CATHOLIC UNIVERSITY COLLEGE OF GHANA

ECONOMIC AND FINANCIAL IMPLICATIONS OF DECLINE IN COCOA PRODUCTION IN THE BONO REGION OF GHANA

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ECONOMIC AND FINANCIAL IMPLICATIONS OF DECLINE IN COCOA PRODUCTION IN THE BONO REGION OF GHANA

BY

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DECLARATION

Candidate's Declaration

I hereby declare that this dissertation is the result of my own original research and that no part of it has been presented for another degree in this University or elsewhere.

Candidate's Signature:……Date:……

Name: Anthony Yeboah

Supervisor's Declaration

I hereby declare that the preparation and presentation of the dissertation were supervised in accordance with the guidelines on supervision of dissertation laid down by the Catholic University College of Ghana.

Supervisor's Signature:…… Date:……..

Name: Mr. Williams Kofi Awuma

ABSTRACT

Cocoa production has been the backbone of Ghana's economy for more decades. It employs over a million people throughout the country and source of livelihood for many in the country. This study assessed economic and financial implications of decline in cocoa production in the Bono Region (Jaman South Municipality, specifically Drobo). The study adopted a case study research design using cross sectional survey methods. Purposive sampling was used to select 100 respondents for the study. Data collected were analysed using, frequencies, means, standard deviation and analysis of variance. Findings of the study revealed that logistics challenges and farm related causes were the influential causes of decline in cocoa production. The study again established that there is a decreasing trend of cocoa production from 2015 to 2018 in the municipality. The study further revealed that the influential economic and financial implications of decline in cocoa production are net balances after expenses are not encouraging, retirement savings after farming operations are reduce, economic asset of the farmers are not achieved, shops selling cocoa chemical and insecticides are affected and cocoa farmers loan delinquency are increase. The study recommended Government agencies responsible for extension service should offer training programs for farmers'. It further recommended that investing in the logistic constraints of the farmers should be the priority of ministry of food and agriculture. The study suggests that a replica of the study should be conducted in most of the municipalities to give more national outlook for generalization.

KEYWORDS

Economic and Financial Implications

Decline in Cocoa Productions

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DEDICATION

This dissertation is dedicated to my wife Tiwaa Diana, two of my lectures, Mr. Frimpong my accounting lectures and Dr. Mustapha for their immense contribution from the start of the course to the end of it and again to my supervisor Mr. Williams Kofi Awuamah.

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CHAPTER ONE

INTRODUCTION

Cocoa production has been the backbone of Ghana's economy for more than six decades now. The sector employs over a million people throughout the country and remains the major source of livelihood for many people in the country. The government of Ghana spends huge sums of money annually on the purchase and distribution of fertilizers, viable seedlings and other inputs to farmers but the sector is still beset with a lot of challenges which reduce yield significantly annually(Aryeetey & Kanbur, 2008). In order to maximize yield, it is very important that cocoa production decline throughout the supply chain are identified, assessed and dealt with early enough in order to restore the level of productivity of the sector. (Jaeger, 1999 cited in Aryeetey & Nanbur, 2008).

Background of the Study

The importance of cocoa to Ghana's economy cannot be overstated. According to the Bank of Ghana, the sector accounts for more than 9% of agricultural Gross Domestic Product (GDP). Cocoa production supports the livelihoods of more than 800,000 smallholder households (Anim-Kwapong & Frimpong, 2004 cited in Awuah et al, 2015) and many others depend on it for a significant share of their income. Cocoa holds a unique position in Ghana's economy. It is a major contributor to Ghana's gross domestic product (GDP) and the country's most important agricultural export crop. It is also a major source of income to over 800,000 farmers and many others engaged in trade, transportation and processing of cocoa (World Bank, 2011). For instance, it contributes about 70% of annual income of small-scale farmers, stakeholders like Licensed Buying Companies (LBC's) depend mostly on cocoa beans for

their trading and marketing activities, employment and income generation (Boansi , 2013).

In Ghana cocoa is been processed when the pods are collected, broken and the extracted beans are fermented, dried and bagged for export (International Cocoa Initiative, 2008). Other processes on the cocoa value chain include cleaning, roasting and removing of the shell of the bean (International Cocoa Initiative, 2008). The nib in the shell is ground to form a cocoa paste. This paste can be pressed to extract cocoa butter which represents 50% of the cocoa bean. The remaining is the cocoa powder which is typically used for producing cocoa drink, for baking and in the cosmetic industry. It is also used in chocolate, confectionary and other food product (World Cocoa Foundation, 2009 cited in ISSER 2013). The cocoa industry of Ghana consists of cocoa bean production by smallholder farmers, collection and bagging by Licensed Buying Companies (LBCs), quality assurance by COCOBOD, haulage of cocoa by private hualers, warehousing and other private companies and COCOBOD (Amoah, 2008).

Over the decades cocoa production in Cocoa shows fluctuations in yield. production reached 566,000 tonnes in the mid-1960s before falling to about 159,000 tonnes in the early 1980s. it then peak up to 350,000 tonnes at the end of 1999 and increase to 700,000 tonnes in 2008 (COCOBOD 2009). The fluctuations and decline in production were mainly attributed to a number of factors, some of which are; land degradation, the use of simple farming practices, swollen shoot disease outbreak, the negligible use of fertilizers, drought and extensive bush fire, depletion of soil nutrients, deforestation, low income for smallholder cocoa farmers(COCOBOD 2009).

The International Cocoa Initiative cited ISSER (2013), assert that over 14 million workers produce cocoa, of which 10.5 million are in Africa 95% of the world's cocoa is grown by small scale farmers. In Ghana, it is estimated roughly that 800,000 people involve in cocoa growing and these figures exclude those working in other areas of the industry such as the processing firms, Licensed Buying Companies, chocolate vendors and other (Awua, 2002 cited Awuah et al 2015). This therefore implies that decline in cocoa production directly affects many Ghanaians and their citizens livelihoods as well as the country as a whole.

The decline in cocoa production caused Gross Domestic Product (GDP) to fall (Argeetey et al., 2008). In realization of the potentials of cocoa in the economy of the country, the government and other non-governmental agencies resorted to introduce policies and other additional interventions to address the problem of low productivity. A shift to increase production would contribute to the national economy through an increase in foreign exchange earnings, an improvement in the GDP of the country as well as an improvement in the balance of payment (Awua, 2002 cited in Awual et al, 2015).

Historically, Ghana has shown some over reliance on revenues from cocoa. Aryeetey and Kanbul (2008), noted that Ghana's first president, Kwame Nkrumah, used cocoa revenue as security for loans to establish different state-owned industries. Nkrumah's dependence on cocoa, along with the fall in prices in the late sixties, caused a decline in the growing of the country and resulted in a coup to overthrow him. Sahn (1994) cited Aryeetey et al, (2008), also stated that from the introduction of cocoa in the late 19thcentury Ghana dominated the world cocoa market, and to a large extend cocoa dominated Ghana. This clearly

shows that if Ghana is able to produce a substantial amount of cocoa there will be a rise in the economy.

