gyae da” one farmer exclaimed. However, interactions with some COCOBOD officials in charge of the programme and the district chief cocoa farmer, revealed a litany of challenges that are worthy of investigation. These centred mainly on delay and inadequate supply of inputs since the inception of the programme in 2001. The chief farmer in particular intimated that they were to take delivery of some chemicals but which had delayed for 2months as at the time of the visit. He also added inadequate spraying gangs to the list of challenges. It was striking to learn that for some years they did not receive any supply of inputs for the spraying but were only encouraged to purchase them at market prices at designated stores.

Considering that the mass spraying programme was introduced as a solution to these development challenges in such a critical sector of the country's economy, couple with the fact that similar ones in the past had been suffocated by these challenges, there is the need for a scientific enquiry. This study thus set out to examine the extent and magnitude of these challenges in the study district and whether there are other emerging ones likely to militate against the sustenance of the programme. In doing so, the study will bring out the inputs supply gaps as a demonstration of the extent to which the sustenance of the programme is challenged, and also put forward some recommendations to deal with the identified challenges.

1.3 Research questions

The study is interested in providing appropriate answers to the questions below:

1. What are the potentials of the mass cocoa spraying in Ahafo Ano North district?
2. What are the challenges or draw backs of the mass cocoa spraying exercise in the study area? and
3. How can any drawbacks be addressed to improve the socio- economic and environmental benefits of the programme, through recommendations?

1.4 Research objectives

The general objective of the study is to examine the extent to which Mass cocoa spraying programme can be sustained in Ahafo Ano North district. The study also aims at providing policy recommendations to address the issues identified.

Specifically, the study intends:

1. to examine the potentials of the mass cocoa spraying programme in Ahafo Ano North district.
2. investigating the issues that beset the programme in Ahafo Ano North district.
3. to assess the economic, social, and environmental sustenance of the mass cocoa spraying exercise in Ahafo Ano North district.
4. To recommend possible measures to sustain the mass cocoa spraying exercise in Ahafo Ano North district.

1.5 Scope of research

Contextually, the study concentrates on sustaining the mass cocoa spraying exercise in Ahafo Ano North district of Ashanti. Issues such as local acceptability and ownership, economic benefits, and environmental friendliness of the programme, and the challenges among other issues will be discussed in the research.

Geographically, the study will take place within the Ahafo Ano North District which is located between latitude 6° 47'N and 7° 02'N and longitude 2° 26'W and 2° 04'W. The District is located in the north-western part of Ashanti Region. It is bounded to the south by Atwima District, to the east by Ahafo Ano South District, and to the north and west by Tano South District and Asutifi District respectively, both of which fall within the Brong Ahafo Region. The district lies within the wet equatorial zone. The time frame is from 2001 to 2011. That is the time scope spans from the time the programme started to date.

1.6 Justification of the research

The study in examining the sustenance of the mass cocoa spraying will contribute to a better understanding of the state of the programme in the Ahafo Ano North District (AAND) and inform decision making on the following grounds:

First of all, this study will produce district-specific information from which the scientific community can draw and also provide empirical data to guide this and similar interventions in the sector. Secondly, since the programme is reported to have contributed positively to improve output, there is the need to sustain it for the benefit of present and future generations. For this to be possible, periodic study is required to reveal strengths and weaknesses for continuous review with the view of sustaining it across generations.

Thirdly, Cocoa is the mainstay of Ghana's economy and has contributed meaningfully to the GDP growth and economic development of Ghana. It is worth researching into the policies geared towards improving and developing the sector in order to achieve economic development. The study will therefore provide the platform to direct interventions which are needed to augment the mass cocoa spraying programme in order to make it sustainable and achieve the desired end state.

Fourthly, though Ghana has made progress with regards to attempts to achieve the millennium development goal one, which aims at reducing extreme poverty and hunger, the

assessment of the mass cocoa spraying exercise will reveal the prospects of the programme and how it is positively affecting the livelihoods of the rural poor cocoa farmers and also serve as an incentive package to attract other poor rural dwellers into the sector to reduce the poverty levels in the rural areas in Ghana.

Finally, the study is a contribution to the literature on mass cocoa spraying. As such, this work will be used by other students and researchers working on similar subject matter. The study also will provide the framework and sets the stage for further studies to be conducted into the mass cocoa spraying exercise in Ghana for the field of the academia.

1.7 Organization of the research report

The report will be organized in five chapters. The first chapter of the report is the general introduction of the report. 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 is discussed in the first chapter of the report.

The second chapter of the report 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 build up of other chapters.

Chapter three of the report looks at the research methodology and profile of the study area. The fourth chapter concentrates on empirical analysis of data obtained from the field and other secondary sources about sustaining the mass cocoa spraying programme in Ahafo Ano district.

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

REVIEW OF RELATED LITERATURE

2.1 Introduction

The chapter reviews relevant literature on mass cocoa spraying and other relevant issues in the cocoa sector. The issues are captured from the world's perspective to the local level. In this chapter, key terms and concepts relevant to sustainable development programmes generally, and Mass Cocoa Spraying in particular, are defined and discussed. Lessons learnt from the chapter are summarised and findings conceptualized in a framework for easy understanding.

2.2 Definition of Concepts and Terms

2.2.1 Cocoa Diseases and Pests Control Programme (CODAPEC)

This is the body that has been put in place since 2001 to oversee the implementation of the mass spraying of cocoa farms in Ghana. According to Obeng and Opoku, (2008), this body is organised into National and Regional Coordinators, District, and Local Taskforces and resources are passed on from the national to the local level where the actual spraying takes place. The national coordinators procure the inputs and pass them to the regional coordinators. They also keep data on the human resource base of the programme and pay wages and salary. Regional coordinators receive and distribute the inputs to the districts who(the districts) also oversee the recruitment of personnel at the district and community levels.

2.2.2 Sustainability

There is no single definition for the concept, sustainability. However, institutions and individual authors define the concept to suit their context of work. The following are definitions the study can begin from to understand the concept of sustainable development generally and applying the principles in sustaining the mass cocoa spraying in the Ahafo Ano north District of the Ashanti Region.

Sustainable development is development that meets the needs of the present without compromising the capacity of future generations to meet their own needs (Brundtland, 1987 cited by IISD, 2012).

This definition contains two key concepts:

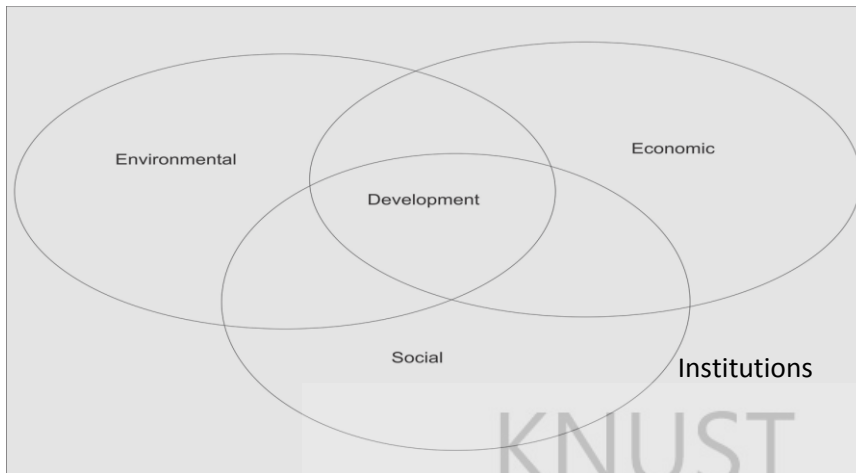
1. The concepts of need, in particular the essential needs of the world's poor, to which overriding priority should be given, and:
2. The idea of limitations imposed by the state of the environment and its ability to provide for present and future generations.

Harwood (1990, cited by Reading University ,n.d) defines Sustainable agriculture as a system that can evolve indefinitely toward greater human utility, greater efficiency of resource use and a balance with the environment which is favourable to humans and most other species. Thus, where the principles of sustainability are put in place and respected and adhered to, the environment becomes resilient and capable of producing for all organisms that depend on it for a rather long time.

Conway and Barbier (1990, cited by University, n.d) of Reading also defines agricultural sustainability as the ability to maintain productivity, whether as a field or farm or nation; where productivity is the output per unit of resource input.

From the definitions outlined above, particularly the one given by the Brundtland's Commission, a sustainable development policy or programme ought to pay equal attention to three key areas namely, **economy**, **society**, and **environment**. Such a balanced investment will build adequate resilience to cater for the needs of both present and future generations. This concept of development is illustrated by the framework below;

Figure 2.1 Brundtland Development Framework (Theoretical Framework for Measuring the Mass Spraying Programme)



Source; Brundtland's Commission Report, 1987.

Under the Mass Cocoa Spraying Programme, resources spent should be directed, according to this principle, equitably to the economic, social, and environmental life of the people if it is to be sustained. It must have positive effects on their economic life 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. The study will therefore reveal the economic, social, environmental, and institutional potentials and challenges of the cocoa spraying programme and make recommendations for its sustenance in the Ahafo Ano North District in the Ashanti Region.

2.3 World Cocoa Industry

The world cocoa industry has been increasing significantly from the twentieth century till date (Breisinger et al, 2008). Changes have taken place in the geographical location of production, processing and consumption, in marketing systems and policies affecting the cocoa sector. There are 40 to 50 million people who depend on cocoa for their livelihood across the globe (Ministry of Manpower, Youth and Employment, 2007).

The origin of the cacao tree dates back to 400 BC in the foothills of the Andes in the Amazon and Orinoco basins of South America, where the Mayans referred to it as "cacao" meaning

“God Food”. The name “*Theobroma cacao*” or “food of the gods” was given by Swedish natural scientist, Carl Von Linné (Grossman-Green and Bayer, 2009). The Spanish started large-scale cultivation of cocoa in the 16th century in Central America, which further spread to British, French, and Dutch West Indies (Jamaica, Martinique and Surinam) in the 17th century and Brazil in the 18th century (Grossman-Green and Bayer, 2009).

São Tome and Fernando Po (present day Equatorial Guinea) recorded cocoa tree growth in 1840; and from there it spreads 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 world cocoa production), *Criollo* (highest quality but tough to produce, Venezuela being the major producer), and *Trinitario* (a mix between Criollo and Forastero (Ministry of Manpower, Youth and Employment, 2007).

2.3.1 Cocoa in Developing Countries

Ghana was the world’s leading producer of cocoa from 1930 to 1978, contributing about 40 percent of world production (Nyanteng, 1980); Cote d’Ivoire is currently the highest producer of cocoa beans. These two countries are the world’s leading cocoa bean producers with shares averaging 38.9 percent and 19.3 percent, respectively (Ministry of Manpower, Youth and Employment, 2007).

Indonesia is the highest non African cocoa producer country with 12.8 percent of world total production. Although Brazil also produces large volumes of cocoa, it consumes most of it and exports little.

2.4 Ghana’s cocoa

Though the first export of cocoa from the Gold Coast was said to have been made in 1885, the first documented shipment of two bags, which was sent to Hamburg, was in January 1893(Grossman-Green and Bayer, 2008). Production grew rapidly to reach 20,000 mt by 1908. At a production level of 41,000 mt in 1911, Ghana was rated the world’s leading producer. In the early 1920’s, Ghana was contributing about 40 percent of the total global cocoa supply with production of between 165, 000 mt to 213,000 mt. The volume of exports grew rapidly to 218,000 mt in 1925; 311,000 mt in 1936; after which it dropped to between 200,000 mt and 300,000 mt in the 1940s due to severe drought and outbreak of diseases and pests (Ministry of Manpower, Youth and Employment, 2007).

Prominent among the diseases was the Cocoa Swollen Shoot Virus, which was discovered and found to be prevalent in the Eastern Region from where the bulk of the cocoa was being cultivated. Action was initiated through a series of reforms in a form of rehabilitation and replanting of farms, mass spraying against diseases and pests, and increase in the producer price to arrest the declining trend in production. However, due to difficulties encountered in re-planting the farms in the Eastern Region as a result of problems of environmental degradation(Vigneri and Kulavalli, undated), coupled with the loss of soil fertility, the centre of production shifted to the Ashanti and Brong Ahafo Regions in the 1940s where fresh forest lands had been planted with cocoa (Grossman et al 2009). Due to the rapid expansion in cultivation and the measures instituted to revamp the farms, especially the mass spraying schemes against capsids, national production rose again between the 1950s and 1960s (Ministry of Manpower, Youth and Employment, 2007), but declined again in the late 1970s and 1980s (Kolavelli and Vigneri, undated).

2.5. Major pests and diseases of cocoa

Black pod is an important fungal disease in Africa, responsible for estimated losses of about 44 percent of global production every year and attacks pods at all stages of their development (CRIG, 1972). Brown pod rot is much less serious, and can only infect through a wound, or through infections caused by other diseases. Cocoa swollen shoot virus (CSSV) in Africa is transmitted by sucking pests, mostly mealy bugs. It affects leaves and pods and causes stem and root swellings, with losses up to 25 percent in the first year and dieback within 2-3 years (European Commission, 2010)

According to the European Commission (2010), Witches' broom is a major constraint in Central and South America. The causal organism(fungus) attacks developing buds or flowers- forming structures called 'brooms' and can cause almost total crop loss. Frosty pod, or monilia pod rot, in the Americas affects younger pods; damage varies from less than 25percent to total loss of production (European Commission, 2010).

Vascular streak dieback, caused by the fungus *Oncobasidium theobromae*, is a problem in South and Southeast Asia. It attacks the vascular tissues which transport water and nutrients around the plant; new shoots of infected plants rarely grow more than 20cm before dying (European Commission, 2010)

Insect pests include Cocoa capsids (*Distintheta theobromae* and *Salbegella singularis*) in West Africa are the most important insect pests; in outbreak years losses can be up to 75 percent; Mealybugs (*Planococcus* and *Stictococcus spp.*) in West Africa, are mainly a problem as vectors of the Cocoa Swollen Shoot Virus Disease (CSSV). Other insect pests include shield bugs, leaf hoppers and thrips (CRIG, 1972). Pod borers, such as the cocoa moth are very important, particularly in South and Southeast Asia and the Americas (European Commission, 2010).

2.6. Cocoa policy interventions

In the MMYE report in 2007, Policies and interventions to boost cocoa production have always been in the areas of diseases and pests control, farm rehabilitation, producer price management, produce payment processes, soil fertility management, planting materials, and research and extension services. By 1930, Ghana had been the leading producer of cocoa for about 20 years. However cocoa production in the Eastern Region was plagued with pests and diseases, which caused production to fast decline (Grossman-Green and Bayer, 2009). The situation called for policy interventions that could control the problems and arrest the declining production trends (MMYE, 2007)

A strange disease(now known to be cocoa swollen shoot virus) which was detected and reported by a farmer, Opanin Sabeng, from Nankese in 1936, formed the basis for the first disease control policy in cocoa production. The disease was later learnt to have been there since 1920 (MMYE, 2007).

In the report of MMYE (2007) the Agricultural Adviser to the British Minister of State for the Colonies, Sir Frank Stockdale, who studied the problem, recommended in the setting up of a Research Station at Tafo. The station was mandated to investigate the disease and pest problems of cocoa in the country in order to recommend the best control measures so as to maintain production levels. Based on the recommendations of the Research Station, the policy of cutting out diseased cocoa trees was enacted. This policy intervention mandated the Agricultural Workers to cut out all affected trees since the causal agent was identified to be a virus and had no control.

Currently, the Cocoa Swollen Shoot Virus Disease Control Unit, a division of COCOBOD, has been entrusted with the mandate to cut out all identified diseased trees and their contacts

after which treatment/ex-gratia grant is paid to the farmer. Hybrid seedlings are then supplied to the farmer for replanting of the treated area, which then paves the way for the payment of first and second replanting grants (MMYE, 2007).

In recent years, the cocoa black pod disease has also come to add to the disease problems and poses a big threat to cocoa production in Ghana. The incidence was reported to be very high in the Ashanti and Brong Ahafo Regions in the early 1980s (CRIG, 1972); losses were estimated to be between 50 percent and 100 percent. The Research Station at Tafo, now Cocoa Research Institute of Ghana (CRIG), identified the causal agent to be *Phytophthora megakarya* and recommended the use of fungicides in spraying the cocoa farms as a means of control. Due to the intensity of the disease, a programme of mass spraying dubbed “*Ye Wafuo Yie*” (maintain your farm properly) was introduced by COCOBOD in 1986 to encourage the effective and efficient application of recommended farm practices alongside fungicidal spraying to achieve improved yields (MMYE, 2007).

In order to sustain the interest of farmers and as a sequel to this initial programme, the “*si anomom kwan preko*” (prevent the incidence of black pod disease) was again put in place and made competitive in 1988. However, disease and pest problems continue to plague the cocoa industry and to efficiently manage these problems, the Government through the Ghana Cocoa Board, has since the 2001/02 cocoa season, been organising a nation-wide cocoa diseases and pests control programme (mass spraying) free of charge for the farmers (Ministry of Manpower Youth and Employment, 2007).