In Ghana, cocoa has been the backbone of the economy for centuries and plays a major role in employment, foreign exchange earnings, government revenue, education, infrastructural development amongst others. (Amoah, 2008). Thus this thesis aims to investigate the economic and financial implications of decline in cocoa production in the Bono region of Ghana.

Statement of the Problem

Looking at the level of government's investment in cocoa production in Ghana, the sector is expected to have experienced much growth and higher profitability than it is today. Anang T. (2015) attributes this to aging trees, widespread disease outbreaks and bad weather. The International Cocoa Organisation downgraded Ghana's cocoa output by 22 percent for the year 2014-2015 based on structural factors (Daryl, 2015). Since independence Ghana has depended mainly on exports of raw cocoa beans for majority of its foreign exchange revenue. Cocoa farmers in Ghana are mostly located in the rural areas and more often than not depend solely in their annual production as a source of livelihood.

Yields on Ghanaian cocoa are generally low as compared with that of other cocoa producing countries such as Cote d'Ivoire and Indonesia (Onumahet al. 2013). The poor performance of the cocoa sector in Ghana could be attributed to low efficiency in production. In 2010/2011 cocoa season, Ghana recorded a higher cocoa production due to a number of interventions including, the Cocoa Hi-tech initiative programme implemented by government, increase in land size for cocoa production, and other private sector initiatives (Onumahet al. 2013).

However, the success story has not been sustainable as it has been fluctuating. Ghana's 2011/2012 cocoa season saw a decline in production, which fell further the next year (Awual et al, 2015). Again in 2016/2017 annual year Ghana recorded 969 thousand tons of cocoa beans, which drop to 905 thousand tons in 2017/2019 annual year and further decline to 812 thousand tons in 2018/2019 annual year (Shahbandeh, 2020) showing a decline in cocoa bean production in Ghana. The question is what actually lead to this national decline in production? Is it that some regions are not able to meet their expectation, or there is effect of climate change on production, or cocoa farm inputs are not been supply to the expectation, or cocoa trees are old etc. In view of this there is the need to research into the causes of such decline in production

Research on the decline in cocoa production in Ghana has either focused nationality or other regions, municipal and districts. Danso-Abbeam et al (2012) assessed production efficiency of cocoa farmers in Bibiani-Anhwiaso-Bekwai Municipality, Dzene (2010) investigated the determinants of technical efficiency on Ghanaian cocoa farmers for the period 2001 to 2006, Onumahet al (2013) analysed the productivity, technical efficiency and its determinants among cocoa producers in the Eastern region of Ghana, Nkamleu et al (2010) investigated on productivity potentials and efficiencies in cocoa production in West and Central Africa (namely Cameroon, Ghana, Nigeria and Cote d'Ivoire).

The above related studies provided useful insights on cocoa production in Ghana in different regions and municipal. Bono region specifically Jaman South municipality(Drobo) was not examined. This study sought to fill this gap by assessing the economic and financial implications of decline in cocoa production in Jaman South Municiality in the Bono Region, specifically Drobo..

Objectives of the Study

The study sought to assess economic and financial implications of decline in cocoa production in Jaman South Municipality in the Bono region specifically (Drobo).

Specific Objectives

Specifically, the study sought to;

1. assess the causes of production decline in cocoa yield in the study areas
2. examine the difference in the mean cocoa yield production within the study areas
3. determine the economic and financial implications of production decline in cocoa on farmers in the study area

Research Questions

1. What are the causes for the decline in cocoa production in the study areas?
2. How differences are the mean cocoa production within the study areas?
3. What are the economic and financial implications of cocoa production decline on farmers in the study area?

Research Hypothesis

To address research question two, the study hypothesizes that;

H_0: There is a no significance difference between mean cocoa yields within the study areas

H_1: There is significant difference between mean cocoa yields within the study areas

Justification of the Study

The significance of this study can be seen from its findings. The findings of this study can serve as a guide to Ghana cocoa board and other governmental agencies to undertake measures to reduce the causes of decline in cocoa productivity region and Ghana as a whole. In particular, as the study seeks to assess economic and financial implications of decline in cocoa production in the Bono region, government and other stakeholders will have much insight into the causes of decline of productivity and can direct interventionist policies.

Again, the study help stakeholders and policy makers to know the actual causes of decline in cocoa productivity and it economic implications in the Bono region specifically Drobo municipality. Knowledge of these will help them to correct such anomalies arising for the benefit of cocoa famers.

In addition, the study contributes to current literature on economic and financial implications of decline in cocoa production in Bono region in particular and Ghana in general. As a result, the study will serve as a point of reference to economic and financial implications of decline in cocoa productionsfor researchers as well as public entities in general.

Furthermore, the study can serve as a foundation upon which future research can be conducted. Granted this, some interesting findings of this study may motivate other researchers to explore the research problem from different perspectives so as to cast broader picture on economic and financial implications of decline in cocoa production in Ghana.

Delimitation

The study focused only on Bono region specifically Drobo municipality due to the fact that studies conducted in Ghana cocoa productivity, Drobo

municipality had not been examined. The target respondents of the study were cocoa farmers in the municipality. The justification for this is that they are the core farmers and understand the issues and activities of cocoa production with regard to it economic and financial implication as a results of decline. Respondents were given questionnaires to provide their opinions, views and information on the topic.

Limitations

The constraints of the researcher in carrying out this study are as follows: Only quantitative research techniques were employed for the study. The researcher could not assess the qualitative views of the respondents due to time and financial resources.

Again the study was limited to only primary data and not including secondary data due to time constraints. Also the study employed a purposive sampling technique which is non probability sampling; hence each respondents have not equal chance of been included in the sample. The study again cocoa farmers who can only read the questionnaires

Some of the bottlenecks experienced were lack of cooperation of some respondents to fill correctly the questionnaire as they overlooked the significance of the study. However, lack of commitment from the participants was used by the researcher to take time to meet with all potential respondents and clarified to them the scope of the study and its significance to the the municipal.

The respondents were also unwilling to give responses due to fear of the unknown and in that the information collected may be used to intimidate them or print a harmful image about them. Some respondents even turned down the

request to fill questionnaires. This was mitigated by obtaining a letter of introduction from the Catholic University College of Ghana, Fiapre, which assured the respondents of the academic purpose of the study and that it would be treated with maximum confidentiality.

Definition of Terms

Economics: It is a social science concerned with the production, distribution, and consumption of goods and services. It can generally be broken down into macroeconomics, which concentrates on the behavior of the aggregate economy, and microeconomics, which focuses on individual consumers and businesses.

Finance: It describes activities associated with banking, leverage or debt, credit, capital markets, money, and investments. Basically, finance represents money management and the process of acquiring needed funds. Finance also encompasses the oversight, creation, and study of money, banking, credit, investments, assets, and liabilities that make up financial systems.

Cocoa: It is the dried and fully fermented seed of Theobroma cacao, from which cocoa solids (a mixture of nonfat substances) and cocoa butter (the fat) can be extracted. Cocoa beans are the basis of chocolate, and Mesoamerican foods including tejate,

Production: It is the process of making, harvesting or creating something or the amount of something that was made or harvested.

Economic Implication: It is a financial effect that something, especially something new, has on a situation or person.

Financial Implication: Financial implications are the, implied or realized outcomes of any financial decision. It can be either good or bad,

example, the financial implication of saving money is an increase in your net worth.

Organization of the Study

The study has been organized into five chapters, the first chapter comprises of the introduction, background of the study, statement of the problem, objectives of the study, justification of the study, delimitation, limitation and definition of terms. A review of relevant prior literature on the origin of cocoa, its production in the country and the importance of cocoa to the nation constitutes chapter two. The third chapter focuses on the methods used in the study followed by chapter four which constitutes data analysis and summary of the results. The final chapter (five) gives a summary of the research work findings, conclusions and recommendations and it is followed closely with references and appendices.

CHAPTER TWO

LITERATURE REVIEW

Introduction

This chapter reviews the literature relevant to the theme of this study. The literature review specifically comprises theoretical framework and models of cocoa production, the history on the origin and the spread of cocoa, the structure of cocoa production and the role on the economy of Ghana, cause of cocoa decline in Ghana, conceptual framework, empirical review.

Theoretical Framework

Theoretical framework involves the review of theories underlying the study. Theories covered in this section includes: Ricardian Theory, Crop Yield Response Theory (CYRT) and models of cocoa production in Ghana.

Ricardian theory

The theory explains the approach that climate change has an impact on crop revenue in general. Ricardian theory regresses climatic variable such as temperature and precipitation on farm yields. A cross-sectional technique that measures the determinants of farm revenue based on Ricardo's original observation that the value of land reflects its productivity (Asafu-Adjaye, 2008). As cited in Seo, et al., (2005), the theory accounts for the direct impact of climate on yields of different crops and an indirect replacement of different inputs; introduction of different activities and other potential adaptation activities. The greatest strength of the model however is its ability to incorporate the changes that farmers would make to fit their operations to climate change (Mendelsohn et al., 1999 cited by Ofori-Boateng & Insah, 2011).

The flaws of theory includes the fact that crops are not subject to controlled experiments across farms, the theory does not account for future change in technology, policies and institutions. It also assumes constant prices which is really not the case with agricultural commodities since other factors determine prices and fails to account for the effect of factors that do not vary across space such as carbon dioxide concentrations that can be beneficial to crops (Kaiser et al. 1993 cited in Ofori-Boateng & Insah, 2011). This method has been extensively used in most studies in Africa to measure the impact of climate change on crop production (Molua & Cornelius, 2007). The current study finds the theory relevant in explaining the climate changes on the decline in cocoa production in the Jaman south Municiality.

Crop yield response theory (CYRT)

The Crop Yield Response Theory (CYRT) allows for weather influence upon crops in agricultural production analysis. It is based on the works of Thornthwaite (1948) cited in Onumahet al. (2013). The method combines precipitation and temperature into composite indexes. Though the CYRT conceives that output is generally through a production function of land, labor and capital, the direct application of such function to agriculture neglects the existence of weather as an important exogenous factor. As a result the theory considers rainfall, temperature and sun radiation as well as many other weather factors as "noncost" inputs into the production process especially when they are taken as deviations from average. This study finds the theory relevant in examining other factors that contributes to total production of cash crops specifically decline in cocoa production in the Jaman South Municipality

Models of Cocoa Production

Models of cocoa supply in Ghana are found more frequently in literature. Different researchers have tried to obtain more accurate forecast models by taking into account not only the lag of planting period but also other exogenous factors that affect output; for example, cocoa output price instability, cocoa production variability, probably caused by bad weather and also the availability of inputs into production have all received considerable attention in the literature (King et al, 1985 as cited in Armah, 2008).

According to Bluir (2002), studies on cocoa modeling can be divided into three broad categories. First, some studies model the supply of cocoa as a "technological" function of the stock of cocoa trees and fertilization effects resulting in long-run or a short-run function that takes into account price and weather shocks,. Second, a traditional partial-Adjustment supply model which defined elasticity of domestic producer prices. Finally, few studies have estimated the supply response to changes in producer prices in neighboring countries and concluded that smuggling explains supply fluctuations better than most other variables.

The second and the largest group of empirical studies have concentrated on the traditional partial-adjustment model using several domestically determined explanatory variables (Stryker et al, 1990 cited in Armah, 2008). In these studies, the estimated equations and the results of those estimates are similar. As a representative example, Stryker et al., (1990) have regressed the actual production on its lagged value, an estimate of cocoa production capacity, producer prices of cocoa, and the producer prices of competing food crops. The estimated own short-run and long-run producer price elasticities were 0.22 and

0.62, respectively, and the cross-price elasticities estimated at -0.14 and -0.40 respectively.

The third group of authors focused on the price incentives to smuggle to explain why the officially recorded cocoa production stayed for several years above or below its estimated production capacity. These authors realize that cocoa is a Golden Cash Crop that can be easily smuggled, because the boarders contribution to the first group (technological capacity model). As a first step, he estimated a long-run production capacity for Ghana based on tree yields among several variables measuring the chemical spraying of cocoa trees that had a built-in ratchet effect (Bateman, 1974 cited in Armah, 2008). As a second step, his short-run function included the previously estimated production capacity, real producer price and rainfall variables.

Both equations were estimated separately for the three major cocoa producing regions in Ghana, and the short-term price elasticities of supply were found to be of similar magnitudes, ranging between 0.14 and 0.22 with Cote d'Ivoire and Togo are practically unguarded. As early as 1982, Akiyama and Ducan (1982) cited in Armah, (2008) regressed cocoa output on real prices and a rainfall variable; in addition, their equation included three variable lagged one year: cocoa output, real producer prices, and the Ghana-Cote d'Ivoire price differential (all in level). Both short-run and long-run domestic producer price elasticities were low and statistically insignificant. However, their models showed the strong impact of price development in Cote d'Ivoire: raising the price differential by 1 percent lowered the Ghanaian supply of cocoa by one-quarter of 1 percent. In order words, the official sales of cocoa to COCOBOD

Ghana might have fluctuated because of smuggling rather than changes in cocoa output growth.

Fosu (1992) cited in Molua and Cornelius, (2007) supported these findings; he estimated the short-term elasticity of Ghana's cocoa export with respect to the Ghana-Cote d'Ivoire price differential at about 0.17. May (1985) cited in Molua & Cornelius, (2007), in estimating the regional motivation to smuggle cocoa to neighboring countries, found that as much as 50 percent of the crop in some regions may have been smuggled either to Cote d'Ivoire or to Togo. As a result, he found that virtually all new cocoa plantings in Ghana in the 1970s and 1980s were made in areas adjacent to Cote d'Ivoire and Togo in order to minimize the cost of transporting smuggled cocoa. Azam and Besley (1989) cited in Ofori-Boateng and Insah, (2011) formulated and tested a general equilibrium model of Ghana's economy that features parallel foreign exchange and consumer good markets, and cocoa smuggling.

Background of Cocoa Industry in Ghana

Cocoa originated from Mexico and parts of tropical America (Manu, 1989 cited in Awual et al, 2015). Cocoa, an important commercial crop of the equatorial region, is extensively planted in areas bordering the Gulf of Guinea in West Africa, which include countries like Ghana, Nigeria, Cote d'ivoire, Liberia, Sierra Leone, Togo and Dahomey (Kishore, 2010 cited in Onumahet al, 2013). Most cocoa is produced by around 1.6 million small farmers on plots of less than three hectares in the forest areas of the Ashanti, Brong- Ahafo, Central, Eastern, Western, and Volta regions of Ghana (Naminse E.Y. et. al, cited in Awual et al, 2015).