Before the current spraying programme however, Control of capsids started in 1944 using 1 percent aqueous DDT suspension, on the recommendation of the cocoa Research Station at Tafo. A large scale capsid control programme (dubbed mass spraying) was organised in 1956, using Gammalin “20” (lindane) when the effects of capsid menace on the cocoa farms became very devastating (CMB, 1979). This programme was continued in the 1960s and increases in production to 580,000 mt in 1964/65 were attributed largely to the ‘saturation spraying’ campaign in the early 1960’s (Nyanteng, 1980). The current policy intervention in a form of “mass spraying programme” is seen as a replication of the spraying policy of the 1960s.

2.7. The Project (Cocoa Rehabilitation Project) 1990

The Cocoa Rehabilitation Project (CRP) was the first African Development Bank (ADB)/African Development Foundation(ADF) financed cocoa project in Ghana. According to Agriculture Development Bank report in 2002, the specific objectives of the projects were to (i) increase cocoa production to give an annual output of at least 300,000 tons per year by 1995; (ii) increase foreign exchange earnings from cocoa export and (iii) reduce rural poverty and improve quality of life in the cocoa growing areas.

According to ADB (2002) the project's objectives were to be achieved through the following actions: (i) maintaining sufficient cocoa producer price incentive, (ii) reorganisation and streamlining of cocoa extension services to enhance its efficiency and ensure effective supervision; (iii) allow better use of skilled staff, and reduce costs; (iv) privatization of cocoa input marketing and removal of subsidies; (v) provision of additional storage capacity and the reorganisation of the cocoa purchasing, efficiency of the cocoa evacuation system through increased transport facilities and additional storage capacity; (vi) privatization of internal cocoa marketing; (vii) strengthening cocoa research; (viii) increased seedling production through improvements to the existing seed gardens by establishment of 100 ha of new gardens; (ix) cocoa swollen shoot virus disease control, over 17,900 hectares of existing plantation; and (x) improvement of cocoa evacuation through the implementation of a roads rehabilitation program in cocoa growing regions.

2.7.1 Funding of the project

The United Airlines 100 million Cocoa Rehabilitation Project (CRP), was financed jointly by ADB (19.2percent), African Development Foundation (ADF) (6.6percent), International Development Agency (IDA) (31.6percent), Banque Arabe de Developpement Economique en Afrique (BADEA) (7.8percent), Official development assistance (ODA) (9.3percent), the Ghana Cocoa Board (17.4percent) and the Government of Ghana (8.4percent). The project was approved on 25 April 1988 by the ADB and ADF Boards and was expected to be completed by June 1993. The loans were signed on 13th February (ADB) and 23rd June 1989 (ADF), and were declared effective on 9th July and 24th August 1989 respectively. Actual start-up was in November 1989 following the finalization of the financing plan. Disbursement started on 24th January 1991 (ADB) and 13th July 1993 (ADF) (ADB, 2002). The ADB financed the Extension and Training, Input Supply, Internal Marketing and

Head Office, Monitoring and Evaluation components, while ADF supported the Roads component.

2.7.2 Implementation of the project

The first phase of the project was implemented as pilot from 1970-1979 at the Suhum area of the Eastern Region and was reported to be successful (unpublished work by Dodjie cited in the department of development studies at the University of Ghana). The implementation of the project took longer than the five years as programmed. The ADB/ADF component of the project was completed in 1997. The ADF loan was fully disbursed and was closed in September 1998 while the ADB loan was 91 percent disbursed by 31 December 1999. The Bank Group Project Completion Report (PCR) was submitted to the Board in December 1999; the other co-financiers also closed their loans (ADB, 2002).

2.7.3 Evaluation of the project

Where no benchmark data existed, the performance during and after implementation was compared with “best practices” based on similar projects elsewhere. The following findings were realized from the evaluation of the project in the ADB report in 2002. The CRP was found to be consistent with the major policy thrust of the Economic Recovery Programme (ERP), which was to realign incentives towards productive activities (producer price increase, exchange rate adjustment, price and trade liberalization) and the rehabilitation of economic and social infrastructure. The policy issues and investment programme were also consistent with that of the Bank’s.

However, the project quality at entry was weak. Neither the Borrower nor the Bank participated in the preparation of the project. The Bank was only “invited” at the appraisal stage to co- finance some of the components. The inability of the GOG to undertake any feasibility study on the technical, financial and economic aspects of the project led to challenges at the implementation stage.

The primary objective of increasing cocoa production was achieved. The major factors for the increase in cocoa production were (i) the increase in producer prices, (ii) the increasing availability of improved hybrid seed varieties, (iii) strengthened research-extension-farmer linkage, (iv) pest and disease control (principally through the Cocoa Swollen Shoot Virus Disease Control) , and (v) improvements in the domestic marketing of cocoa. Producer price (in nominal terms was increased by more than 300 percent between 1983/84 and 1995/96.

The increase in nominal price was also translated to real price increase but in later years (1996-1999) real producer price fell as a result of lack of congruence between macro and micro economic policy measures and falling world cocoa prices. The capacity of the Cocoa Research Institute of Ghana (CRIG) to deliver the necessary scientific and technical support to the cocoa industry was enhanced and research/extension linkages have been strengthened. Seedling production (on a cost recovery basis since 1998/99) is being tailored to meet effective demand. Though the road component was scaled down as a result of late start-up, the revised target of 1,500 km; had an implementation completion record of 83 percent. Progress in the unification of extension was slow as a result of lack of strong institutional commitment on the part of COCOBOD to the unification in the first instance and the inadequate preparation for the merger by Ministry of Food and Agriculture (MOFA) (ADB, 2002).

An annual incremental production of 110,000 – 115,000 tons had been attributed to project intervention and activities, and the Economic Rate of Return (ERR) of 24.3 compared favourably with the Appraisal estimate of 23 percent. The CRP had also contributed to increased rural welfare and rural poverty reduction as the ADB report of 2002 indicates that farmers were earning returns 2.4 – 4.9 times better than before project intervention. Results of the Ghana Living Standards Survey (GLSS, 2005) also revealed that rural poverty (absolute) declined from 43percent to 34 percent between 1989 and 1999 with cocoa farmers experiencing a faster decline (39percent to 27percent) in poverty level (ADB, 2002).

The project contributed to institutional development. Research is now strengthened and focused, human capacity developed (particularly in research and training), support given to Farmer- Based Organisations in inputs procurement and marketing and the gradual involvement of the private sector in domestic cocoa marketing. Cocoa extension services were merged with the extension directorate of MOFA (in 1999) and cocoa feeder roads development and maintenance transferred to the Department of Feeder Roads in the Ministry of Roads and Transport. Progress has been made in the liberalization of domestic marketing. The Produce Buying Company has been privatized (in 2001) and Licensed Buying Companies (LBCs) have been permitted to buy cocoa since 1993/94. The market share of the LBCs has steadily increased from 31percent in 1993/94 to 63percent by 2000/2001. Progress could have been faster if a more conducive macroeconomic environment and institutional support had been given to the private sector in terms of financial assistance (credit), training, logistics and improved marketing margin (ADB, 2002).

2.8. The Current Mass Cocoa Spraying Programme in Ghana

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

2.8.1 Institutional framework of the 'Mass Spraying' programme in Ghana

Cocoa Diseases and Pests Control Committee (CODAPEC), was established by the government of Ghana in the year 2001 as the implementing body of the programme. The programme aimed at providing free assistance to farmers in controlling cocoa pests and diseases such as black pod and capsid. The organisational 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 chemicals, protective cloths, and spraying machines. Salaries of workers are also determined by them.
- Regional coordinators. The task force consists of; the regional minister, chief farmer in the region, the regional cocoa manager, and the regional representative from licensed cocoa buying companies. They distribute chemicals, protective cloths and spraying machines to the various districts.
- The district coordinators. The task force comprises; the district chief executive, the district cocoa manager, the district chief farmer, and the district representative from licensed private cocoa buying companies in the district.

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

- Local coordinators. The task force consists of; the local chief farmer, supervisor of the spraying gang, assemblyman, 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.

2.8.2 Training

In each season, the programme starts with the training of farmers, gang supervisors and Mechanics by the Project Coordinators and resource persons from CRIG. The trainees are taken through the appropriate methods of pesticide application with emphasis on the dosages of the various pesticides, dangers of exposure to pesticides, importance of the use of protective clothing, handling and minor repairs of spraying machines, observance of personal hygiene, environmental safety issues, first aid, and techniques of application, handling and disposal of empty containers. The roles and responsibilities of stakeholders are also explained during each training sessions (Obeng and Opoku, 2008).

2.8.3 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).

2.8.4 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 fertiliser 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 300,000tons in 2000/01 crop season through 740,000tons in 2007 to the current 1000, 000tons reported in 2011, as to whether the spraying programme account for this is yet to be ascertained. This is however beyond the scope of this research.

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).

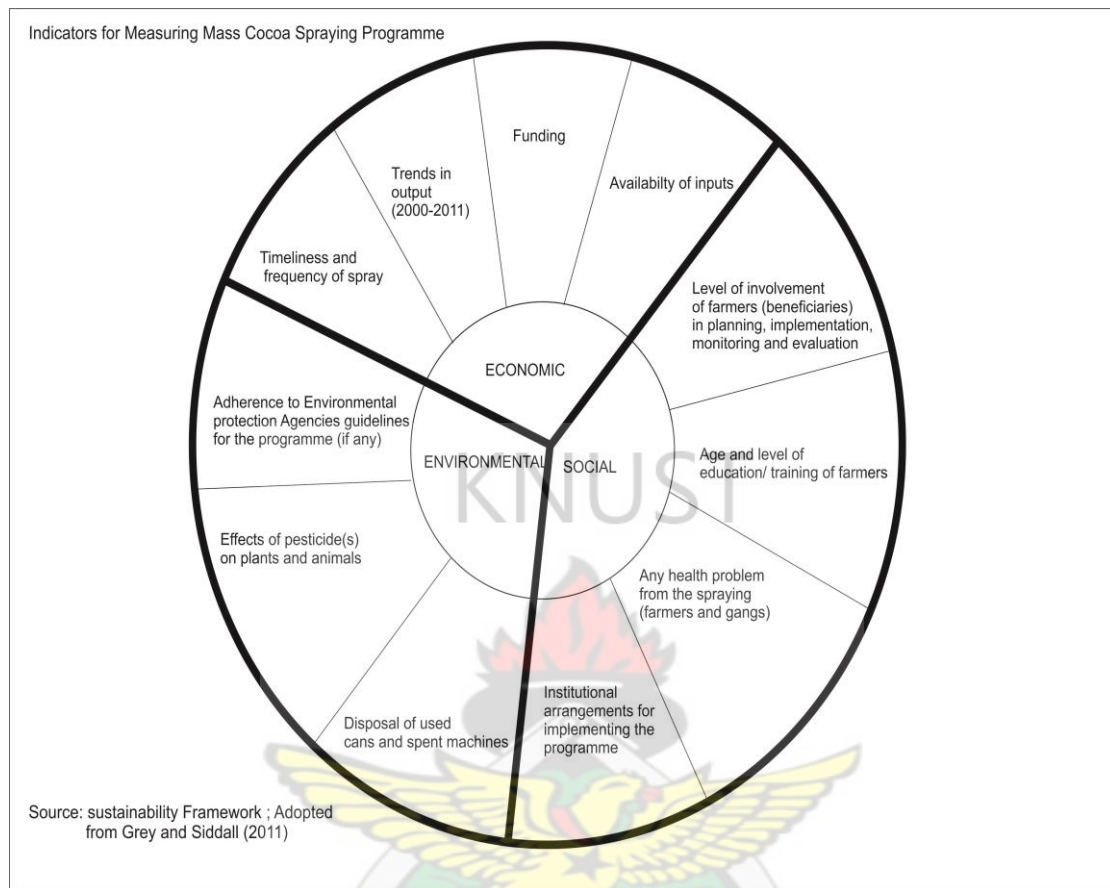
2.8.5 Challenges

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 in the study area.

2.9. Indicators for measuring the Sustenance of the Mass Cocoa Spraying Programme

The indicators are selected to satisfy the Triple Bottom Line principle of sustainability measurement which requires that sustainable development programmes/interventions should create a balance among social, economic, and environmental sectors. Also, a study by Nyanteng(1980) on some fundamental problems in the cocoa sector revealed non-availability of inputs(chemicals and machines) leading to wrong spraying periods, as the main challenge that plagued and made similar earlier spraying programmes in the 1950s and 1960s unsustainable. Issues of resource availability and use, economic viability, social acceptability, and environmental friendliness inform the selection of indicators. Below is a summary of indicators to come out with ways of sustaining government cocoa spraying programme in the Ahafo Ano North district, in a framework adopted from Grey and Siddall (2011).

Figure 2.2: Indicators for measuring the Mass Spraying Programme in the Ahafo-Ano North District



2.9.1 Economic Sector

Sources of funds for maintenance and replacement of equipment, vehicles, payment of employees on the programme, and purchase inputs (chemicals, vehicles, and spraying machines) will be scrutinised. Other economic indicators will include number of people employed on the programme, number of people trained on safe use of chemicals and spraying period. In the 1959 and other spraying programmes before the current one, the non-availability and the irregularity in the supply of inputs(chemicals and spraying machines) were the major factors that made them unsustainable(Nyanteng, 1980). Output levels between 2000 and 2011 will also be measured since any decline in output will constitute a threat to the sustainability of the programme.

2.9.2 Social Sector

Participation in this context refers to the involvement of stakeholders, especially the beneficiaries, in the planning, implementation, monitoring and evaluation of the programme. It is believed that where people, particularly the beneficiaries, are involved from the beginning (planning) of any development policy, sustaining it because becomes easier to address. Giving an opportunity for the beneficiaries of the mass cocoa spraying programme to speak of their involvement or otherwise, and how they feel about participatory issues will throw more light on issues of sustenance.

Other indicators relating to the social sustainability of the programme will include institutional capacity of the implementing bodies, and any health problem associated with the spraying programme. Institutional capacity is influenced by level of education, and presence of opportunities for training and retraining of farmers and spraying gangs. Again, issues of political commitment (support of political leaders) are to be addressed as the social aspects of the programme.

2.9.3 Environment

Under the environment, the indicators will include disposal of empty chemical cans and spent machines, adherence to Environmental Protection Agency (EPA) guidelines (if any), and effects of the insecticide(s) used on flora and fauna.

2.10 Other Issues Relating to Mass Spraying Programmes in Ghana.

Though the exact details of mass spraying programmes before the current one are scanty, references made by Nyanteng (1980); and CMB (1979) show that there were indeed mass spraying programmes of cocoa before. All the Authors agree that Gamalin[®] 20[®] and DDT were the chemicals used in those sprayings. The conclusions of these authors point to non-availability of inputs, and wrong spraying time as the main challenges that made these earlier schemes unsustainable as can be seen in the write up below.

The cocoa research institute of Ghana (CRIG) recommends a 4 times spraying in August, September, October, and December for effective control of Capsid. However, supply of chemicals to farmers between 1959 and 1978 fell badly below demand as illustrated by the table 2.1 below.

Table 2.1. Quantity of Gamalin”20” Distributed to Farmers (1959-1978).

Year	Quantity(Thousand litres)	Percentage of estimated chemical demand, met
1959/60	743	16.4
1960/61	1655	36.5
1961/62	1098	24.2
1962/63	1021	22.5
1963/64	680	15.0
1964/65	931	20.6
1965/67	492	10.9
1967/68	128	2.8
1968/69	473	10.4
1969/70	813	17.9
1970/71	1325	29.2
1971/72	1257	17.7
1972/73	858	18.9
1973/74	1016	22.4
1974/75	948	20.9
1975/76	708	15.6
1976/77	919	20.3
1977/78	2550	56.3
1978/79	875	19.3

Source; Nyanteng,1980.

From the table 2.1, it can be seen that supply of chemicals for the control of capsid fluctuated with the highest being the 1960/61 and 1977/78 seasons. Apart from 1977/78, where more than 50 percent of demand was met, all the other years from 1959 to 1975 supply have always fallen below demand. In 1967/68 in particular, only 2.8percent of the quantity of chemicals required by farmers for spraying was supplied. It thus appears that the supply of chemicals for spraying cocoa farms (whether government mass spraying or farmer-sponsored spraying) has never been sustainable over the years.

The results from table 2.1 also throw doubt on the claim that chemical use necessarily increases cocoa production. For instance, within the period analysed, the highest production of cocoa was recorded in 1965/66 crop season (over 540,000tons)(Leston,1974) with just 492,000litres of insecticide compared with 2,550,000litres supplied and used in 1977/78 at a time when production was in a decline(about 400,000tons; Leston,1974; CMB, 1980). The long term sustainability of increased output under Mass Routine Spraying Schemes has also been challenged by Leston (1974). According to him, capsids and the vector of the Cocoa Swollen Shoot Virus Disease (CSSVD) are biologically controlled by certain species of ants

and spiders which nest mostly in the parts of the trees that are sprayed. Routinely spraying these areas kills these beneficial insects, a situation that reverses to high capsid build up leading to low production in spite of the spraying. This may have implications for the current mass spraying programme (which is also routinely done) unless continuous technical advice is sought from CRIG.