In 1964/1965, Ghana became the leading producer of cocoa (Adjinah and Opoku, 2010). Cocoa production is carried out in about six out of the ten regions in the country namely the Volta region, Central region, Brong- Ahafo region, Eastern region, Ashanti region, and the Western region which supply about fifty 50 percent of the annual production (Anim- Kwapong&Frimpong, 2005).

The cocoa value chain is exposed to multiple types of shocks. Crop pests and diseases are frequently occurring and are a key challenge for the sustained production of cocoa. Other shocks include impacts of climate change, such as heavy rainfalls, floods, droughts and bushfires, which lead to yields losses, destruction of roads and infrastructure and community facilities, and, consequently threaten food security, through decrease of income of people engaged in the cocoa sector.

Besides natural shocks, the cocoa value chain in Ghana is prone to sudden economic disturbances. Around 80% of cocoa is directly exported in raw form, therefore, fluctuations of world prices of cocoa have significant impacts on the functioning of the cocoa value chain in Ghana. Inflation is another common economic risk, to which the cocoa value chain is exposed: for example, many activities of the cocoa value chain rely on imports of materials and goods, such as agro-input products (fertilizers, pesticides, etc.), transportation (vehicles and spare parts) and processing equipments.

In Ghana cocoa is the most important agricultural export crop for Ghana as it delivers 30% of the country's total export earnings (Asante-Poku and Angelucci, 2013). Being primarily a cash crop, cocoa does not contribute much to the nutritional aspects of food security. However, cocoa remains an important

indirect contributor to food security in Ghana due to its function to support the livelihoods of people engaged in the cocoa sector. As of 2011, more than six million Ghanaians, around 25% of the population, were involved in the cocoa sector as farmers, distributors, processors and retailers (Gockowski et al., 2011)

Again, cocoa has been the backbone of the economy for a century and plays a major role in employment, foreign exchange earnings, government revenue, infrastructural development amongst others (Amoah, 2008). The cocoa industry alone employs close to about 60 percent of the national agricultural workforce in the country. However, Ghana's cocoa production has over the years faced major challenges which have adversely contributed to the country losing her position as the leading producer of cocoa beans in the world (Anim-Kwapong and Frimpong, 2005)

For proper regulation of the cocoa industry in Ghana, the government mandated COCOBOD to give license to private buying companies. The various Licensed Buying Companies (LBC) have District Managers who in- turn have Commission Marketing Clerks. The Commission Marketing Clerks are given funds by the LBCs to purchase cocoa from farmers. Farmers sell their beans to the Cocoa Marketing Clerks who then sort the beans and bag them. The beans are stored temporarily and evacuated to the district depots or society sheds. The Cocoa Marketing Company (CMC), a subsidiary of COCOBOD receives the beans whilst the Quality Control Unit (QCU) of COCOBOD grades the beans for substandard and rejects beans if necessary. At this point, each bag is tagged with a station identification number. The bagged beans are then sent to the port and received by the CMC and rechecked for quality by QCU before final export. This process is also referred to as secondary evacuation.

Structure of Cocoa Production in Ghana

The Amelonado cocoa which takes three to four years to mature was introduced into the Ghana in the 1950's. It takes not less than five years to bear fruit. In the initial stage of land cultivation, cocoa is intercropped with staple food crops, which provides shades to the young cocoa trees. Cocoa trees typically take between three to six years from planting before they start bearing the first pod, and full production capacity is only reached after ten years from first planting. Cocoa production also depends heavily on the pattern of rainfall; the average distribution of monthly rains throughout the year is more important than the annual total.

Cocoa needs deep, well-drained soils adequately supplied with nutrient and moisture and containing little or no coarse materials (Dickson and Benneh, 1985). The cocoa belt in Ghana generally coincides with the semi-deciduous forest zone. Land preparation for the cultivation of cocoa in Ghana is done in the same way as for foodstuffs. Cocoa farms only need occasional weeding and brushing to control weeds

Cocoa is harvested in two seasons within the year in Ghana, the main crop and the smaller or mid-crop season .Harvesting or picking of the ripe cocoa pods starts from about September till late December or mid-January, depending on the size of the crop. It is done by means of a cutlass or a metal hook. Labour is mainly supplied by family or relatives who collect the harvested pods into heaps for breaking.

The beans are fermented for a period of 6-7 days in the wrapped, airtight container made of banana or plantain leaves. The fermented beans are then transferred to raise drying platforms made of sticks and covered with mats of

split bamboo. The dried beans are then collected into mini or maxi bags of 30kgs and 62.5kgs respectively and are sold to local buying agents for onward transportation to COCOBOD.

Economic and Financial Implication of Cocoa in Ghana

Cocoa contributes about 70 percent of annual income of small scale farmers and stakeholders like licensed cocoa buyers (LCBs). Also economy of Ghana depends largely on cocoa products for market, employment and income (Asamoah&Baah, 2002). Knudson (2007) shows that income from cocoa is still the determining factor for most households.

The cocoa sector in Ghana employs over 800,000 smallholder farm families. The sector specifically employed numerous cocoa purchasing clerks, drivers and others involved in the purchasing and shipping of cocoa to the European and American markets. In addition other stakeholders like chemical companies, input distributors and licensed cocoa buying companies also depend largely on cocoa for their market, employment and income. (Dickson and Benneh, 1995 cited in ISSER, 2013).

Sales of cocoa beans have been one of the major foreign exchange earners to Ghana throughout the years. In 2002, cocoa made up for 22.4 per cent (463 million US $) of the total foreign exchange earnings constituted 63% of the foreign export earnings from the agriculture sector (ISSER, 2013). The total export receipts from cocoa (beans and products) in Ghana are far ahead other cash crops (ISSER, 2013).

Additionally Cocoa is used in Ghana for the production of products such as chocolate powder, biscuits, and bars of chocolate, sweets, perfume (Mossu,

1992 cited in Kenny et al, 2004). Its by-products (husk) are also used to feed cattle, manufacture fertilizers and soap.

Cocoa is used in Ghana as a plant-based food that contains carbohydrates, fats, proteins, natural minerals and some vitamins. Cocoa contains a group of compounds which exhibit health benefits (Kenny et al, 2004). Cocoa contains vitamin E and some vitamin B complex such as thiamine, riboflavin and niacin (Keen et al, 2005). There is a growing body of evidence about the health benefits of cocoa (Zhu et al. 2002). The cocoa component in chocolate is rich in magnesium, copper, potassium and manganese, sodium, calcium, iron, phosphorus.

Cash crops are seen as an integral part of a strategy to improve the food security in countries with a substantial agricultural sector. It provides higher wages and employment opportunities for the rural people (Achterbosch et al, 2014). Although cocoa can be processed into food products, it does not serve as a foundation for a daily diet, unlike plantain, cassava or maize. Its primary contribution to the food security is in providing livelihood for people engaged (directly and indirectly) in the cocoa sector. The cocoa sector provides income for more people engaged in input supply, production, marketing, transportation and processing activities (Gockowski et al., 2011).