The main insect that pose much challenge to farmers have always been Capsid (akate). A survey conducted by Nyanteng (1980) revealed that capsid was the most important insect from farmer's perspective. Out of 233 farmers surveyed, 79percent of them considered capsid to pose the most threat to yields (it is instructive to note that the current spraying programme which is the subject of study here aims at controlling capsid and black pod). In the same report, 86percent of the farmers interviewed could not spray their farms (the only control measure known to farmers then) because they could not afford to purchase enough insecticides. Beside affordability, non-availability of chemicals came up very high (45.4percent) as a reason for inability to spray farms.

Erratic supply of chemicals also influence the time of spray. For effective control of capsid, spraying is recommended to be done in August, September, October, and December. However, the report by Nyanteng (1980) reveal that 87percent of farmers could not conform to this recommended spraying periods because of non-availability of insecticide at the right time during the 1950s and 1960s spraying.

It is interesting to find out what the situation with the current mass spraying programme is since improper spraying time may minimise the achievement of effective insect control. The availability of spraying machines in good numbers has also been a challenge over the years between 1959 and 1977/78. An agricultural census results, cited in Nyanteng (1980) indicates that there were 292, 600 cocoa farmers at the time, but 246, 144 spraying machines were sold to farmers. What is more serious is that over 60percent of these machines were over 5years (the recommended lifespan of a spraying machine according to Nyanteng, 1980). Again only 25percent of the farmers own machines, while 70percent hired them; 2percent borrowed from friends and relatives; and 3percent from unspecified sources.

In the current spraying programme, farmers do not need to own machines and chemicals (since spraying is done freely). However, how do farmers obtain service when the pest appears on their farms and government is not ready with inputs? Those who will want to do the spraying themselves, will they buy or borrow or hire?. According to CMB (1979), non-

availability of insecticides and spraying machines, resistance of capsid to chemicals, and efficacy of spraying technique, were some of the challenges that militated against the sustenance of previous spraying programmes.

2.11. SUMMARY/KEY OUTCOMES OF THE REVIEW OF LITERATURE

There seem not to be evidence of a baseline survey in the literature before the introduction of the current mass cocoa spraying programme. Therefore it is difficult to find quantities regarding performance levels (output, farm sizes of smallholder farmers, etc) before and after to make meaningful comparisons. Again, it is not clear whether field trials of efficacy and environmental friendliness of the chemicals were undertaken before their selection, and whether there was any health problem associated with their use.

The sustainability of previous spraying programmes had been challenged by non-availability of spraying machines, and chemicals (Nyanteng, 1980), and the negative effects of chemical spraying on beneficiary insects that naturally control capsid (Leston, 1974). Indeed the report by Leston (1974) challenged the claim that mass routine spraying leads to increased production. According to him targeted spraying (only when the insect appears) produce better results than routine spraying which rather leads to build up of the capsid and favourable conditions for other diseases like Swollen Shoot Viral and black pod diseases.

This study will obtain expert information from the experts at the Cocoa Research Institute of Ghana (CRIG) at Tafo on the effects of the current insecticides and fungicides used in the spraying programme on plants and animals, particularly those beneficiary insects referred by Leston (1974) as natural control for capsid. Again, information on the availability of the chemicals, spraying machines, and protective clothing, will be obtained from the farmers and spraying gangs and analysed along the lines argued by Nyanteng (1980) and CMB (1978), that non-availability of inputs and farmer acceptability (because of non-involvement) were major challenges in previous mass spraying programmes.

Any sustainable agricultural programme must be economically viable (have good funding source, increased output etc) and environmentally friendly (minimal effect on plants and animals, proper disposal of waste etc) (Brundtland's Commission, 1987). The current mass spraying programme will be investigated along the lines of these widely accepted attributes of a sustainable programme. Finally, the institutional structure in place to implement the

programme will be examined to ascertain its capacity to check leakages of resources, as alluded to by Obeng and Opoku (2008), and also ensure timely spraying of the farms.

2.13. Conceptual framework

The framework seeks to put all the lessons and ideas obtained from the concepts and principles of sustainability and their relevance to the mass cocoa spraying programme in Ghana, together. Below is a summary of the indicators to be used to measure the sustenance of the mass spraying programme, built into a conceptual framework.

Figure 2.3: conceptual framework of the principles and concept of sustenance and the mass cocoa spraying programme.

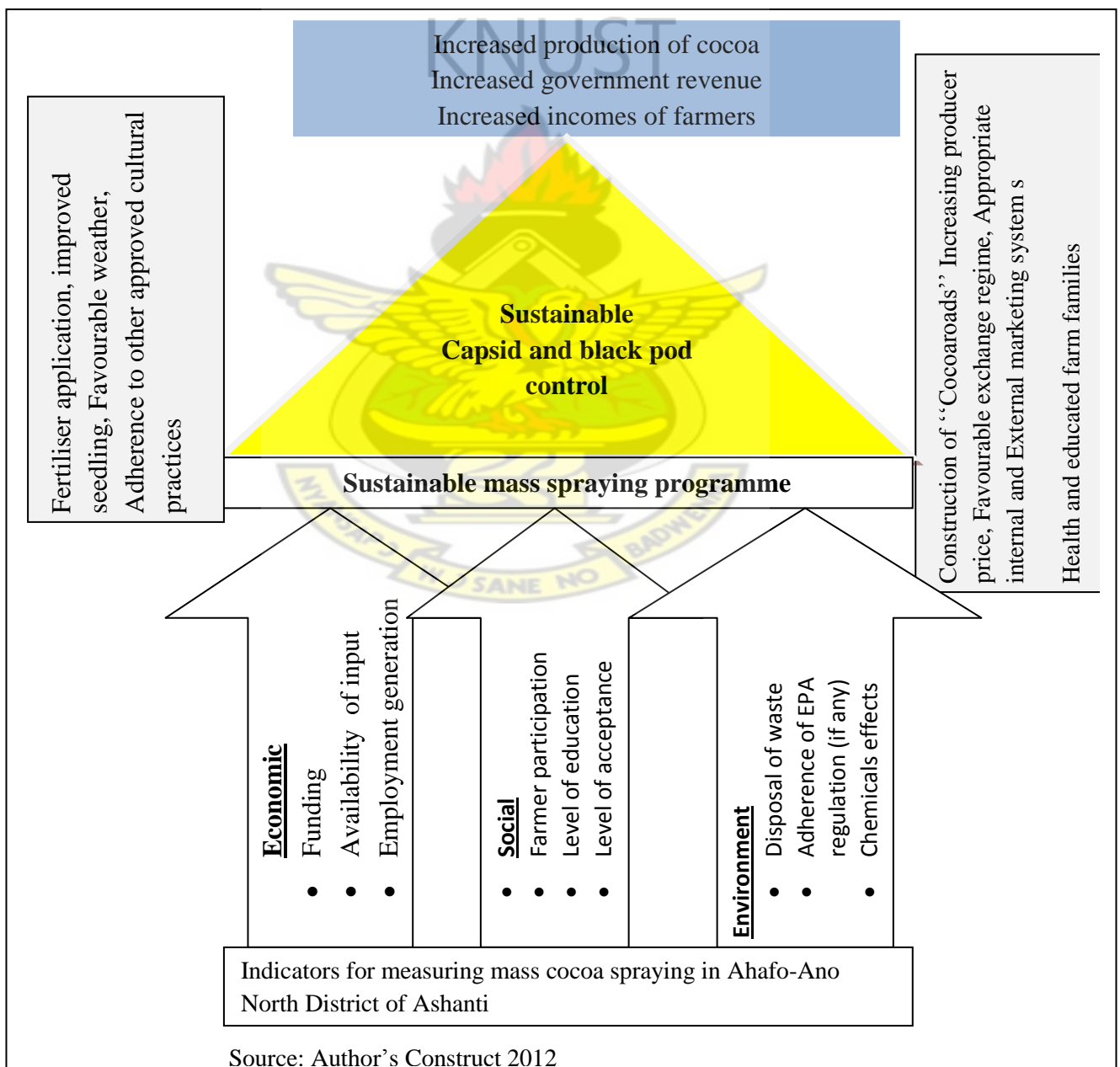


Figure 2.3 illustrates a graphical conceptualization of the sustainability of the mass cocoa spraying programme. From the illustration, the desired end of the Mass Cocoa Spraying Programme is to achieve a sustainable control of capsid and black pod. For this to be achieved, there should be a Sustainable Mass Spraying Programme, which is also dependent on sustainable funding, increasing output, availability of inputs, spraying at the recommended times, beneficiaries acceptance and participation, training of farmers and gang sprayers, proper disposal of spraying waste, and adherence to EPA's regulation on mass chemical spraying. The framework calls for a balanced investment by the programme in the social, economic, and environmental sectors of the study area.

However, it is important to state that the mass spraying alone cannot lead us to increased output, increased government revenue, and increased farmer incomes which are the ultimate goals. According to Nyanteng(1980) and Leston(1974), the factors of increased output or production of cocoa are many and include but not limited to, fertiliser application, improved seedlings, favourable weather, increasing producer price, favourable exchange rate regime, development of rural infrastructure(like roads in the cocoa areas), and healthy and trained cocoa farmer. Thus, the spraying programme alone (represented by the issues in the arrows) will not lead to increase production unless these other factors (outside the arrows but in the rectangle) are all favourable.

The chapter has provided a conceptual framework and a body of theory from which lessons are learnt to understand and develop the subsequent chapters. The next chapter will consider the profile of the study district (Ahafo Ano North district) to understand the natural, social and economic structure of the district to relate and understand the issues of sustenance of the mass cocoa spraying exercise in the district. The next chapter will also detailed out the methodology for conducting the study.

CHAPTER THREE

RESEARCH METHODOLOGY AND PROFILE OF STUDY DISTRICT

3.1 Introduction

This chapter presents the methodology adopted for the study. A detailed procedure for the design of the research, sampling method, sample size, sample distribution, collection of primary and secondary data required for the study as well as their analysis is explained in the chapter. The chapter also continues to look at the profile of the study district which is Ahafo Ano North district; the geophysical, social and economic characteristics of the district.

3.2 Research Design

The research design explains the organization and planning of the study. The research design adopted in the study was a Cross-sectional study (specifically survey research). The design enables the researcher to gather information from a cross-section (representative sample) of the farmers in the district and generalise the conclusions to affect all cocoa farmers in the study district. Techniques in the study included the administration of questionnaires to households (cocoa farmers on the Mass Spraying Programme) and interviews of community leaders, such as chiefs. In addition, questionnaires were sent to personnel of relevant institutions for their responses.

3.3 Data Requirements and Sources

Data about the sustaining of the mass cocoa spraying in Ahafo Ano North district was gathered from households (cocoa farmers), traditional leaders and key institution (COCOBOD, Cocoa Research Institute of Ghana, Cocoa Diseases and Pest Control Programme, the Environmental Protection Agency, and Ghana Health Service).

Details of the data collected and their sources and tools for collection are illustrated in table 3.1 below;

Table 3.1: Major Types and Sources of Information Collected for the Study

Objective	Type of Information	Source/Tool for collection
	Review of major literature on Sustaining the Mass Cocoa Spraying Programme	Libraries, internet, articles, magazines, and books
	Map of Ahafo Ano North District indicating the study communities	District Town and Country Planning and other government agencies Tool; Questionnaire
To assess the economic challenges and potentials of the cocoa spraying programme	Sources of funding, job creation, reduction in losses due to capsid and black pod, inputs supply, and number of spraying gangs	COCOBOD and CODAPEC at the regional and district levels Tools; Structured questionnaire, interviews, and focus group discussions
To assess the social challenges and potentials of the mass cocoa spraying programme	Levels of participation of the beneficiaries, level of acceptance of the programme, any health challenges after spraying	District Health Directorate, and beneficiaries(cocoa farmers) Tools; Structured questionnaire and interviews
To examine the environmental challenges and potentials of the cocoa spraying programme	Disposal of cans and bottles after spraying, effects of chemicals on non-target plants and animals, and adherence to EPA regulation guiding the programme	Cocoa Research Institute of Ghana(CRIG), farmers, and Environmental Protection Agency(EPA)
To assess the institutional arrangement for implementing , monitoring and evaluating the programme	Various institutions associated with the programme, and the structure and strength of CODAPEC,	COCOBOD and CODAPEC

Source; Author's Construct, 2012

3.4 Sampling Techniques

Institutions were selected according to their relevance to the study. The purposive sampling method was adopted because only those institutions that deal with the mass spraying programme were required (traditional authority and government agencies such as the Ahafo Ano North district assembly, District Agriculture directorate unite, cocoa board and others) in the study. Thus these institutions were selected due to the special knowledge they have about the topic under discussion.

The purposive sampling was again used to select the three communities for the study because not all communities in the district cultivate cocoa and also not all the cultivating communities are on the spraying programme. Indeed these communities were recommended by the district manager of the spraying programme and the district chief cocoa farmer on the basis of performance and proximity. Being good performing communities in the district means they would have received more attention by the spraying body.

3.4.1 Sample size determination

The sample size was determined mathematically as follows;

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

Sample frame =453 (CODAPEC)

Where:

n: the sample size

N: the sample frame (total number of cocoa farmers in the study communities)

e: the standard error

A standard error of 8 percent (due to time constraint, 8 percent was chosen to reduce the sample size in order to meet deadlines) was employed in the above formula to arrive at the number of farmers (n) surveyed in the District. The sample was thus determined as follows;

453

1 + 453(0.08)²

453

1+ 453*0.0025

453

33.55

=116

3.4.2 Sample Size Distribution

The sample was distributed among the three communities by proportional representation since the three communities do not have equal number of farmers. Again, the specific farmers to be interviewed in each community were determined by lottery (lists of farmers were obtained and individual farmers selected at random until the required number is obtained), and snowballing (where an interviewee was absent, the interviewer was guided to the next cocoa farmer and continue until the required number was obtained). The chief farmers in the study communities (Dwaho, Asuhyiae, and Brosanko) each submitted lists of farmers on the programme as follows; Dwaho, 152; Asuhyiae, 146; and Brosanko, 155. This gave a sample frame of 453 and a sample size of 116 as indicated by sample determination above. By the proportional representation technique, 37 farmers were interviewed in Asuhyiae; 39 in Dwaho; and 40 in Brosanko.

Names of these farmers in each community were written on pieces of paper and put in a box and closed. Each chief farmer was asked to repeatedly dip his hand into the box and pick names at random until the number of farmers to be surveyed in his community was obtained. Interview then began after the houses of the selected farmers were identified. However where a selected farmer was absent, the family members were asked to direct the enumerators to the house of any cocoa farmer they know. Such a farmer was interviewed only when he/she was certified to be on the programme. This was continued until the number of farmers to be interviewed in each community was reached and interview stopped.

3.5 Field Work

The field work process adopted in the study is organized as follows:

Visit to the communities to observe the social and economic development conditions of cocoa farmers. This was followed by the preparation of questionnaires to be administered to the community dwellers, and traditional leaders and officials of relevant institutions.

Selection and training of two field enumerators: This was to equip them with an understanding of requirements of the study. Another visit to the communities was organised to conduct a pilot of the questionnaire. The enumerators accompanied the researcher to the field to introduce the team to the traditional leaders so as to test the adequacy and exclude all

unnecessary questions in the questionnaires. The weaknesses found in the administration of the pilot questionnaire were corrected to improve the survey instrument in order to achieve its set objectives.

Preparation of materials for the questionnaire administration: The materials included 125 questionnaire forms(for the farmers), one questionnaire form each for Cocoa Research Institute of Ghana(CRIG), Environmental Protection Agency(EPA), COCOBOD (regional and district offices), Ahafo Ano North District Assembly, EPA, the Ahafo Ano North District Health Directorate, and the Ministry of Food and Agriculture, Ahafo Ano North. Then, the questionnaires were administrated in the study communities and interviews with key informants (mainly the chief cocoa farmers), scheduled and conducted.

3.6 Data Collection and Analytical Methods

Secondary and primary data were required for the study. Secondary data was collected through a review of relevant documents, articles and academic reports. Others included governmental reports, international reports, books, working papers, magazines and internet sources. The primary data required the design and administration of questionnaires in the communities. In addition, structured interviews to key informants in the community and the government sector such as the Ahafo Ano North district authorities, district agriculture directorate unit, district cocoa board, spraying gangs, and cocoa buying companies were also designed. The results of the interviews were analysed and interpreted with statistical methods in order to generalize conclusions. Pivot tables of Excel were used to generate tables of results.

Trend analysis was the major analytical technique adopted to enable the researcher observes the behaviour of the indicators over the years and to determine whether they are declining or appreciating. Reduction or appreciation of key indicators is at the core of whether the programme would be sustainable or not.

3.7 Profile of the Ahafo Ano North District

Ahafo Ano North District has existed at different times under different administrative areas in the local government administration of the country since independence. It existed as part of the Ahafo District with its headquarters then at Goaso, prior to independence. At the creation of the Brong Ahafo Region, the area fell under Ashanti Region with a district as Ahafo Ano and its headquarters was at Tepa. In 1961, the Local Government Act (Act 54 of 1961) was

passed dividing the country into local councils. This led to the emergence of Tapa and Ahafo Ano Local Councils with their headquarters at Tapa and Mankranso respectively. In 1979, upon the recommendation of the then Constituent Assembly, the two local councils were merged to become Ahafo Ano District with headquarters at Tapa. The situation existed until 1988, when the current decentralization programme was launched and the number of districts nationwide increased from 68 in 1988 to 168 in 2007. Out of this came the Ahafo Ano North District Assembly also with its capital at Tapa. It is one of the more than twenty-three (23) districts in the Ashanti Region and the highest political and administrative authority responsible for the formulation of plans and strategies for the development of the area.

3.7.1 Location and size

The Ahafo Ano North District is located on the north-western part of the Ashanti Region with its western and northern boundaries coinciding with the regional boundaries, which separate the Brong Ahafo Region from the Ashanti region.

The district has about 515 settlements, out of which only six (6) are indigenous- i.e. Tapa, Dwaaho, Manfo, Akwasiase, Maabang and Asuhyiae. The map that follows illustrates the district in detail. Communities highlighted red are the study communities (Asuhyiae, Dwaho, and Brosanro).

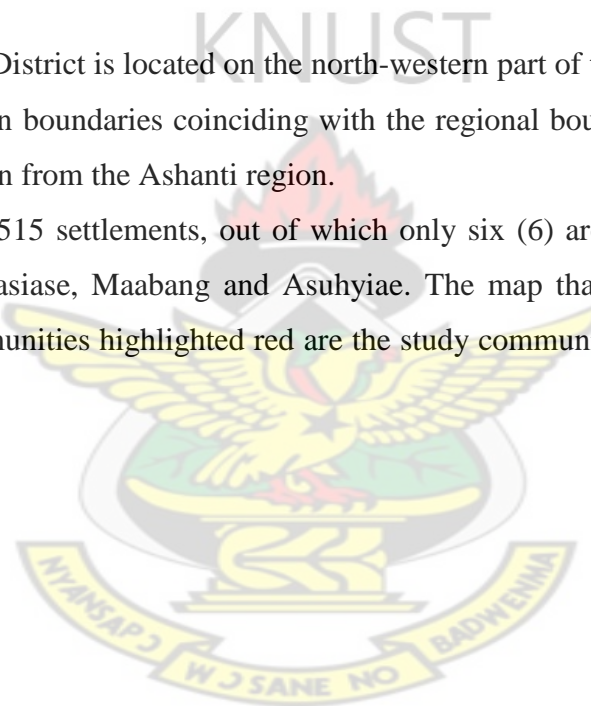
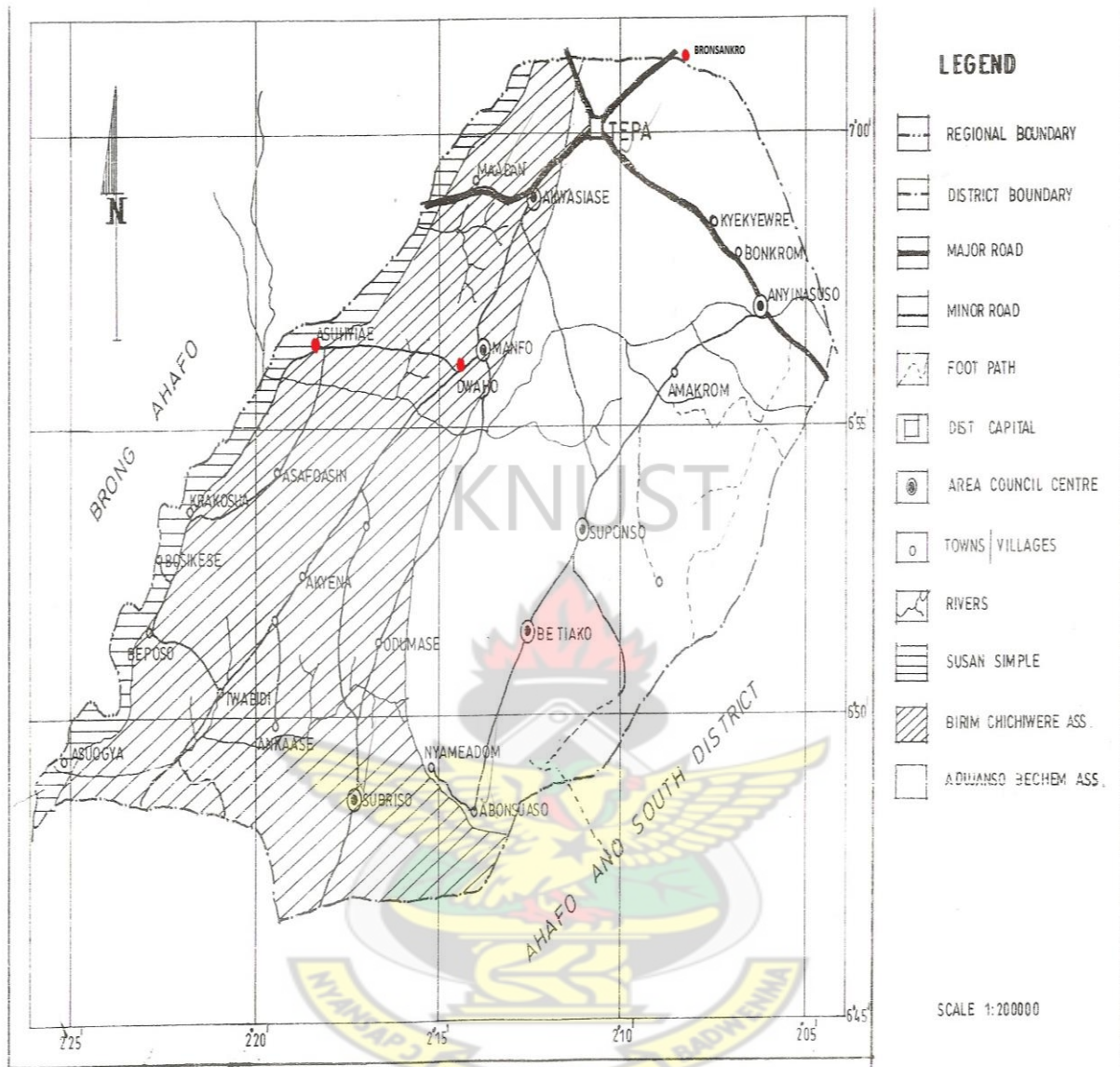


Figure 3.1 Location of Study Area in Ahafo-Ano North



Source: AANDA(2011)

3.7.2 Physical Characteristics of Ahafo Ano North District

Relief and Drainage

The area is situated on an arm of the Southern Voltaian Plateau that is heavily dissected. It has undulating topography, rising up to about 500 meters above sea level (E.P.A 2002). The highest point of the district is found around Suponso and Betiako. The soil is of deep-weathered, well-drained forest orchrosols, which is the most important soil in the forest zones of Ghana suitable for the cultivation of tree crops. It is therefore suitable for the cultivation of variety of crops such as cocoa, oil palm and others in the study area. The District has

comparative advantage in agriculture over other economic undertakings, where the people can conveniently make their living. The major rivers draining the area are Abu, Kwasu, Katabo, Anyinasu and Tano. Beside these, are numerous streams, most of which get dried up during the dry season. Example is the Asuwa and Takubonsua.

Climate

The area experiences the wet semi- equatorial type of climate (E.P.A, 2002)). The mean annual temperature is about 26° C. The area is marked by two-rainfall regime with the major one in May-July and the minor in August-September. Mean rainfall is between 125cm and 175cm per annum (E.P.A, 2002). The dry season begins in October through to the early part of March.

Vegetation

The Ahafo Ano North district is found in the high forest zone of the country. The type of vegetation found here is the moist semi-deciduous forest. Due to the once vibrant cocoa industry in the area, coupled with intensive activities of timber merchants, the original forest has almost been replaced by secondary forest (Breisinger et al, 2008; MOFA, 2011)). This is found around Maabang, Manfo and Asuhyaie area. However, in most parts vegetation similar to the interior Wooded Savanna termed as derived savanna has taken over, especially around Tapa, notably Tapa- Anyinasuso, and Tapa- Akwasiase. At the southern part of the District are the Desiri forest, and the Tinte Bepo Forest Reserve at the extreme north- eastern section of the area.

The forest of the area, which once contained most of the country's valuable timber trees such as Sapele, Odum, Wawa, Mahogany and many others, are almost extinct. It is therefore not surprising that the once flourishing timber industry is also gradually dying out. The district is found in the agro-ecological zone of the country where the livelihood of the people depends on agriculture as the main income generating activity for a number of households. (EPA, 2002). The district is endowed with natural resources such as mineral deposits of gold at Asuhyaie, diamond at Manfo, clay and sand timber and other forest products. The soils are of high agronomic value with abundant water resources for irrigation purposes, agro-based industrial resources, and a large labour force (AANDDP, 2006).

Soil

The district exhibits three (3) major soil types according to the Ministry of Food and Agriculture (MOFA, 2011). These are: Adjaso Hwidiem Association, Susan Simple Association and Biri Chichiwere Association. The soils in the district are generally fertile and support the cultivation of the so many cash, food and vegetable crops as already listed above under climate (MOFA, 2011).

3.7.3 Demographic characteristics

Population Growth Rate, Size and Distribution by Sex

Current population of the district is about 93,916 (2009 projection by the Statistical Service). Between 1994 and 2009 the population increased from 44,799 to 93,916. The district has more males than females as shown below from the 2009 projections;

Total population – 93,916

Male – 49,118

Female – 44,798

Those in the labour bracket (i.e. ages between 15 and 64) are about 54.0percent of the total projected population. Population density of the district is 125 persons per square kilometre. This is lower compared to Ashanti regional figure of 148 persons per square kilometre, but higher than the national figure of 79 persons per square kilometre (MOFA, 2011).

3.7.4 Land Tenure System

The land is vested in chiefs, family heads and individuals and structured into share cropping (Abunu and Abusa). Also practiced are cash rent and lease. Under both Abunu and Abusa, the farms are left in the hands of a caretaker who cultivates the cocoa and if proceeds are shared equally, the practice is Abunu, and proceeds are shared into three, with two-thirds going to the caretaker it is referred to as Abusa. These however lead to land fragmentations, hence major impediments to large scale commercial farming.

3.7.5 Other Interventions in the Cocoa Sector in the District

3.7.5.1 COCOA HI-TECH

Another intervention in the cocoa sector in the district is Cocoa Hi-Tech programme which combines fertilisation and other good cultural practices for improved yield. Under the fertiliser programme, the District, through the District Agriculture Development Unit(DADU) received 4,500 bags of Cocoa fertilizer (1,500 of Asaase Wura and 3,000 bags of COCOFEED) from Ghana Cocoa Board and by December 31st. 2010, 2,302 bags of the Fertilizer were sold to cocoa farmers with a balance of 2,198 bags (MOFA, 2011). The rest of the interventions are; *Sustainable Tree Crop Project and Women in Agriculture Development*. Details of these projects are not discussed in this work because they are not directly link to this research.

Cocoa production has been fluctuating between 100,000 bags and about 200,000 bags in the District especially after the introduction of the mass cocoa spraying exercise but largely higher than period prior to the mass spraying. Table 3.2 shows the figures for cocoa production after the introduction of the mass cocoa spraying exercise.

Table 3.2 District Cocoa Production Figures: (2002 – 2009)

YEAR	PRODUCTION (BAGS)	TONNAGE (M/TONS)
2002/03	118,986	7,436.63
2003/04	168,754	10,547.13
2004/05	112,577	7,036.06
2005/06	185,169	11,573.06
2006/07	191,155	11,922.63
2007/08	186,472	11,654.50
2008/09	163,319	10,207.44

Source: District Cocoa Quality Control Unit – Tepa

The general increase in production from 118,986 to 163,319 bags might be attributed to adoption of improved technologies such as good agronomic practices, impact of cocoa mass spraying exercise under CODAPEC and the cocoa Hi-Tech Programme. Decreases in

production in 2004/05 and 2007/08 have been attributed largely to inadequate rainfall by the Ministry of Food and Agriculture in 2011.

The chapter concludes here giving a fair knowledge about the characteristics of the district. This will help to explain the issues that will be raised to support or otherwise militate against the sustenance of the mass cocoa spraying programme in the next chapter.

KNUST



CHAPTER FOUR

THE SUSTAINANCE OF THE COCOA MASS SPRAYING EXERCISE IN THE AHAFO-ANO NORTH DISTRICT OF THE ASHANTI REGION ANALYSIS AND DISCUSSION

4.0 Introduction

The chapter focuses on the analysis of field data collected on the mass cocoa spraying exercise from the Ahafo-Ano District of the Ashanti Region. In this chapter the background of farmers, the potentials of the programme and the and the associated challenges, are discussed.

4.1 Background of Respondents

4.1.1 Sex of Respondents

Due to the challenges that women, more than men, face in ownership of land, tree crops (like cocoa) farming is mostly undertaken by males. The trend is not different from what pertains in the Ahafo-Ano North District as illustrated in Table 4.1 below;

Table 4.1 Sex Composition of Respondents

Sex of Respondents	Frequency	Percent
Male	88	75.9
Female	28	24.1
Total	116	100.0

Source: Field Survey, May 2012.

From Table 4.1 it can be seen that 75.9 percent of the respondents are males whilst the rest constituting 24.1 percent are females. This is because cocoa farm establishment is a tedious job that requires large financial outlay, land title, and time and it is relatively easier for many men than women to gain access to these resources. Even those women who own cocoa farms in the study communities, the day to day care of the farm is in the hands of men, and in many cases, such farms were bequeathed to the women by their dead husbands or relatives.

4.1.2 Age Composition of Respondents

Farming in Ghana which is still predominantly done by hoe and cutlass, requires strong muscles to be successful. Unfortunately, majority of the farmers in the study area are above 50 years. From the survey, it was observed that 17.3 percent of the respondents fall within 20 to 40 years, 40.5 percent within 41 to 50 whilst the rest constituting 42.2 percent are more than 50 years old. In all 82.7 percent of the farmers are above forty years as illustrated by Table 4.2 below;

Table 4.2 Age Composition of Respondents

Respondents' Age	Frequency	Percentage
21-30	3	2.6
31-40	17	14.7
41-50	47	40.5
51+	49	42.2
Total	116	100.0

Source: Field Survey, May 2012

The situation above is so because most of the able bodied young people from the villages have been trooping to town in search of non existence job opportunities leaving the elderly in the village to take care of the farms according to the farmers interviewed. Again, most of the young people see farming as not lucrative enough for them to achieve their dreams. As a result, they pursue other careers other than farming. From the survey, it was also realised that most of the current farmers started at a very tender age and they are still farming. Now as a result of old age, they have become managers and have given their farms to caretakers who work on the farm in return for reward. Some of these caretakers share the proceeds with the owner of the farm, in some agreed proportions, depending on whether *abunu* or *abusa* is practiced.

4.1.3 Educational Level of Respondents

Education is important in all spheres of endeavour. From the survey, it was found that 44.8 percent of the respondents either never attended school or completed school at the primary level, only 9.5 percent completed technical and/or Senior High School(S.H.S) level with the rest 45.7 percent completing J.H.S/Middle school level. Clearly, the educational level of the respondents is therefore low which could affect the adoption of farming technologies. This may hinder their ability to determine the right dosage of pesticides that they can apply from

labels, handling and disposal of empty containers, dangers of exposure to toxic and the importance of wearing protective clothes without proper guidance. As a result, it is advised that extension services should continuously be carried out to educate the farmers on the use of pesticides. Table 4.3 illustrates the educational background of the respondents;

Table 4.3: Educational Level of Respondent

Educational level	Frequency	Percent
No formal education	40	34.5
Primary	12	10.3
JHS/Middle	53	45.7
Technical/SHS	11	9.5
Total	116	100.0

Source: Field Survey, May 2012.