Actors of Cocoa Value Chain in Ghana

The analysis of the literature identified actors who contribute directly to the production, processing, transportation and marketing of cocoa and cocoa products. The actors of the cocoa value chain belong to public, formal, informal and agribusiness sectors of economy. The public sector within the chain is represented by COCOBOD's input supply and export activities. LBCs,

processors and a part of bigger food retailers operate under the formal sector of Ghana's economy, which is subject to government regulations and existence of contractual agreements between employers and employees.

The informal sector is widely present in trading (private input dealers and food retailers) and transportation activities, and mostly consists of small businesses or self-employment ventures. In contrast to the formal sector, the informal sector in Ghana is characterizedby the non-coverage by official legislation (minimum wage, social security, state-recognition, etc.) and by the absence of the contractual agreements between employers and employees (Osei-Boateng & Ampratwum, 2011).

Main Actors of the Cocoa Value Chain in Ghana

Input supply

Main inputs for cocoa production are cocoa seedlings, fertilizers, pesticides, fungicides as well as farming equipment such as harvesting hooks locally known as "*go-to-hell*", cutlasses (large knives to break pods), pruners and spraying machines (farmers interviews). Pesticides and fungicides are widely used against common threats for the production of cocoa, such as the black pod disease, swollen shoot virus, whereas fertilizers help to revive soils and increase yields (World Bank, 2013). COCOBOD retains an active role in the distribution of improved planting material and agro-inputs. Seed Production Division (SPD) of COCOBOD multiplies and distributes the seedlings for the cocoa farmers. Cocoa Health and Extension Division (CHED) supports the distribution of seedlings, delivers fertilizers and conducts spraying on cocoa farms.

The private input market is, with few exceptions, represented by a large number of small-scale input dealers (World Bank, 2013). The presence of private input dealers in different regions is presented in figure 6. Private input dealers are usually located in urban and peri-urban areas and sell their products mostly on a cash-and-carry basis (Word Bank, 2013). Input dealers re-sell inputs sourced from wholesalers, which are located in major urban areas such as Accra or Kumasi (Krausova and Banful, 2010). So far, most of the fertilizer products, fungicides and pesticides have been imported (Krausova and Banful, 2010; IFDC, 2012)

Production

There are multiple households cultivating cocoa on small plots of land. While the majority of farmers own the land that they cultivate, others are sharecroppers – they manage the fields on a share basis (World Bank, 2013). There are two sharecropping systems in Ghana locally known as *abunu*and *abusa*. In *abunu*, sharecroppers establish cocoa farms themselves and are responsible for the main activities on the farm such as managing the farm, training, hiring labor and applying inputs (Laven, 2010). In return, *abunu*sharecroppers receive 50% of the harvest (Laven, 2010; UNDP, 2011). In *abusa*, owners hire caretakers to manage farms for one-third of the crop, while inputs are usually provided by the land owner, also the quantity may be inadequate (UNDP, 2011).

Cocoa farmers are responsible for the growing, harvesting, fermenting and drying of cocoa. After the harvest, farmers break cocoa pods with a cutlass and keep the beans with its natural pulp in boxes to ferment. Fermentation is a

critical step, which determines the flavor of chocolate. Then, farmers leave the beans to dry under the sun for several days (World Cocoa Foundation, 2014).

Cocoa farming is a labor intensive activity, therefore many farmers organize into informal groups, locally known as *nnoboa*, in order to help each other with harvest and postharvest practices (Laven, 2010). Creation of informal groups also helps farmers to facilitate access to credit as banks are more likely to offer loans to organized groups of farmers than to individuals (Kadri et al., 2013; farmers interviews). Another example of cooperation between farmers is their participation in cocoa certification schemes such as Fair trade, Rainforest Alliance certified cocoa. To comply with requirements of the cocoa certification programs, farmers' groups need to follow specific standards on cultivation of cocoa as well as on social aspects of farming.

Internal marketing and transportation

There are around three dozen private national and international Licensed Buying Companies (LBCs). At the beginning of every cocoa season, COCOBOD provides LBCs with loans with interests lower than market rates, locally known as a "seed fund", to purchase cocoa from farmers. LBCs receive a fixed amount of revenue per quantity of cocoa and, therefore, try to increase their profits by maximizing the beans purchases and seek to turn over cocoa quantities as quick as possible (Williams, 2009; World Bank, 2013). LBCs employ district managers and purchasing clerks from the local communities to organize purchases and evacuation of cocoa from the villages. Purchasing clerks deliver cocoa to the LBCs' warehouses. LBCs hire private transport service companies to transport sealed bags of cocoa to the Cocoa Marketing Company (CMC). An increasing number of LBCs do not outsource the transportation

activity anymore and deliver cocoa to CMC themselves. There are also non-recognized individuals who buy cocoa directly from farms and then sell it either to LBCs, or elsewhere illegally for higher returns (Mohammed et al., 2012).

Exports

All cocoa is delivered to a subsidiary of COCOBOD – the Cocoa Marketing Company, which stores cocoa in three take-over centers (Tema, Takoradi and Kaase) prior to shipment (World Bank, 2013). CMC has exclusive rights to the marketing and exports of cocoa beans to local and foreign buyers. In addition, CMC manages pre-harvest forward sales and contracts a fixed price with international merchants and cocoa processors to hedge against price volatility. Around 60% - 80% of cocoa is pre-sold (World Bank, 2013). The forward contracts are then provided as collateral to borrow the funds from an international syndicate (World Bank, 2013). These funds are used as the seed fund for LBCs (Kolavalli et al., 2012).

Processing

Majority og Ghanaian cocoa is directly exported in form of raw beans and the rest is domestically processed into semi-finished or consumer products. The majority of the total processed cocoa is used for semi-finished products (liquor, butter, powder and cake), most of which is exported, and the rest is processed into confectioneries and other cocoa-based products destined for domestic market.

To attract foreign direct investments into the domestic cocoa processing sector, Ghanaian government offers to investors a competitive package of economic incentives. It includes price discounts, tax free zones and extended

payment credit (World Bank, 2013). These efforts resulted in an increase in domestic grinding capacities (World Bank, 2013)

COCOBOD offers domestic processors a discount of 20% on beans produced during the light crop season. The growth of processing capacities in Ghana has increased the competition for discounted beans thus reducing their availability. Although domestic processors can also purchase main crop without a discount or import beans from abroad (Asante-Poku and Angelucci, 2013), this is often not economically efficient as processors in general face high operational costs. As the result, processors are unable to procure sufficient quantities of beans and cannot operate at full capacity.

Cocoa waste marketing

There are cocoa waste companies, licensed by COCOBOD, that purchase cocoa waste from farmers and processors in Ghana. Agents of these companies travel around cocoa growing areas and purchase inferior quality cocoa from farmers. In addition, they purchase cocoa shells, husks and cocoa skin from domestic cocoa processors. Before being shipped abroad, cocoa waste is gathered at the companies' warehouses to be checked by COCOBOD in order to make sure that no cocoa of acceptable quality is exported through this channel.