4.2 Potentials of the Mass Cocoa Spraying Exercise

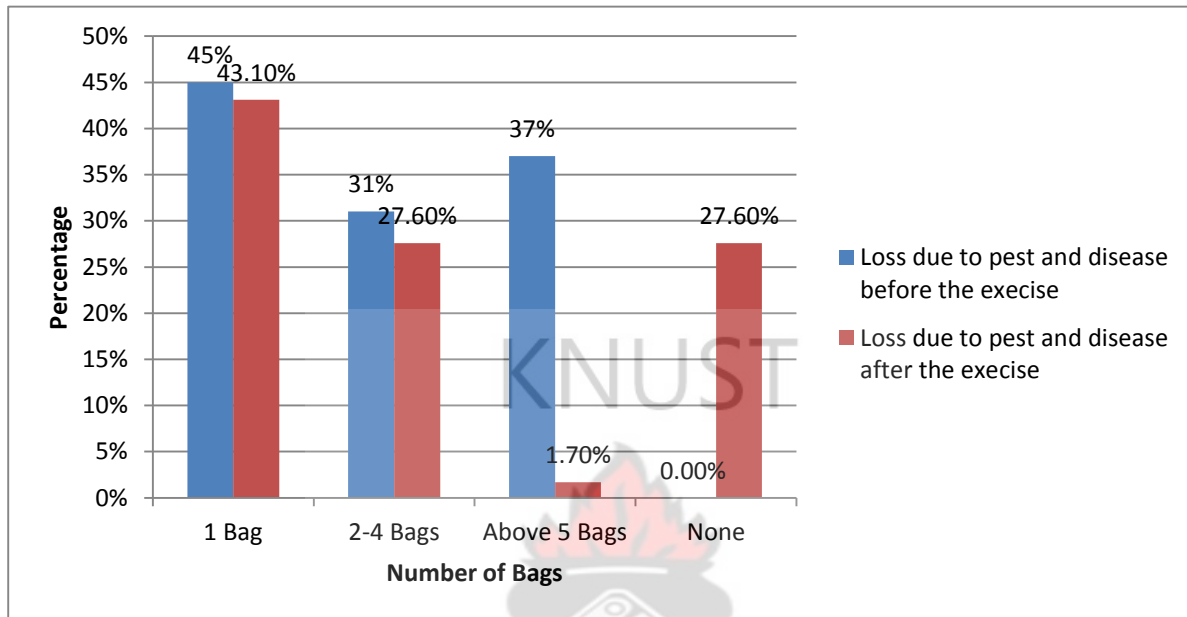
4.2.1 Economic Potentials

4.2.1.1 Reduction in Losses due to Pest and Disease (Capsid and Black pod)

One of the problems that have been a thorn in the flesh of the cocoa sector is pest and disease control. Some of these diseases and pests are capsids, swollen shoot and black pod diseases. These diseases have devastated cocoa farms and in a year could result in framers getting nothing at all from their farms according to the farmers interviewed in the study communities. From the survey, it was found that the yield losses in terms of bags were that 45percent affirm a loss of one bag of cocoa per season, 31 percent affirm loss of 2 to 4 bags of cocoa per season whilst 37percent of the respondent affirm a loss of 5 and above bags of cocoa per season; the farmers could not however relate these figures to land size. The category of respondents who lose 5 and above bags of cocoa seasonally, in some extreme cases, lose the whole of their yield to pest and disease attack and would have to depend on small plots of land on which they grow food crops like maize and vegetables. With the introduction of the mass cocoa spraying exercise, this unfortunate situation has been reduced to a large extent. This has resulted in losses in yield of 5 and above bags seasonally being reduced from 37 percent to 1.7 percent. This is mainly because the chemicals used in the

spraying are certified CRIG to be effective for the control of the disease and pest (black pod and mirrid) and that the people who undertake the spraying exercise have been trained. Figure 4.1 graphically illustrates this.

Figure 4.1 The Loss of Yield before and After the Introduction of Exercise



Source: Field Survey, May 2012.

Again, it can be seen from fig. 4.1 that the reduction in losses due to pest and disease is drastic (highest) for the category of farmers who harvest 5 bags and above. This may be due to the good purchasing power of this group. Harvesting relatively more bags means that they earn more and can afford to purchase chemicals to adequately supplement what government provides, which is often less than required. Where signs of pest and disease appear on farms and government-supplied chemicals are not ready, this category can buy their own inputs and do their own spraying to prevent destruction while their counterparts who harvest less rely on the government supplies which often delay leading to destruction of trees and pods.

Going forward, those who harvest above 10 bags report no losses at all. This is due to similar reasons stated in the preceding paragraph. For this group, they do not often depend on government supplies to spray their farms; they buy their own chemicals, do the spraying with the trained sprayers, and whatever they receive latter is kept for timely spraying in the next season (and a cycle of good spraying practice continues leading to higher reductions of losses among this group). On the whole, the district has reduced the mirrid and black pod menace by

50percent and 65percent respectively over the study period according to CODAPEC officials at the district office.

4 .2.1.2 Employment Generation

One of the objectives of the MCSE according to Obeng and Opoku(2008) is to create employment for the rural folk in the cocoa growing areas. Data gathered from COCOBOD and CODAPEC officials at the district revealed that as at the time of this research, 1232 people were employed by the programme on part-time basis. They consist of sprayers, supervisors, and local, district coordinators on CODAPEC.

Also, the transfer of knowledge from CRIG personnel to the sprayers, and their supervisors, through the training (capacity-building) component of the programme add value to the trainees and make them potentially employable even when the programme is discontinued. More importantly, it makes the spraying exercise sustainable since these training sessions will soon build a cadre of people who are well vexed in the techniques of chemical control of pest and disease. Latter, in the absence of CRIG officials, the programme can still run.

4.2.1.3 Sources of Funding

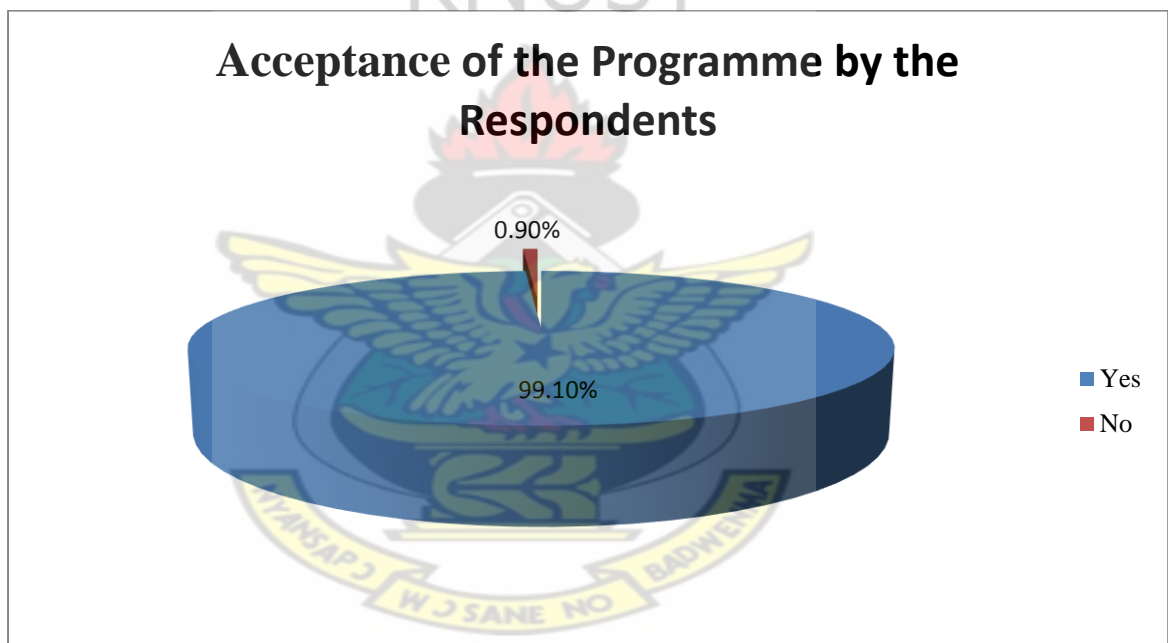
The programme is funded solely by the government of Ghana either through COCOBOD or directly from the centre. Once cocoa is an extremely important crop to the economy of this country, the will power to sustain an intervention that controls pest and disease with positive bearing on production, do exist. This will power also transcends political boundaries; it will not be politically wise for any party to win power and decide to starve the programme of funds looking at the high level of acceptance it is enjoying among beneficiaries. Again, cocoa price in the world market after 2000 have been increasing and currently is above US\$2000 per tonne. COCOBOD has also been given the leverage to contract any amount in loans to carry out its activities and so in 2011 it was able to take a loan of US\$1billion to undertake a number of interventions in the sector. The sector is thus so huge that there are enormous opportunities that can be exploited to sustain any intervention, including the MCSE, that is important to the sector's own survival. The credibility to borrow, the political will, and the good market price, makes the programme looks potentially sustainable.

4.2.2 Social Potentials

4.2.2.1 High Level of Acceptance

The acceptance of the programme by the respondents is vital to ensure its sustenance. From the survey, 99.1 percent of the respondents affirmed (rated the programme as high) that the programme is good and must continue whilst only 0.9 percent affirmed in the negative (rated the programme as low). Of those who affirmed in the negative, they said that late arrival of pesticides and equipments account for the position that they have taken. This shows that the programme is very good from the viewpoint of the respondents and so is enjoying a high level of acceptance among the farmers. Figure 4.2 below graphically illustrates this;

Figure 4.2 Illustrates the Acceptance of the Programme by the Respondents

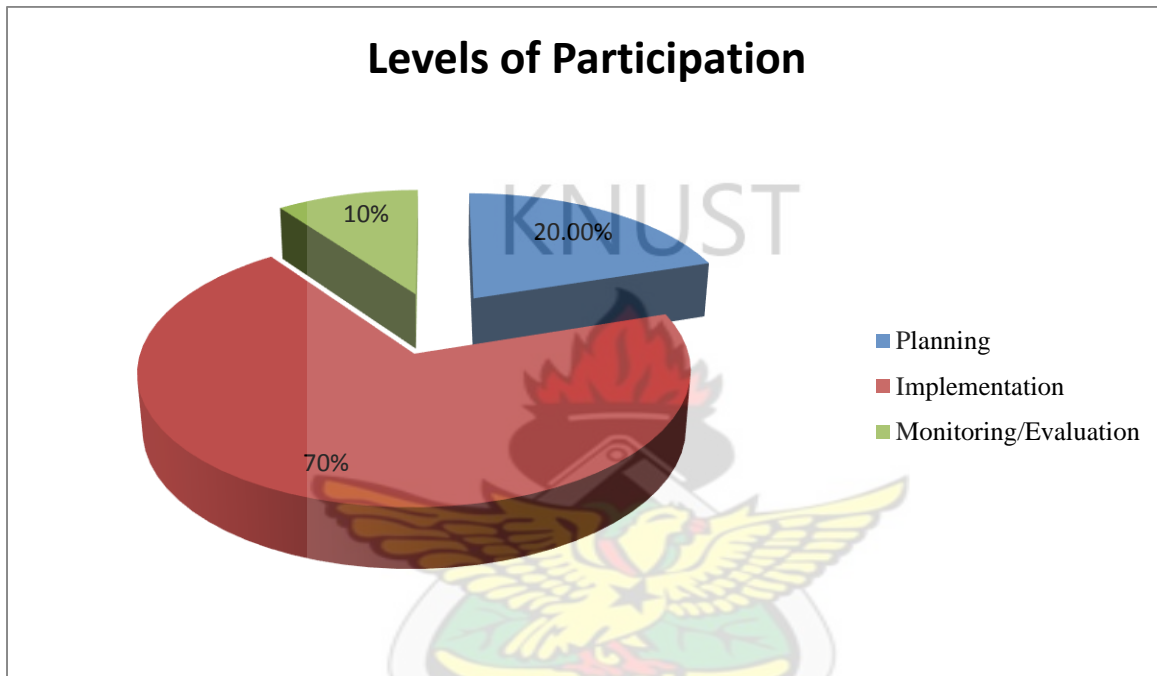


Source Field Survey, May 2012.

4.2.2.2 Level of Participation

As part of social sustenance, the study looked at the level of participation of the respondents in the planning, implementation and monitoring/evaluation of the mass cocoa spraying exercise. Figure 4.3 gives more information on the levels of participation of the respondents in the mass spraying exercise.

Figure 4.3 Levels of Participation



Source: Field Survey, May 2012.

Figure 4.3 indicates that 20 percent of respondents participated in the planning of the programme (these were the chief cocoa farmers and opinion leaders), 70 percent during the implementation whilst only 10percent(the chief cocoa farmers and some of the opinion leaders) participated in the monitoring/evaluation. Participation is vital to the sustenance of any programme. It allows the beneficiaries to have their views heard and the designers of the programme also get the opportunity to explain to the beneficiaries the essence of the programme and address any misgivings the beneficiaries might have. From the survey, it was found that the level of participation of the farmers in the mass cocoa spraying exercise was minimal at the planning and monitoring/evaluation stage of the programme. The programme was designed by the Cocoa Disease and Pests Control Committee (CODAPEC) the body responsible for the implementation of the programme with other bodies such as Cocoa Research Institute of Ghana (CRIG).

According to the farmers, they were merely informed of the programme and their assistance sought in the implementation. They however thought that spraying their farms freely was a good programme that needed their support, particularly when the pest and disease that are to be controlled had been a thorn in their flesh. They therefore accepted it and gave it their fullest support. The potential for the sustenance of the programme thus exist as it enjoys high level of goodwill among the farmers and other stakeholders like the licence buyers, traditional rulers and political leaders.

4.2.3 Environmental Potentials

The environment involves the atmosphere, water bodies, and land (including plants and animals). For a development intervention to be sustained by a people, it must maintain or seek to improve their environment. When negative tendencies like destruction of plants and animals (which constitute the livelihood of the people) are noticed, there may be popular uprising against it resulting in its discontinuation.

Fortunately for the mass spraying programme, such negative effects as destruction of plants and animals are not associated with it. This is because, all the chemicals used in the spraying are found not to have any negative effects on non-target organisms. This view was conveyed in responses by CRIG officials to a questionnaire during this research. Therefore threats to the programme as a result of environmental destruction usually associated with chemical spraying, are either non-existent or greatly reduced.

4.3 Challenges of the Mass Cocoa Spraying Programme in the Ahafo- Ano North District

4.3.1 Economic Challenges

4.3.1.1 Supply of inputs (pesticides, fungicides, spraying machines, and protective clothing)

The mass cocoa spraying exercise is a district- wide programme which aims to cover the entire cocoa farms in the District. From the survey, it was found that so far the programme in the district covers 53,275ha of cocoa farms with about 14,411farmers (with an average farm size of about 4hectares) benefiting. Tables 4.4, 4.5, 4.6, and 4.7 below give a breakdown of inputs supplied at the district level since the inception of the spraying programme in 2001.

Table 4.4: showing the Supply of Inputs (Clothing)

YEAR	WALLENTON BOOTS	HAND GLOVES	NOSE/MOUTH MASKS	OVERALLS	GOGGLES	HATS	TOTAL
2001	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0
2003	435	900	340	680	400	1000	3755
2004	864	150	400	200	200	100	1914
2005	0	0	0	0	0	0	0
2006	680	1100	363	100	326	100	2669
2007	0	0	0	0	0	0	0
2008	561	0	564	540	543	564	2772
2009	0	0	0	0	0	0	
2010	1198	1198	1198	0	599	599	4792
2011	1231	0	1231	0	0	1231	3693
TOTAL	4971	3348	4096	1520	2068	3594	19597

Source: COCOBOD(CODAPEC), 2012.

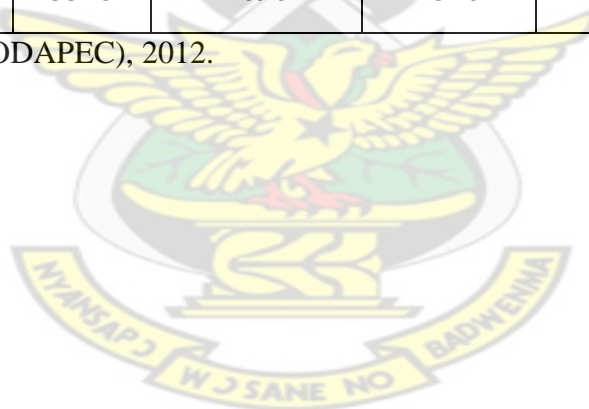


Table 4.5: Showing the Supply of Inputs (Fungicides)

YEAR	CHAMPION (100)	KOCIDE (100)	FUNGURAN (100)	METALM (250)	RIDOMIL (400)	FUGIKILL (150)	NORDOX (200)	TOTAL
2001	0	0	0	0	0	0		0
2002	0	0	0	0	0	0		0
2003		800			487		828	2115
2004	2675				546		440	3661
2005	1100	0	1140	0	525	0		2765
2006			2800		700			3500
2007	742	800	0	0	975	0	340	2367
2008	1205	1042	1800		1010			5057
2009	0	0	1405	320	797	0	215	2737
2010	700	700	847	0	1390	1167		4806
2011	700	700	1195		1710		501	4806
TOTAL	7122	4042	9187	320	8140	1167	2324	31814

Source; COCOBOD(CODAPEC), 2012.

NB; To obtain the number of sachets of a particular chemical supplied, multiply the main figures in the table by the figures in bracket at the top.

Table 4.6: Showing the Supply of Inputs (Pesticide)

YEAR	AKATE MASTER	CONFIDOR	COCOSTAR	TOTAL
2001	0	0	0	0
2002	0	0	1200	1200
2003	0	0	0	0
2004	0	0	0	0
2005	0	0	0	0
2006	0	0	0	0
2007	0	0	0	0
2008	700	300	0	1000
2009	0	390	0	390
2010	0	1300	0	1300
2011	0	1300	0	1300
TOTAL	700	3290	1200	5190

Source: COCOBOD(CODAPEC), 2012.

Table 4.7: Showing the Supply of Inputs (Spray Machines)

YEAR	KNAPSACK	MIST BLOWER	TOTAL
2001	0	0	0
2002	360	60	420
2003	635	0	635
2004	0	0	
2005	0	0	
2006	230	50	280
2007	250	0	250
2008	220	0	220
2009	0	33	33
2010	100	0	100
2011	100	0	100
TOTAL	1695	143	1838

Source: COCOBOD(CODAPEC), 2012.

There is a way that these district level figures are broken down to get each community's share of supplies. Between 2001 and 2005, quantity of each input received was divided by 100 (the total number of spraying gangs in the district). The rest of the division went like this; 2006 to 2007, supplies were divided by 102; 2008, 104; 2009, 106; 2010, 108, and 2011, 110; 2 spraying gangs are added every year after 2008. Every community is allocated one spraying gang regardless of farmer population or land size under cultivation. The implication is that the same quantity of supplies is received by all communities; this is not the best. Farmer population and land sizes should form the major factors for creation of new gangs and allocation of inputs.