Retail

Ghana's food retail environment mostly belongs to the informal sector and consists primarily of traditional open-air markets and small groceries. Supermarkets account only a few of the retail food market. Retailers offer local and imported cocoa-based products such as cocoa powder for beverages, chocolate, spreads, candies, cookies, pomades and creams. However, retailers

are merely tangentially connected to the cocoa value chain as these products constitute only a small fraction of their offerings.

Consumers

Although a very little fraction of cocoa is destined for the local market, Ghanaians still have a soft spot for cocoa-based products. Powdered beverages are the most affordable and, thus, the most popular cocoa product among local consumers. Many people, regardless of their income, prepare cocoa drinks for themselves and their families every day. In contrast, chocolate is commonly perceived as a luxury product because it is rather expensive for the majority of consumers. Visited food retailers mentioned the popularity of chocolate around holidays and for special occasions. This pattern was even noticed by the past government to re-branded the Valentine's Day into the National Chocolate Day to further encourage domestic consumption of chocolate.

Supporting Actors of the Cocoa Value Chain

The cocoa value chain also includes actors that do not directly participate in the production, processing and retailing of cocoa, but provide various types of support to the value chain. These actors are from now on referred as "supporting actors". There is a wide range of supporting activities: research, extension, quality control, disaster management

Extension services and research

Extension services to farmers are provided by the subsidiary of COCOBOD. Cocoa Health and Extension division (CHED) as well as NGOs ((Laven, 2010). Extension services are aimed at increasing yields and enhancing productivity. They include training of farmers on traditional, chemical and sustainable methods of producing cocoa as well as on weed, pest and disease

control, safe pesticides usage, new agronomic and forestry technologies, sustainable practices, etc. (World Bank, 2013).

Cocoa Research Institute of Ghana (CRIG), another subsidiary of COCOBOD, is the main center of the study of cocoa. CRIG conducts research on various aspects of the cocoa industry, such as pests and diseases, varieties of cocoa species, cocoa establishment on the field, socio-economic aspects of cocoa cultivation and alternative ways of cocoa processing. Other institutions conducting research on the cocoa industry in Ghana are KNUST, Institute of Statistical, Social and Economic Research (ISSER) at University of Ghana, Soil Research Institute, etc. In addition, the cocoa industry in Ghana is of research interest for numerous international organizations: the World Bank, the Food and Agriculture Organization of the United Nations (FAO), the World Cocoa Foundation, the International Cocoa Organization, the Institute of Development Studies, and many universities as well as other international research institutions.

Quality control

The quality control is performed by a subsidiary of COCOBOD the Quality Control Company (QCC). The QCC assures the traceability of the cocoa value chain by overseeing the quality from the LBCs warehouses to the ports. QCC is responsible for inspection, sampling, grading and packaging of cocoa (Asante-Poku&Angelucci, 2013).

Financing

Financial institutions in Ghana, which provide financial services to the cocoa value chain actors, can be divided into three main categories: formal, semi-formal and informal.Formal financial institutions are licensed by the Bank

of Ghana and include banks, which target urban middle and high income clients, as well as Rural and Community Banks (RCBs), which provide financial services in rural areas but cannot conduct foreign exchange operations (Kadri et al., 2013). Formal institutions usually require a collateral (e.g. in the form of real-estate), stable employment guaranteed by the employer and a package of documents from the borrower (Kadri et al., 2013). Semi-formal financial institutions are represented by credit unions and financial NGOs. Finally, the informal financial system can be divided into non-commercial transactions (between relatives and friends) and for-profit credit arrangements conducted by all sorts of local moneylenders.

Insurance and social protection

Insurance and social protection schemes serve as the financial protection for the actors of the cocoa value chain against natural catastrophes, business failures, illness, unemployment, etc. A number of commercial organizations offer a range of life and non-life insurance services in Ghana (Giesbert& Steiner, 2011). In addition, there are public insurance schemes open for voluntary enrolment, including the Social Security and National Insurance Trust (SSNIT) and National Health Insurance Scheme (NHIS). SSNIT provides coverage for old age, invalidity or family member loss (SSNIT, 2016). NHIS provides medical care at public hospitals and health centers. As premiums depend on income, particular groups such as elderly, poor people and pregnant women, are exempted from charges for NHIS (Giesbert& Steiner, 2011).

Disaster management

Disaster management organizations play an important supporting role for the cocoa value chain, protecting if from bushfires, floods and other natural

cataclysms. There are several disaster management governmental agencies in Ghana including the National Disaster Management Organization (NADMO) and the Ghana National Fire Service (GNFS). NADMO has offices in every district in Ghana and provides first line response in times of disasters, coordinates the activities of various organizations in disaster management, provides rehabilitation services and helps communities to restore their activities following a disaster event (NADMO, 2016). Presence of trained disaster volunteer groups increases the responsiveness of the local communities to hazards.

Causes of Fluctuation and Decline of Cocoa Production in Ghana

Various forms of challenges occur in the supply chain of the cocoa production in Ghana. These challenges may be related to the following: improper distribution of farm inputs (fertilizers, pesticides, funds, etc.) from government or Licensed buying companies to farmers; Improper sorting of the cocoa beans; poor handling, packaging and storage of the cocoa beans; poor transportation or evacuation of the cocoa beans from the farmers through to the port. Environmental challenges such as bush fires, flood, etc also pose serious challenges to the sector. The industry is also challenged with a communication gap between Cocobod and other partners of the chain. This results in information distortion, arms- length relationship between partners of the supply chain (ISSER, 2013).

Fluctuation and Decline of Cocoa Production Related to Farm Inputs

Distribution of quality farm inputs are very important to ensure high cocoa production in the cocoa industry. There are however a lot of challenges associated to the distribution and use of these inputs. In 2008, 932 tractors were

imported by the Ministry of Food and Agriculture to enhance productivity of the sector but as a result of poor monitoring of the distribution, it was found out that some government officials who were not farmers rather ended up being the beneficiaries (http://graphic.com.gh/news/ cited byAwual et al, 2015).

Similarly, in 2014, the government established a scheme to distribute free fertilizers to farmers, however the purpose of the scheme could not be achieved as a result of corrupt practices that occurred in the distribution chain. The Amanfi farmers for example blamed COCOBOD's officials for a massive corruption in the distribution of these fertilizers as farmers were rather forced to pay for them whilst others had to show political party cards in order to benefit (Mark F., 2015).

There is also a risk of use of farm inputs such as fertilizers and pesticides as a result of the fact that many cocoa farmers in Ghana have little or no education. Looking at the number of cocoa farmers in the country, the numbers of agric extension officers are woefully inadequate. Farmers are sometimes asked to be in groups so that they can receive training together at a predetermined venue. For lack of funds and will to travel for training, some farmers resort to their own initiatives and end up applying the wrong proportions of fertilizers, use pesticides at wrong times and even combine various pesticides which give different reactions and rather have negative effects on productivity.