However, going by their way of allocation, the study communities' (Asuhyiae, Dwaho, and Brosankro) share of inputs for the period under study are as shown in table 4.8 below;

Table 4.8: Study communities' Share of Inputs Between 2002 and 2011.

Year	Wellington Boots	Hand Gloves	Nose Masks	Overalls	Goggles	Hats	Totals
2002	0	0	0	0	0	0	0
2003	4	9	3	7	4	10	37
2004	9	2	4	2	2	1	20
2005	0	0	0	0	0	0	0
2006	7	11	4	1	3	2	27
2007	0	0	0	0	0	0	0
2008	5	0	5	5	5	5	25
2009	0	0	0	0	0	0	0
2010	11	11	11	0	6	6	45
2011	11	0	11	0	0	11	33
Total	47	33	38	15	20	34	187

Source; COCOBOD(CODAPEC), 2012

NB. This is same for the three communities sampled

From CODAPEC officials, every spraying gang consist of 11 workers (1 supervisor, 10 sprayers). Therefore, for every figure that is less than 11 in table 4.8 above, the difference is a gap for the input concerned. For 2002, 2005, 2007, and 2009, no clothes were supplied for the spraying exercise. If the spraying did take place, then sprayers had to do their work without protective clothing a situation that is against safety rules as outlined by CRIG and EPA officials. On year on year basis, the highest supply was witnessed in 2010 (68.2percent) while wellington boots enjoyed the highest supply among the clothes chosen for protecting the sprayers (42.7percent) albeit less than 50percent (for a past mark in an examination). To make the picture clearer the gaps are also presented in table 4.9 below;

Table 4.9: Gaps in Supply of Protective Clothing to the Study communities

Year	Boots	Hand gloves	Nose/mouth masks	Overalls	Goggles	Hats	Total
2002	11	11	11	11	11	11	66
2003	7	2	8	4	7	1	29
2004	2	9	7	9	9	10	46
2005	11	11	11	11	11	11	66
2006	4	0	7	10	8	10	39
2007	11	11	11	11	11	11	11
2008	6	11	6	6	6	6	41
2009	11	11	11	11	11	11	66
2010	0	0	0	11	5	5	21
2011	0	11	0	11	11	0	33
Total	63	77	72	95	90	76	473

Source; COCOBOD(CODAPEC), 2012

NB. This is the same for the three studied communities (Asuhyaié, Dwaho, and Brosankro)

Tables 4,8 and 4.9 together constitute an illustration of what has been happening regarding the availability of protective clothing for the spraying exercise for one community (which is also the same for all the communities sampled). For adequate supply of these all important clothes for a successful spraying exercise, a total of 660 pieces were required for the period analysed. This would have provided each sprayer with a pair of wellington boot, a pair of hand gloves, a hat, one overall, one nose/mouth mask, and spectacles (goggles). These are the basic requirement for a sprayer to be deemed properly dressed for his work which involves handling poisonous chemicals.

However, for all the years between 2002 to 2011, the programme has not met the requirement of these communities for the spraying exercise, supplying only 187 pieces of these inputs which is 28percent of total requirement. This leaves a gapping gap of 473 pieces or 72percent of total requirement.

The picture is not different in the supply of other inputs for the programme as illustrated by tables 4.10, 4.11 and 4.12 below;

Table 4.10:Supply of Spray Machines Between 2002 and 2011

Year	Knapsack	Mist Blower	Total
2002	4	1	5
2003	6	0	6
2004	0	0	0
2005	0	0	0
2006	2	1	3
2007	2	0	2
2008	2	0	2
2009	0	0	0
2010	1	0	1
2011	1	0	1
Total	18	2	20

Source; COCOBOD(CODAPEC), 2012

NB. This is the same for the three studied communities (Asuhyaie, Dwaho, and Brosankro.)

The recommended lifespan of an average spraying machine according to Nyanteng (1980) is 5years. This was also confirmed by CODAPEC engineering unit at the district. These officials however believe that a mist blower can go up to 10yaers if properly used, for example, not used continuously for more than 4hours a day and also undergo regular maintenance. Whatever is the true technical situation of these machines, it is expected that at any point in time, all members of the gang should have access to machines to work with on a 1:1 basis. It should have been the case that 4machines be replaced in 2006 and 6 replaced by 2007, based on the technical advice of 5years official lifespan. This was not done and so by 2010 and 2011, only 4machines were left with the 10workers per gang per community to do their work.

The implication is that 6 sprayers would always have to wait to take over from their tired co-workers or the farmers should have to purchase their own machines and clothes (since there are gaps in clothing as indicated above) for their farms to be sprayed effectively, timely, and adequately. By all standards, this is not a pleasant situation and may not lead to sustainable mass spraying going forward.

The situation with chemicals supply is not different from the machines and the clothing supply as discussed above. For pesticides, quantities of three chemicals (Confidor, Akate master, and Cocostar) are presented in table 4.11 below;

Table 4.11: Community's Share of Pesticides

Year	Akate Master (Thousand litres)	Confidor (Thousand litres)	Cocostar (Thousand litres)	Total (Thousand litres)
2002	0	0	12	12
2003	0	0	0	0
2004	0	0	0	0
2005	0	0	0	0
2006	0	0	0	0
2007	0	0	0	0
2008	7	3	0	10
2009	0	4	0	4
2010	0	12	0	12
2011	0	12	0	12
Total	7	31	12	50

Source;COCOBOD(CODAPEC), 2012

This is the same for the three communities studied; Asuhyiae, Dwaho, and Brosankro

Here again, only 12000mil of Cocostar was supplied to each of the communities between 2002 and 2007. In other words, there were no supplies of pesticide(s) in 2003, 2004, 2005, 2006, and 2007. The pesticides are supplied for the control of mirrid or capsid and the mist blower is used in the spraying. In each of the three communities studied, only 2 mist blowers were supplied and considering that five years of the period under study did not see any supply, it means the farmers made their own arrangement to spray their farms. The three communities require quantities of confidor(the chemical of choice in the district) as follows; Asuhyiae, 83bottles; Dwaho, 87bottles; Brosankro, 89bottles for one spray. A bottle is supposed to cover 7hectares and the communities together have an average holdings of 584ha, 608ha, and 620ha respectively for Asuhyiae, Dwaho, and Brosankro.

From table 4.11, it is clear that supply of these pesticides has not been regular over the period studied. *Regularity, adequacy, and timeliness* in the supply of inputs are critical factors in delivering an effective and efficient spraying exercise on a sustainable basis. This cannot be said for the supply of protective clothing, spray machines, and pesticides in the communities concerned. This confirms the concerns of the focus groups (spray gangs members, chief farmers of the study communities, and one informant) during the discussions.

The supply of fungicide for the three communities was found to be relatively better for the period. This is because, apart from 2001 and 2002, an adequate amount of chemicals were supplied every year for the period covered as can be seen in appendix A.

4.3.1.2 Creation of Spraying Gangs

The number of spraying gangs in the study communities was found to be less than what is required to do the spraying adequately and timely. According to CODAPEC officials, each gang is to spray 120hectares in a month which works to 600hectares for the five- month spray time. Granted that the communities in question have an average land size of 604(which is true), a gang is enough, on the surface, to do the spraying. However the requirement that these gangs should spray this land size 3times in the 5months, introduces a gap. It thus means that farmers would have to wait for their turn even if their farms are infested by pest or infected by disease. This is a major concern of the farmers in the communities studied.

4.3.1.3 Employment of workers on part-time

One of the concerns of stakeholders particularly, the sprayers and CODAPEC officials was the employment of people on part-time basis on the programme. This according to the respondents and discussants was creating anxiety and insecurity among the workers. Again, majority (about 90percent) of these sprayers are either JHS or SHS leavers who may be awaiting results or struggling to improve their results. At anytime results are released and are good, they leave the programme and go to schools without informing officials. What it means is that they leave with the inputs (mainly protective clothing, and in some cases, spraying machines) in their possession.

The implication is that new members have to be recruited and it takes time for these inputs to be supplied to them. This may partly explain why some members go to work in ordinary clothes and without nose/mouth masks, hand gloves and hats. What is even more troubling is the constant loss of institutional memory; those who exit, leave with the knowledge and experience gained at the training sessions and on the field. Again, new recruits have to be trained either by CRIG officials or the supervisors, whichever body is involved in the training, it cost extra money and time to do this.

Another dimension which is even more worrying is the invisible but ever present hand of politics in the programme. A change of government often lead to a wholesale change in the members of the spraying gangs. This leads to the programme having to go through the full

cycle of training and equipping these new and often “political appointees” (who may be untouchable). Being new, they may not be as fast on the job of spraying as the more experienced ones that were fired. This invariably results in delays and missing of schedules. Low remuneration also came up as a challenge to the sprayers in particular. Currently, they are paid fifty Ghana Cedis (GH¢50) and in their opinion (which they expressed forcefully) this is inadequate. On the whole, one gets the impression that these sprayers who are on the ground and are directly responsible for the day-to-day spraying of farms (which is what the mass spraying is mainly about) are not only living on the margins and are ready to leave anytime other opportunities come, but are also disgruntled. This may have implications for a sustainable mass spraying programme going forward.

4.3.1.4 Lack of Reliable Data on Farm Sizes

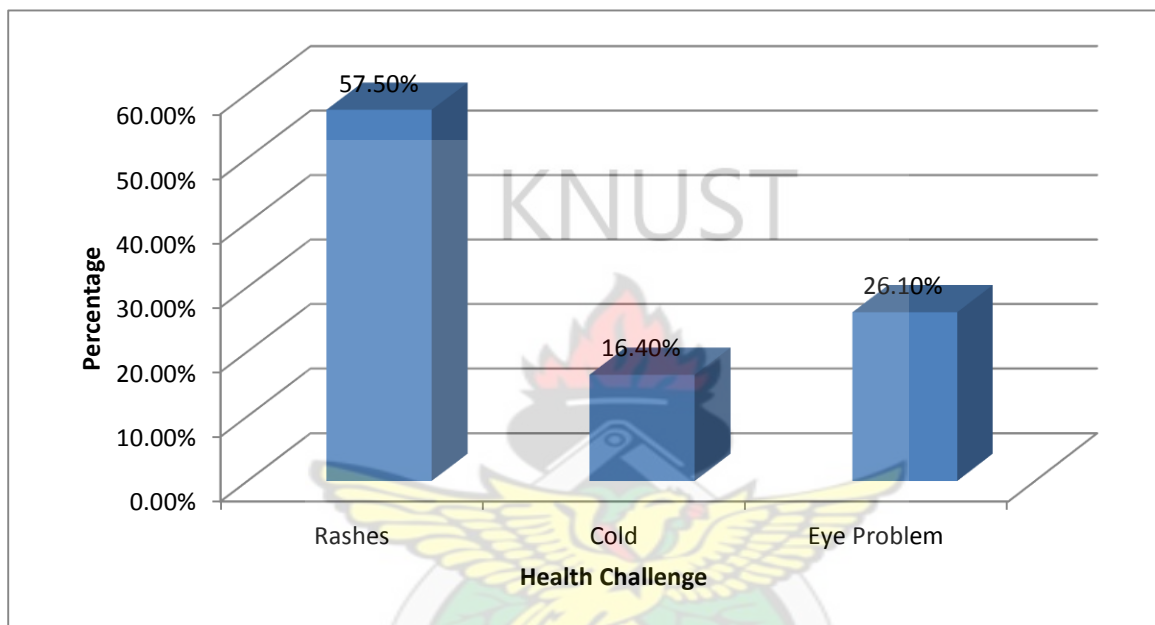
During the interview and responses received from questionnaires, it was realized that chemicals are supplied to gang members without reference to total land area to be covered. Again, it was found that every gang in every community is to handle the same amount of chemical every day, even if a particular gang has a large area to cover over the spraying period. It was surprising when an official with CODAPEC could not tell the number of farmers and total land size of a single community. This situation can be exploited by unscrupulous individuals during distribution of inputs. Pilfering, stealing and doctoring of records are possible under the circumstances.

4.3.2 Social Challenges

4.3.2.1 Effects of Chemicals on Respondents

From the survey, the respondents complain of side effect emanating from the mass cocoa spraying as illustrated by figure 4.4 below;

Figure 4.4 Effects of Chemicals on Respondents



Source: Field Survey, May 2012.

For instance, 62.9 percent (these were mainly farmers) complained that they become affected any time they take part in the exercise. Of those who complained of sickness, 57.5 percent of them reported of some strange rashes after taking part in the exercise, 16.4 percent gets cold whilst the remaining 26.1 percent complained of eye problems as indicated above in figure 4.4. This was confirmed by the District Health Directorate. According to these health officials, this was as a result of the farmers not wearing protective clothing whilst spraying. The method of spraying is also poor because they have to spray in a direction that will not allow the wind to blow the chemicals on the sprayers. The spraying gangs were duly supplied (although inadequate) with fungicides, clothing and machines to spray against the black pod. However, the farmer spray against capsid by themselves without protective clothing and this is where the challenges are. Again, when gang members are changed, it takes time to supply new members with clothes as discussed in previous sections of this chapter.

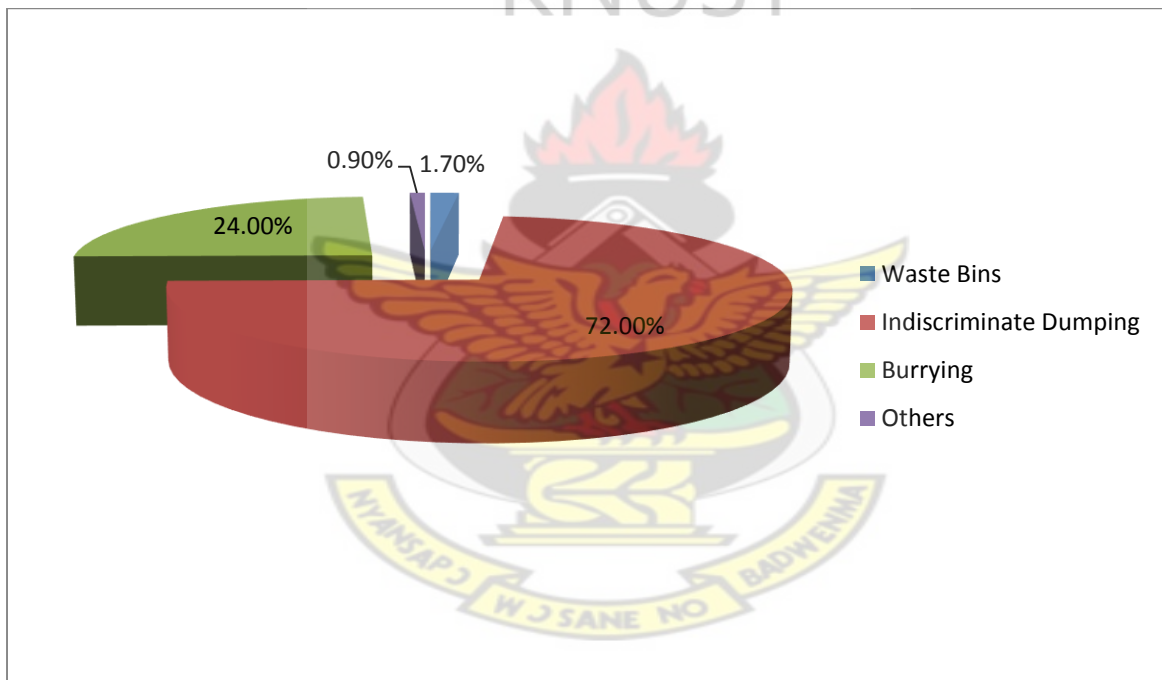
If this trend continues, some farmer may not be willing to do the spraying since no one will continue to do something that threatens his/her health. This will have consequences on sustaining the programme.

4.3.3 Environmental Challenges

4.3.3.1 Disposal of Used Pesticides Containers

Environmental sustenance is vital to ensure the sustenance of the programme. This section assesses the methods of disposal of empty containers after spraying their farms. Figure 4.5 below shows the various methods of disposal of used pesticides containers.

Figure 4.5 Methods of Disposal of the Waste Containers



Source: Field Survey, May 2012.

From figure 4.5, it can be seen that 1.7 percent of the respondents dispose of their refuse into waste containers/bins, 24 percent by burying whilst 72 percent dispose their refuse by throwing them on the farms or in nearby bushes. According to the Environmental Protection Agency (EPA) the best way of disposing of waste containers is by burying. From the survey, it was found that this directive is not being adhered to by the farmers. This is because as high as 72 percent of the respondents dispose of their waste containers by leaving them on the farms. Considering the fact that many of the containers are plastics and so are not

biodegradable, there could be soil pollution and fertility challenges in the future. Again these farmers or their dependants could inadvertently drink water from these containers, when they are taken home. This could have dire health consequences and possibly results in casualties. If farmers begin to encounter these health and environmental challenges on a large scale, it could have negative implication for sustaining the programme going forward.

4.3.3.2 Use of unapproved Chemicals

Though CRIG professionals have approved chemicals for the spraying programme and also that these chemicals have no negative effects on the environment, there are times when farmers have to buy chemicals from the open market to spray their farms. For all the communities studied in this research, farmers lamented the non-availability of these approved chemicals (especially the pesticides) in the input stores (designated stores for the sale of approved agricultural inputs). Under conditions where the government supplies are not in and the input stores do not also have the approved chemicals, farmers whose farm require immediate spraying have to buy from the open market which is inundated with all kinds of insecticides.

Unable to recognise the differences among these chemicals, these farmers do fall into the hands of business men and women who convince them to buy their products which are often faked and only become known after the destruction is caused. There were testimonies of this at Brosankro where farmers sprayed their farms and within three days, the leaves of all trees (young and mature) affected became scorched. Agricultural officials later found that unapproved and faked chemicals were used.

4.4 Institutions involved in the Mass Spraying Exercise in the District

The Cocoa Swollen Shoot Virus Division (CSSVD) is responsible for undertaking the programme in the District. Though this institution has been in existence in the District since 1948, it was given the mandate in 2003 to regulate and control the mass spraying programme. This was due to the fact that the District Agricultural Development Unit (DADU) which was given the mandate to execute the programme when it began in 2001 could not meet its expectation due to inadequate personnel and which over burden the limited staff. The day-to-day running of the programme is however handled by CODAPEC.

4.5 Period that the Programme is undertaken and how Communities are selected

The spraying of the farms has been divided into two main periods within the year. The first one is sprayed from the second week of May to the end of October every year. This is done to control the Black Pod disease which is predominant within this period. The second one which is used to control the spread of Capsid is sprayed from the first week of August to December each year.

Before the exercise is undertaken, there is the need to recruit the people who will be spraying the farms (that is, the spraying gangs). Prior to this, the beneficiary communities are divided into gang areas (that is the area a spraying gang is responsible for spraying). Before the gang is formed, the communities have to select one person to be interviewed by the CSSVD staff to become a gang supervisor. After the selection, that person in collaboration with the chief cocoa farmer in the community, the traditional authorities and some prominent persons in the community come together to select the gang persons/members and submit their names to the office of the CSSVD. The number of people that is required to constitute the gang is 10 sprayers, 1 supervisor. These gangs are not permanent workers but are engaged at the period of the year where the exercise is being implemented; May to December each year.

The chemicals and the spraying machines for the implementation of the programme are sent to the gangs at their gang areas where the roads are motorable and where vehicles cannot go, either the gang members come for it or it is sent to them by motor bikes. Some farmers, especially at Brosankro and Asuhyiae, were not happy with the arrangement where the chemicals are kept with the gangs. They would have preferred that these inputs were kept by themselves or their leaders (they mentioned the chief cocoa farmer in the community) and released to the gangs. This according to them will enhance accountability since the release of chemicals will be recorded and monitored. In addition to the supply of the chemicals and machines freely to the beneficiary communities, all the communities contribute some amount of money for the maintenance of the machine and buying of fuel to supplement the community's allocated quantity of fuel. This amount that is contributed is decided by the community members themselves but not a flat rate from the head office.

4.4.2 Monitoring of the Programme

The district monitoring team of the programme goes around the various gang areas to inspect how the spraying is being done. The personnel from the Municipal Assembly, CSSVD,

COCOBOD and district and other chief cocoa farmer, and some communities' leaders, constitute the monitoring team that goes around on a routine basis to supervise the implementation of the programme.

KNUST



CHAPTER FIVE

SUMMARY OF KEY FINDINGS, RECOMMENDATIONS AND CONCLUSIONS

5.1 Introduction

The focus of this chapter is in two folds. First, it presents a summary of the key findings of the study based on the situational analysis of the Cocoa Mass Spraying Exercise presented in the previous chapter. Second, it discusses recommended approaches that can be adopted to sustain the cocoa mass spraying exercise based on the findings.

5.2 Summary of Key Findings

5.2.1. Ages of Farmers and Educational Levels of Respondents

Cocoa production in the District is mainly being undertaken by the aged and elderly. The average age of cocoa farmers in the District according to the study is pegged at between 45 and 50 years. Cocoa farming is not being seen by farmers and upcoming young people as a business opportunity from which decent income flow could be earned; but as a way of life, which one must move away from once circumstances get better. Clearly, the future sustenance of the cocoa sector could be under threat because it would hit a downturn again once the mass elderly generation of cocoa producers are forced by weak limbs and tired feet to lay down their tools. The active participation of young educated people in cocoa production is not only vital for the future sustenance of the cocoa sector, but also for increased productivity on the cocoa farm, which would translate into higher income earnings from the cocoa industry.

The educational level of the farmers is not also encouraging. About 91percent of farmers have only up to middle/JHS education with 9percent completing technical/SHS. This situation has direct effect on the spraying programme since farmers are required to measure the chemicals and mix the well in order to derive maximum benefit from the spraying. They should also be in a position to read labels on chemical containers to enable them recognise fake chemicals when they are being convinced to buy. Good education will also enhance record keeping and help track movement of inputs by sprayers and their supervisors.

5.2.2 Supply of Farming Inputs for the Cocoa Mass Spraying Exercise

The supply of inputs for the cocoa mass spraying exercise was found not enough to cover all the farms and farmers in the District. Farming inputs is supplied by the Government of Ghana through the Cocoa Diseases and Pest Control Division for distribution to the District for the programme. Farming inputs such as pesticides, fungicides, spraying machines, and protective clothing, fall far below what is required to meet demand in the communities as amply demonstrated by tables 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 4.10, 4.11 in the analysis, and also appendix A. That is the size of farms in the study area outstrips the supply of farming inputs for the programme. The farmers concerned are not informed of this limitation and they always wait in vain for their farms to be sprayed for them only to be running around last minute when the truth hit them. Cocoa production levels in the District suffer as a result since some of the cocoa farmers still suffer losses from pest attacks.

5.2.3. Level of Acceptance

The programme is found to be enjoying a high level of acceptance. On the whole, 99 percent of respondents rated the programme as high. They therefore accept it and hail it as a saviour from pest and disease.

5.2.4 Disposal of Waste and Effects of Chemicals Used on Respondents

The disposal of waste containers used for the exercise is very vital to the environmental sustainability of the programme. The method of waste chemical disposal is not the best. Most of the farmers resort to indiscriminate disposal of waste containers. They are thrown on their farm or bushes. This is not the best practice as it endangers the environment since the plastics and bottles are not bio-degradable with attendant land pollution and soil fertility challenges. The best method of disposing of these waste containers is by burying as advised by the EPA.

Related to this point are the effects of the chemical use in the spraying exercise on the farmers and the spraying gangs. They complained that after undertaking the spraying exercise (especially those who do not wear the protective clothing) they experience adverse health conditions such as itchy bodies resulting in some strange rashes which used not to be there. Again cold and headaches are other health problems they have been experiencing since taking part in the exercise. Clearly, these are adverse effects of the contacts of the chemical use in the spraying exercise on human bodies. The respondents were taking through safe

methods of disposing waste chemical containers and proper methods of spraying to avoid some of these occurrences. The expert at CRIG however stated categorically that the approved chemicals do not pose any danger to flora and fauna but were quick to add” if only the guideline are adhered to”.

5.2.5 Employment Generation

The programme so far employs 1232 workers in the district on part-time basis. It has the capacity to employ more if gangs are to be created to be commensurate with the number of farmers and land size in the district. However, the employment of people only on part-time basis is making the employees apprehensive and serve as a disincentive to them. The remuneration of fifty Ghana cedis (GH¢50.00) a month was also found to be inadequate and gang members interviewed did not hide their feelings.

5.2.6 Use of Unapproved Chemicals

It was also revealed that some farmers resort to buying chemicals from the open market in the absence of the government supplied ones. These chemicals in many cases are imitated and often lead to crop losses through scorching.

5.3 Recommendations

With reference to the findings from the study, the following recommendations are being made to achieve the objectives for sustaining the programme in the study area.

i. Farming should be Made Attractive to the Young and the Educated

Farming should be made attractive to the young and the educated in the District by MOFA, and central government. This can be done by educating the people about the opportunities involve in undertaking cocoa farming in the District. Again, incentive packages such as further increase in the price that go to the farmer, timely payment of bonuses(a major concern of farmers in the area) etc. The land tenure system should be enhanced to make land easily available to the people for it to motivate the young and the educated to venture into cocoa farming with assurance of secure title to their property. The current situation where a land owner can anytime claim his land and ask you to literally uproot your trees if you like, does not incentivise the youth and educated who are more strategic in their thinking and will view cocoa farming as a business. Special awards should also be created purposely for the youth and the

educated to attract them into the sector. The truth is that the state is investing a lot of scarce funds in the sector by way of the various interventions and for these to be sustained in order to reap the full benefit, there is the need to look beyond the current generation of aging cocoa farmers. This is where the young educated come in.

The sector has historically relied on peasant, predominantly illiterate aging generation to chalk all the success associated with Ghana's cocoa story. However, this may prove unsustainable going forward. Already, it is reported that the country has one of the lowest productivity figures (Breigsinger et al, 2008) and technologies are required to improve this situation; some level of literacy is needed to achieve this, hence the recommendation to do all it takes to attract the educated youth to this critical sector.

- ii. Build a Reliable Database of the Number of Cocoa Farms and Sizes in the District and their Needs

To adequately provide the number of farming inputs such as pesticides, insecticides, spraying machine and protective clothing required for the spraying exercise, there is the need to build a reliable database of the number of farms in the District and particularly the communities, the size of these farms, new farms that are springing up and the number of communities involve in the programme. The District coordinator for the cocoa mass spraying exercise should make it a duty to build this data base as a basis for future planning and modification of the programme. With this, the number of farming inputs needed for the programme within a year will be known and procured adequately beforehand to avoid gaps.

- iii. Strengthening the sources of funding.

The source of funding for the programme should be strengthened. The source of funds for the programme is solely from Government chest (COCOBOD resources are also government resources). This put enormous amount of pressure on the state purse. As a result, if the Government at some point reneges on her responsibility (in times of serious economic meltdowns for instance) inadequacies in the supply of inputs for the programme will intensify further threatening sustenance. This was the bane of similar spraying exercises in the 1950s and 1960s (Nyanteng, 1980; C.M,B, 1979). Again, the farmers are willing to be supplied with spraying machines on credit basis. It is recommended that the government should consider this proposal to supply these machines on credit basis as it has the advantage of

increasing the number of machines available to the farmers while reducing the financial burden on government.

iv. Strengthening of Modalities Guiding the Cocoa Mass Spraying Exercise

To avoid favouritism and pilfering in the distribution of the inputs, the rules guiding the distribution need to be strengthened. The farming inputs should not be kept at the District Store, what should rather happen is that once a strong data base is prepared with the farmers and independently verified by officialdom, then during the spraying season, each farmer's allocation could be supplied to him/her directly from the national office based on the list that was provided. This can be done by allocating one vehicle for each of the cocoa districts which will go round distributing the inputs to the farmers in their communities with the assistance of the chief farmer and the elected representative of the farmers. The farmers will keep these inputs in their houses and upon the arrival of the spraying gangs, they (farmers) will provide the chemicals for the work to be done for them. It must be stated again with emphasis that there is the need to decentralise the programme from the district to the community level to whip up more interest and ensure programme ownership.

v. Education of the Farmers

The education of the farmers must be intensified. This can be done by increasing the number of times they have awareness and sensitisation programmes in the district for present ageing farmers, but more importantly encouraging the youth and the educated men and women to enter the cocoa sector. This can be done through the local information systems (community radio etc.) and through churches. It can also be done through dramas which are performed in schools to show the growing children of today that farming is a good "profession" from which one can make a decent living. Spraying to effectively control pest and disease is a relatively technical exercise that require some level of literacy to be successful and sustainable.

vi. The Supply of Inputs (chemicals, spraying machines, and protective clothes)

There are gaps in the supply of pesticides, spray machines and protective clothes to the programme in the study communities. For example in each of the communities, there is a cumulative gap of 473 protective clothes (boots, hats, overalls, mouth/nose masks, goggles, and hand gloves) in the supply. There are only 2 mist blowers which have not been replaced over the period studied. It is therefore recommended that supply of these

inputs should be improved drastically to cover the gaps. The beneficiaries are willing to meet the government halfway by taking some of these supplies on credit in order to improve availability of the recommended inputs for the programme. Once again, this proposal should be considered.

5.4 General Conclusion

Cocoa is a major source of revenue for producing countries. Revenue derived from it is used to finance the provision of development infrastructure in other sectors. Various interventions have thus been undertaken by various governments to increase cocoa production. These methods include mass spraying, fertilizer application, provision of improved seedlings etc. The Government of Ghana introduced the mass cocoa spraying exercise in 2001. This programme has been lauded by majority of people in the communities studied. The main objective of this study was to identify ways of sustaining the mass cocoa spraying exercise in the Ahafo Ano North District. The study identified that the CMSE is a step in the right direction toward increases in the level of production in the District and must therefore be sustained. However the programme is bedevilled with certain challenges as revealed by this study which must be addressed.

Some of the challenges identified with the programme include inadequate supply of inputs, use of unapproved chemicals, dissatisfaction of sprayers (because of job insecurity and remuneration), favouritism and pilfering or diversion of inputs. The study recommends the strengthening of modalities governing the distribution of the CMSE in the district, increased supply of inputs (in some cases, on credit to farmers where resources are a constraint to government), improved remuneration and job security of workers particularly the gangs, and conscious efforts to involve the beneficiaries in subsequent planning, implementation and monitoring/evaluation of any modification to the programme.

CRIG and EPA officials have to intensify their training, education, and monitoring roles to ensure that their guidelines are adhered to. This will help reduce the health and environmental issues that the study revealed.

REFERENCES

Amanor, K. (2005), "Agricultural Markets in West Africa: Frontiers, Agribusiness and Social Differentiation", *IDS Bulletin* Vol 36 No 2 Institute of Development Studies.

Amanor, K. (2010), "Family Values, land sales and agricultural modification in rural Ghana" *Africa*, 80 (1), pp. 104-125.

Africa Development Bank (2002), "Cocoa Rehabilitation Project's Performance Evaluation Report"

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*.

Bulif, A., (2002), "Can price incentive to smuggle explain the contraction of the cocoa supply in Ghana?" *Journal of African Economies*, 11:3, pp. 413-39.

Cocoa Marketing Board (1978); CMB News; *House Journal of the Cocoa Marketing Board, No. 67*. CMB News (1980); *House Journal of the Cocoa Marketing Board, No. 71*.

Cocoa Marketing Board News(1979); *House Journal of the Cocoa Marketing Board, No. 70*

Cocoa Marketing Board News (1981); *House Journal of the cocoa Marketing Board, No. 74*

Fiksel, J (1997) "Practical Issues in Environmental Performance Evaluation", in Tibor, T. and I. Feldman, *Implementing ISO 14001*.

Fiksel J, J. Mcdaniel and C. Mendenhall (1999) measuring progress towards sustainability, principles, process, and best practices. Battelle Memorial Institute Life Cycle Management Group, 505 king avenue columbus, Ohio 43201-2693(614) 424-5730 fiksel@battelle.org.

[Http://www.eco-nomics.com/images/sustainabilitypercent20measurementpercent20gin.pdf](http://www.eco-nomics.com/images/sustainabilitypercent20measurementpercent20gin.pdf)

European Commission,(2010): Sustainable cocoa production system; Pest Management Notes *No.12*

German Federal Ministry for Economic Cooperation and Development (BMZ) (2009): Promotion of Sustainable Cocoa Production; Armajaro, Deutsche Gesellschaft für Technische

Grossman-Green and Bayer. C.(2009), “A Brief History of Cocoa in Ghana and Cote d’ivoire”, Tulane University-Payson Centre for International Development.

Grey.T. and Siddall . E. (2011) “Sustainability Indicators Framework”, *Toward a Sustainable Dublin Region, Baile Atha Cliath, Dublin City.*

Himme, M.V. and Snoeck, J. (2001). Beverage and Stimulant Crop Belgium: Geokint Graphics, N.V. Brussels.

Hart M (2010): Sustainable Measures; West Hartford, CT 06137-0502, <http://www.sustainablemeasures.com/node/89>

Hill, P. (1963), *The migrant cocoa farmers of Southern Ghana. A study in rural capitalism.* James Currey publisher

IISD(2012), “What is Sustainable Development?”, *iisd*<http://www.iisd.org/sd/>

James P (1997). “The Sustainability Cycle: A New Tool for Product Development and Design” *Journal for Sustainable Product Design.* July 1997.

Obeng .K.A. and Opoku I.Y. (2008): The National Cocoa Diseases and Pests Control (CODAPEC): Achievements And Challenges

Kolavelli .S. and Vigneri .M. (undated): Cocoa in Ghana: Shaping the Success of an Economy

Leston Dennis(1974), “The Diseconomy of Insecticide use in Cocoa Production in Ghana”. Institute of Statistical, social, and Economic Research; University of Ghana, Legon.

Ministry of Manpower, Youth and Employment (MMYE) (2007): Labour Practice in Cocoa Production in Ghana. (Pilot survey); National Programme for the Elimination of Worst Forms of Child Labour in Cocoa (NPECLE)

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(ISSER), Legon.

Quartey E. (undated): Research Department, COCOBOD; COCOBOD Presentation.
<http://www.google.com.gh/url?sa=t&rct=j&q=what is mass cocoa sprayingpercent3>

The University of Reading (undated): Sustainable Agriculture; http://www.ecifm.rdg.ac.uk/sustainable_agriculture.htm Accessed on 19/01/2012

Stryker, J. D. (1990), “Trade, Exchange Rate, and Agricultural Policies in Ghana”. *World Bank Comparative Studies*. The World Bank.