Low soil fertility has been identified as one of the major causes of decline in yield of cocoa. The significance of fertilizer in ameliorating this problem will go a long way to boost cocoa production. Replacement of soil nutrients that are being mined through cocoa pod harvest annually cannot do

without application of fertilizer. Adequate application of fertilizer has been found to increase agricultural output. Traditionally, Ghana's cocoa was grown with minimum purchased inputs, although it has long been recognized that soil nutrients reserves would become exhausted

Farm Related Causes of Fluctuation and Decline of Cocoa Production

Aged of cocoa trees and farmers economic status

The cocoa yields in Ghana are relatively low in recent times partly because of the old age of farmers and the cocoa trees (Laven, 2010). The productivity of cocoa trees generally decline after a period of about 20 years; what aggravates the problem is that cocoa production is also labour intensive. Farmers perceive that the cost of destroying old plants and replanting new ones is so high as compared to the cost of maintaining old trees; coupled with the old age and lack of enough strength by most farmers, they decline to do replanting.

The income levels of cocoa farmers in Ghana affect their ability and willingness to invest in response to high world prices. Coupled with the fact that most trees are aging, cocoa farmers' low incomes make it nearly impossible to invest in fertilizers, regular spraying and the hiring of labour, among other costs.

Unsatisfactory land tenure policies in Ghana

The land tenure policy has also been a significant obstacle to the expansion of cocoa farms in Ghana. The chiefs in a traditional area own most of the lands and most of the farmers are immigrants and sharecropping farmers. The policies around the possession and use of the land in most cases are unfair to the ordinary farmer who toils so much to realize the yield. Policies such as: 'abunu', 'abusa' or 'abunan' systems de-motivate the farmers who most times feel cheated looking at their level of investment into the production.

In the era of climate change where some old cocoa growing areas are likely to be vulnerable to its effects, moving to areas more favourable to the cocoa plant will be necessary. Unfavourable land tenure systems in plausible new areas will limit farmers and hence affect the cocoa sector. Land related issues in cocoa farming must, therefore, be tackled with the urgency they deserve if cocoa is to continue its role as a mainstay of the Ghanaian economy.

Pests and diseases

Cocoa plantations are susceptible to many kinds of diseases, which are said to destroy from 30-40% of the world cocoa production every year (Basso et. al., 2012). Pests and diseases pose one of the greatest challenges in the production of cocoa in Ghana. However, farmers may find it more economical to expand than replant old and diseased trees, because it takes twice as long to clear an old farm than to clear new forest lands (Kolavalli&Vigneri, 2011). The high incidence of pest and disease infestation is considered by many farmers to be the major cause for low cocoa yields (Nyanteng, 1980). Three major diseases and pest of economic significance exist: swollen shoot caused by virus black pod caused by fungus and capsid, which feed on plant tissues (shoot and pods), eventually killing them.

Smuggling and government policies

Smuggling has the tendency to render projections of cocoa beans production erroneous. As contended by Armah (2008) in his report, the current boom in cocoa exports from Ghana is primarily the result of the reversal of price incentives to smuggle Ghana cocoa to Cote D'Ivoire and not due to gains in the Ghana cocoa supply chain. The Government of Ghana has over the years been committed to implementing policy measures within the cocoa sub-sector such

as increased producer prices, an effective diseases and pests control programme, bonus payment, a hi-tech programme (subsidized fertilizer for application) and replanting enable the sub-sector contribute significantly to the growth of agriculture's share in the GDP, foreign exchange earnings, employment generation and poverty reduction in the country (Naminse, et al, 2011).

Logistic related challenges

Many local buying companies (LBCs) are unable to provide adequate storage facilities for farmers and even at the port, difficulties in storage often times becomes very difficult and contributes to traffic congestion at the port (Dankyi et al, 2007). Access to tractors to easily convey cocoa beans for drying on sheds pose serious challenges to many farmers. What aggravates the situation is the deplorable roads leading to farming communities; some communities have broken bridges and very poor access routes to their farms. These farmers are most times left with no choice than to resort to child labour to carry the seeds from the farms in small quantities. The situation becomes unbearable especially in the raining season when a lot of seeds are destroyed for lack of these facilities.

Commercial Risks Factors on Fluctuation and Decline in Cocoa Production

Cocoa price volatility

One major challenge associated with cocoa production in Ghana is the cocoa price volatility. This short-term challenge is borne entirely by COCOBOD as it transfers the challenge of freely floating international cocoa prices into the guaranteed price it provides to the farmer. In guaranteeing a fixed price, Cocobod effectively absorbs price challenge within the season from the farmer, as the international market is subject to freely floating prices. Cocobod therefore has to carry a significant cash flow obligation to pay the farmer for

their produce at the time of harvest while it only receives revenues post-shipment. When international prices rise, the margin between the prices COCOBOD pays to the farmer and its international market sales price increases. According to Kwanashieet. al.,(1994) cited in Saunders, (2009) the degree of fluctuation in prices is a major concern to the cocoa industry. Farmers, as any other rationale producers, respond to price by changing the intensity with which they tend their farms. If prices are not enough to cover their normal average variable cost including maintenance, the farmer's first response will be to reduce maintenance of the farm and stop new planting activities. If prices do not even cover harvesting, fermenting and drying, then harvesting is most likely to cease. Conversely, if prices cover or exceed variable cost, farmers will intensify farm.

Lack of adequate credit facilities and low buyer margins

Inadequate credit facilities for cocoa farmers are another big challenge in the cocoa industry. Small-scale cocoa farmers especially have a tough time in obtaining farm inputs for their farms. Some farmers who seek financial assistance from some purchasing clerks sometimes feel cheated as they try to dictate unfriendly terms and conditions to these farmers. This results in a very little profit being achieved at the end of the day and de-motivates other cocoa farmers to expand the size of their farms for lack of funds (Laven, 2010). Zeitlin(2006) concludes that the bankruptcy rate among local buying companies (LBCs) is so high meaning that margins paid by government to cocoa delivered by the LBCs to Cocobod is woefully unsatisfactory

Excessive power of COCOBOD and high cost of financing

Some local buying companies (LBCs) complain that COCOBOD exerts excessive power over them which sometimes affect their efficiency. Policies from quality control division (QCD) and cocoa marketing board (CMC) are pushed on them with little or no consultation. Cocobod defines the quantum of seed it requires from an LBC in order to maintain its license. With little or no flexibility, some LBCs feel quite overstretched. The cost of borrowing in Ghana is very expensive. The interest rate is high coupled with the time it takes to get funds locked up in stock of cocoa released to Cocobod makes it very challenging to do business as an LBC in Ghana. This amounts to the collapse of some LBCs.

Effects of Climate Change on Cocoa Production

Agriculture in Africa is one of the sectors most susceptible to climate variability and change, as it is highly rain-fed and dependent on other climatic variables such as temperature, relative humidity, and sunshine (Müller-Kuckelberg, 2012). Climate variability directly affects crop development processes (Sarr, 2012) and indirectly affects soil properties, as well as thriving pests that attack crops (Sagoe, 2006). The temperature in Africa rises faster than the global average (IPCC, 2014). These rising temperatures coupled with variable and highly unpredictable rainfall patterns have negative impacts on agricultural activities across Africa and the developing world (Sarr, 2012). In effect, empirical studies suggest that changes in the climate have led to a reduction in crop production (Ehiakporet al., 2016). Yield from rain-fed crops in some countries especially Sub-Saharan Africa is projected to halve by 2020 (Piloet al., 2016).