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

Vigneri M. and Santos, P. (2008), “What does liberalization without price competition achieve? The case of cocoa marketing in rural Ghana”, IFPRI-GSSP Background Paper n. 14. International Food Policy Research Institute.

Vigneri M. (2007): Drivers of cocoa production growth in Ghana; ODI Project Briefing No 4 •

Zusammenarbeit (GTZ) GmbH, Kraft Foods Inc., United States Agency for International Development (USAID)

The World Bank (2010), Agriculture and Rural Development (ARD) 1818 H Street, NW
Washington, D.C. 20433 USA Telephone: 202-477-1000 Internet: www.worldbank.org/ard

KNUST



APPENDICES

Appendix A; Fungicides Supplied to Study Communities Between 2001 and 2011

Year	Champion (100 sachets/box)	Kocide (100 sachets/box)	Funguran (100 sachets/box)	Metalm (250 sachet/box)	Ridomil (400 sachets/box)	Fungikill (150 sachets/box)	Nordox (200 sachets/box)	Total
2002	0	0	0	0	0	0	0	0
2003	0	800	0	0	2000	0	1600	4400
2004	2700	0	0	0	2000	0	800	5500
2005	1100	0	1100	0	2000	0	0	4200
2006	0	0	2700	0	2800	0	0	5500
2007	700	800	0	0	4000	0	600	6100
2008	1200	1000	1700	0	4000	0	0	7900
2009	0	0	1300	750	3200	0	400	5650
2010	600	600	800	0	5200	1650	0	8850
2011	600	600	1100	0	6400	0	1000	9700
Total	6900	3800	8700	750	31600	1650	4400	57800

Source; COCOBOD(CODAPEC), 2012

APPENDIX B;

DEPARTMENT OF PLANNING

COLLEGE OF ARCHITECTURE AND PLANNING

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND
TECHNOLOGY



This research is to solicit for relevant empirical data for the completion of an academic exercise on the subject “sustainability of the mass cocoa spraying programme in the Ahafo Ano North District” for the award of a Masters’ of Science degree in Development Policy and Planning from the Department of Planning, KNUST. Your cooperation is very much anticipated since data collected will be treated with complete confidentiality.

A. PROFILE OF FARMERS	
<i>Please, circle the appropriate responses</i>	
1.	Age of farmer years old
2.	Sex of farmer a. Male b. Female
3.	Were you/was he/she born and raised here? a. Yes b. No c. Don't Know
4.	Farmer's highest educational level. a. Non/no formal education b. Primary c. JHS//Middle Sch. d. SHS e. Technical/voc f. Tertiary g. Others (specify)

B Effects of the mass cocoa spraying exercise			
No.	Questions	Before	After
5.	What is your farm size before and after the cocoa spraying?	(a)1-3acres (b) 4-6 acres (c)7-10 acres	(a)1-3acres (b) 4-6 acres (c)7-10 acres

		(d) above 10 acres Others specify.....	(d) above 10 acres Others specify.....
6.	How many bags of cocoa do you harvest annually?	a. 1-3 b. 4-6 c. 7-10 d. Others, specify.....	a. 1-3 b. 4-6 c. 7-10 d. Others, specify.....
7.	How many bags of beans get spoilt annually due to pest and diseases?	(a) Less than ½ bag (b) ½ -1 bag (c) 2-4 bags (d) above 5bags	(a) Less than ½ bag (b) ½ -1 bag (c) 2-4 bags (d) above 5bags
8.	How many bottles of pesticides do you used to spray your farm in a season?	(a) less than 3 bottles (b) 4-10 bottles (c) 11-20 bottles (d) above 20 bottles	(a) less than 3 bottles (b) 4-10 bottles (c) 11-20 bottles (d) above 20 bottles
9.	How many times do you spray your farm in a season?	(a) 1-3 times (b) 4-7 times (c) 8-10 times (d) above 10 time (e) others, specify.....	a) 1-3 times (b) 4-7 times (c) 8-10 times (d) above 10 time (e) others specify.....
10.	How many trees do you cut down annually due to pest and disease infection?	(a) less than 10 (b) 10-30 (c) 31-60 (d) above 60 (c) None Others specify.....	(a) less than 10 (b) 10-30 (c) 31-60 (d) above 60 (c) None Others specify.....
11.	What is your annual income?
C.	<i>Sustainability of the mass cocoa spraying programme</i>		
12.	How often do you spray your farm in a season?	(a) Ones (b) Less than 3 times (c) 3-6 times (d) 7-10 times	
13.	Has your farm been sprayed for you	(e) YES	

	this year by the government?	(f) NO
14.	If yes, how many times in this year?	(a) Ones (b) Less than three times (c) Other specify.....
15.	If No, when was the last time your farm was sprayed by the government?	(a) Less than a year (b) A year ago (c) 1-3 years ago (d) Above three years (e) Others specify.....
16.	How do you get the government to spray your farm?	(a) Voluntary visit by the spraying team (b) Invitation of the team to the farm (c) Invitation by the assembly to cocoa farms (d) Others specify.....
17.	Who are the managers of the mass cocoa spraying programme in your community?	(a) The district assembly (b) Cocoa board (c) District agriculture directorate unit (d) FBOs (e) Others specify.....
18.	Do you have to supplement with what the programme provides before you get adequate spraying in a season?	(a) YES (b) NO
19.	If yes, what size of your farm do you spray on your own?	(a) ¼ (b) ½ (c) 1/3 (d) Others specify.....
20.	In the absence of the mass cocoa spraying programme, what other alternative cocoa spraying do you receive?	(a) Personal spraying (b) Farmer base organization (c) NGOs (d) Relative(s) (e) Others specify.....
21.	Do you have difficulties in getting	(a) YES

assistance from the mass cocoa spraying team(s)?.	(b) NO
---	--------

22. If the answer to question 18 is YES, could you please mention some of the challenges you face?

.....

.....

.....

.....

.....

.....

23. What will you recommend to help improve the effectiveness and efficiency of the mass cocoa spraying exercise?

.....

.....

.....

.....

.....

24. Do you think the programme is a good one and should be sustained? YES/NO

25. Were you involved in the programme from onset? YES/ NO

26. If yes, at what level?

Planning

Implementation

Monitoring/Evaluation

27. Is there any “strange” health condition that you think comes from the spraying?.YES/NO

28. If yes, could you please describe this condition?-----

28. Do you sometime have to do the spraying yourself?.

29. Under what condition will you have to do the spraying yourself?. a. Spraying gangs not ready.

b. Gangs demanding money

c. Gangs not doing it well

d. Quarrel with gangs

e. Others specify-----

30. Do you receive training on the use of the chemicals?. YES/NO

31. Have they provided you with protective clothing anytime you are to do the spraying yourself? YES/NO.

ENVIRONMENT

32. How do you dispose of the chemical containers after use?

33. When spraying machines spoil beyond repair, how are they disposed off?

34. Do the Environmental Protection Agency (EPA) give any guidelines to regulate the spraying? YES/NO

35. If yes, can you tell us some of these guidelines?-----

36. Do you think the spraying gangs follow these guidelines? YES/NO

37. If no, which ones are not followed?-----

38. How will you rate the present mass spraying programme?

- a. Very high
- b. high
- c. Low
- d. Very low



**DEPARTMENT OF PLANNING
COLLEGE OF ARCHITECTURE AND PLANNING
KWAME NKRUMAH UNIVERSITY OF SCIENCE AND
TECHNOLOGY**

This research is to solicit for relevant empirical data for the completion of an academic exercise on the subject “sustainability of the mass cocoa spraying programme in the Ahafo Ano North District’ for the award of a Masters’ of Science degree in Development Policy and Planning from the Department of Planning, KNUST. Your cooperation is very much anticipated since data collected will be treated with complete confidentiality.

A. PROFILE OF INSTITUTION

KNUST

1. Name of the institution

.....

2. Mission and vision of the institution

.....
.....
.....
.....

Leston(1974) reports that there are some ants that naturally control capsid in cocoa farms. Is that correct? YES/NO

1. If yes, could you please identify these ants?-----

2. Do the current insecticides used in the mass spraying of cocoa have any effects on these ants? YES/NO

3. If yes, what are these effects?-----

4. What are the yield loss technically attributable to capsid and black pod?
 - a. Capsid-----

 - b. Black pod-----

5. Do the selected insecticides in the current mass spraying programme have any effects on other plants and animals? YES/NO.
6. If yes, what are some of these effects on
 - a. Plants?-----

 - b. Animals?-----

 - c. Soil?-----

7. How can the contribution of the current mass spraying programme to yields be determined from that of the other components(fertiliser subsidy, and improved seedlings)?
8. Was your institution involved in the planning, and implementation of the current mass spraying programme? YES/NO/CONSULTED
9. If yes, what specific role did you(the institution) play?-----

10. What do you think are the main challenges of the current mass spraying programme?

a. Generally-----

b. Ahafo-Ano North District specific(if you know)-----

11. Is the institutional structure put in place to implement the programme the best?

a. YES

b. NO

c. No opinion

KNUST

12. Please explain you answer in (11) above-----

13. Do you think the programme is sustainable, looking at the funding arrangement?

YES/NO

14. What will be your recommendations for a sustainable spraying programme generally?-----





**DEPARTMENT OF PLANNING
COLLEGE OF ARCHITECTURE AND PLANNING
KWAME NKRUMAH UNIVERSITY OF SCIENCE AND
TECHNOLOGY**

This research is to solicit for relevant empirical data for the completion of an academic exercise on the subject “sustainability of the mass cocoa spraying programme in the Ahafo Ano North District’ for the award of a Masters’ of Science degree in Development Policy and Planning from the Department of Planning, KNUST. Your cooperation is very much anticipated since data collected will be treated with complete confidentiality.

A. PROFILE OF INSTITUTION

Name of the institution.....

Mission and vision of the institute-----

1. What are the sources of funds for financing the current mass spraying programme?----

2. How much money is spent per year on the programme between 2001 and 2011?

YEAR	AMOUNT
2001	-----
2002	-----
2003	-----
2004	-----
2005	-----
2006	-----
2007	-----
2008	-----
2009	-----
2010	-----
2011	-----

3. Do you think that the funding sources are enough to sustain the programme going forward? YES/NO

4. What are the benefits of the mass spraying programme in the Ahafo-Ano North district in the form of;

a. Elimination or reduction in the incidence of

i. Capsid-----

ii. Black pod-----

b. Number of people employed on the spraying programme as

i. Part time-----

ii. Full time-----

c. Number of people trained by the programme since its introduction in 2001, on the proper use of the chemicals and others.

i. Spraying gangs-----

ii. Farmers-----

iii. Supervisors-----

d. Others, specify-----

5. Has the Environmental Protection Agency(EPA) issued any guidelines to regulate the spraying programme?. YES/NO

6. Do you know whether these guidelines are followed during spraying in the Ahafo-Ano North district of Ashanti? YES/NO

7. If answer to (6) above is yes, could you please give some evidence that show compliance?-----

KNUST



8. What do you think are the challenges of the programme

i. Generally-----

ii. Ahafo-Ano North district-----

KNUST

9. How are the spraying inputs(chemicals, machines, and protective clothes) made available to the farmers and how often?-----

10. What are the recommended months for spraying cocoa in the Ahafo-Ano North district?-----

11. Is the spraying actually done in the recommended months? YES/NO

12. What do you think are the issues that may make the mass spraying programme unsustainable?-----

13. What are your recommendations for a sustainable programme?-----

14. What are the output levels (Production) between 2000 and 2011 in your district (Ahafo-Ano North)?-----



**DEPARTMENT OF PLANNING
COLLEGE OF ARCHITECTURE AND PLANNING
KWAME NKRUMAH UNIVERSITY OF SCIENCE AND
TECHNOLOGY**

This research is to solicit for relevant empirical data for the completion of an academic exercise on the subject ‘sustainability of the mass cocoa spraying programme in the Ahafo Ano North District’ for the award of a Masters’ of Science degree in Development Policy and Planning from the Department of Planning, KNUST. Your cooperation is very much anticipated since data collected will be treated with complete confidentiality.

A. PROFILE OF INSTITUTION

Name of the institution

.....

Mission and vision of the institute-----

1. Does the EPA issued guidelines to monitor the current Mass Spraying Programme in the Ahafo-Ano North District? YES/NO

2. If yes, what are these guidelines?-----

3. If no, how do you regulate the spraying since chemicals are involved?-----

4. Do the chemicals really have any effects the environment at all? YES/NO

5. If yes, what are these effects on;

a. Plants-----

b. Animals-----

c. Waterbodies-----

d. Air-----

e. Soil-----

6. If the empty cans from the chemical and other used containers are not properly disposed of, what are the effects?-----

7. Is there any incidence of environmental pollution that your outfit had ever dealt with that was caused by the spraying programme? YES/NO

8. If yes, could you please describe the incidence briefly?-----

9. How was the incidence resolved?. -----

10. What are your technical recommendations for an environmentally friendly spraying programme that is sustainable



DEPARTMENT OF PLANNING
COLLEGE OF ARCHITECTURE AND PLANNING
KWAME NKRUMAH UNIVERSITY OF SCIENCE AND
TECHNOLOGY

This research is to solicit for relevant empirical data for the completion of an academic exercise on the subject ‘sustainability of the mass cocoa spraying programme in the Ahafo Ano North District’ for the award of a Masters’ of Science degree in Development Policy and Planning from the Department of Planning, KNUST. Your cooperation is very much anticipated since data collected will be treated with complete confidentiality.

A. PROFILE OF INSTITUTION

Name of the institution.....

Mission and vision of the institute-----

1. What are the output levels of cocoa in the Ashanti region between 2000 and 2011?
2. What are the cocoa output levels nationally between 2000 and 2011?
3. Could you please list the source of funds for financing the current mass spraying programme nationally?-----

4. Do you receive inputs at the appropriate time from the national level for spraying in the region? YES/NO
5. What are the recommended months for spraying the cocoa in the region?-----

6. What are the challenges of the spraying programme in the region/country?-----

7. What are the potentials of the programme in the region/country?-----

8. Do you think the programme in its current state is sustainable? YES/NO/NO
OPINION

9. What will be your recommendations to deal with the challenges for so as to ensure
a sustainable programme?-----

KNUST





**DEPARTMENT OF PLANNING
COLLEGE OF ARCHITECTURE AND PLANNING
KWAME NKRUMAH UNIVERSITY OF SCIENCE AND
TECHNOLOGY**

This research is to solicit for relevant empirical data for the completion of an academic exercise on the subject “sustainability of the mass cocoa spraying programme in the Ahafo Ano North District’ for the award of a Masters’ of Science degree in Development Policy and Planning from the Department of Planning, KNUST. Your cooperation is very much anticipated since data collected will be treated with complete confidentiality.

1. Have you handled any health conditions in the Ahafo Ano North District that is as a result of the Mass Cocoa Spraying programme? YES/NO
2. If yes, could you please describe/list these health conditions?-----

3. How were they finally treated?-----

4. Do you still receive these complaints? YES/NO
5. If yes, what precautionary measure do/ will you suggest to the farmers?-----

6. What are your recommendations for a sustainable mass spraying programme that does not pose health threats to the farmers and spraying gangs?-----



DEPARTMENT OF PLANNING
COLLEGE OF ARCHITECTURE AND PLANNING
KWAME NKRUMAH UNIVERSITY OF SCIENCE AND
TECHNOLOGY

This research is to solicit for relevant empirical data for the completion of an academic exercise on the subject “sustainability of the mass cocoa spraying programme in the Ahafo Ano North District’ for the award of a Masters’ of Science degree in Development Policy and Planning from the Department of Planning, KNUST. Your cooperation is very much anticipated since data collected will be treated with complete confidentiality.

1. Could you please provide us a map of the Ahafo Ano North District with, all communities, villages, and towns?.
2. Make the following communities identifiable(stand out) on the map; Dwaaho, Asuhyiae, and Brosankro.





DEPARTMENT OF PLANNING
COLLEGE OF ARCHITECTURE AND PLANNING
KWAME NKRUMAH UNIVERSITY OF SCIENCE AND
TECHNOLOGY

This research is to solicit for relevant empirical data for the completion of an academic exercise on the subject “sustainability of the mass cocoa spraying programme in the Ahafo Ano North District’ for the award of a Masters’ of Science degree in Development Policy and Planning from the Department of Planning, KNUST. Your cooperation is very much anticipated since data collected will be treated with complete confidentiality.

1. Could your office please provide us with the following information?
 - a. Amounts of money spent on CODAPEC yearly between 2001 and 2011?

Year	Amount
2001	-----
2002	-----
2003	-----
2004	-----
2005	-----
2006	-----
2007	-----
2008	-----
2009	-----
2010	-----
2011	-----

b. Seasonal/yearly supply of inputs to CODAPEC between 2001 and 2011.

Year	Quantity of chemicals(bottles or gallons etc)	Number of spraying machines	Quantity of protective clothes(hand gloves, boots, nose masks, overalls etc)
2001			
2002			
2003			
2004			
2005			
2006			
2007			
2008			
2009			
2010			
2011			