According to Agbongiarhuoyiet al., (2013) and Lawal&Emaku (2007), one crop that is vulnerable to climate variability is Cocoa. Cocoa on the average thrives well within the temperature range of 18ºC to 21ºC mean minimum and 30ºC to 32ºC mean maximum (Anim-Kwapong&Frimpong, 2004), and rainfall averages of 1500 millimetres (mm) to 2000mm annually (Nair, 2010). This means that any increase or decrease below the mean minimum or beyond the mean maximum would negatively affect cocoa output, as well as, the application of some other determinants of cocoa output such as fertilizer and pesticides.

Climate affects the three phases of cocoa production, the seedling, establishment and processing phases (Oyekale, et al, 2009). Most of the processes involved in cocoa production are influenced by climate. For example, solar radiation produces energy for warming the soil, plants, air and metabolic processes. The characteristics of rainfall in terms of its amount, intensity, reliability and distribution influence crop growth (Oyekale et al. 2009). The planting date of cocoa is determined by the start of the rains. The survival of the crops and their performance are also affected by evaporation. After harvesting of the cocoa pods, the intensity of heat from the sun helps in drying the beans. The heat reduces the water content of cocoa seeds and makes their processing easier. A prolonged wet season and windy or cloudy days, on the other hand, slow down the drying and processing of cocoa beans. This reduces the value of the beans and increases the cost of processing

Cocoa is highly sensitive to changes in climate, from hours of sunshine to rainfall. It is also very sensitive to the soil moisture condition and, particularly, to temperature due to effects on sunshine (Oyekale, et al, 2009).

Climate changes also alter stages and rates of development of cocoa pests and pathogens. They also modify host resistance and cause changes in the physiology of host-pathogen or pest interaction. These happenings affect cocoa yields and result in harvest losses and their effect on socio-economic variables such as farm incomes, decision-making at the farm level, marketability and, more especially, the livelihoods of farmers (Ojo&Sadiq, 2010).

Cocoa is also highly susceptible to drought, and the pattern of growing cocoa correlates to rainfall distribution. Reports have shown a significant correlation between cocoa yield and rainfall over varying intervals prior to the harvesting of cocoa pods (Anim-Kwapong&Frimpong, 2005). A prolonged dry season encourages cocoa seedling mortality, and the short dry season during the main crop pod filling can also affect the bean size if it is significantly severe on bearing plants. Mirid (capsid) is an insect which makes cocoa difficult to establish. In mature plants, water deficits lead to low yield and increase the level of damage. Also related to the climate is the blackpod disease which is the most destructive disease that affects the ripening of cocoa pods. It is prevalent in damp conditions and most destructive during the wet season With proper cocoa husbandry practices, the increased effects of diseases and pests as a result of climate change can be mitigated. When farmers are equipped with the skills and resources, the negative effects of climate change can be reduced to the barest minimum.

Empirical Review

Nyanteng (1980) cited inEffendy et al. (2013), found the following to be some of the reasons for farmer‟s inability to spray their farms as often as recommended: lack of adequate quantities of insecticides, lack of funds to buy

insecticides and unavailability of motorized spraying machines. It follows that, given that these constraints persist, an increase in the usage of insecticides resulting from low cost (subsidization) of insects would increase output per hectare and hence increase farmers revenue

Oluyole et al. (2008) estimates the determinants of the occurrence of black pod disease of cocoa. He uses the probit analysis approach to determine the influence of some explanatory variable such as availability of fungicides, price of fungicides, price of cocoa beans, and labour availability among other things. The parameters of the probit model were estimated by maximum likelihood estimation rather than by Ordinary Least Square. Price of fungicides was a significant determinant of the probability of cocoa farm having black disease ($P< 0.05$).

Opeke (1987) cited inOnumahet al (2013) suggested early spraying in the season and application repeated every three weeks until rains ceased. Cocoa Research Institute of Ghana also recommends an average of seven to eight times of spraying fungicides per season and three to four times of insecticides spraying per cocoa season.

Appiah, et al. (1997) cited in Uwagboe et al., (2012) reported a doubling of yields in Ghana from the applications of 4.94bags of triple superphosphate and 2.47bags of muriatic of potash per hectare over 4 years. According to Olson (1970), fertilizer could increase food production by at least 50 per cent.

Opeyemi et al. (2005) in their work noted that, an effective use of fertilizer on cocoa would help not only to improve yield but also has the advantages of profitability, product quality and environmental protection. FAO

(1987) noted that tremendous increase in fertilizer use has the highest potential of increasing productivity.

Ogunlade et al. (2009), use regression analysis to assess the determinants of the quantity of fertilizer usage of cocoa production. The quantity of fertilizer used was regressed on explanatory variables like farm size, fertilizer availability, and rate of fertilizer application and the price of fertilizer. They showed that the farm size as well as the price of fertilizer was much more critical in determining the quantity of fertilizer to be used. However, the fertilizer availability as well as rate of fertilizer application has no influence on the quantity of fertilizer used by cocoa farmers. However these authors did not quantify the effects of fertilizer quantity and its usage on annual cocoa production and, hence this work seeks to fill that gap.

. Brew, (1991) indicated that there is a significant correlation between cocoa output yield and amount of rainfall over varying interval prior to harvesting. In Ghana, a year with high rainfall is followed by a year with larger crop output, though the correlations not applicable in all years Ali (1969) reported both positive and negative correlations between rainfalls in certain months with the mean of yield crop

Anim-Kwapong and Frimpong (2008) estimated the impact of climate changes on the supply of dry cocoa beans. Their work sought to determine the effect of changes in total annual rainfall, total rainfall in the two driest months and sunshine duration. They used multiple regression analysis to show that over 60% of variation in dry cocoa beans could be explained by the combination of the preceding total annual rainfall, total rainfall in the two driest months and the total sunshine duration.

Oyekale et al. (2009) also showed that about 82 percent of cocoa farmers in Nigeria depend heavily on rainfall and could be more in the rest of West African countries. They estimated the impact of climate change on the production of cocoa. It was stated that, the main climate was rainfall and has a very significant impact on cocoa growth. Rainfall failure therefore has the ability to increase the cost of controlling diseases and pest and reduce the quality of the cocoa beans.

Bulir (2003) examined the reversal in price-incentive to smuggle Ghana cocoa to Cote d'Ivoire using co-integration model and a single equation error correction model. Bulir indicate that effect of domestic taxes in Ghana widened the gap between the Cote d'Ivoire and Ghanaian domestic prices, and ultimately created incentives to smuggle Ghana cocoa to the Cote d'lvoire.

Armah (2008) also showed that the smuggling incentive was statistically significant at 5% and that the international cocoa price is positively statistically significantly related to cocoa supply in the long run while the cocoa producer price correlate to supply response in the short run. So as the producer price of cocoa increases, Ghanaian cocoa farmers responded by supplying more cocoa both in the short and long run.

Fosu (1992) cited inUwagboe et al., (2012) indicated that most of the factors postulated to influence cocoa export supply in Ghana are directly or indirectly related to the real exchange of the domestic currency. Fosu further stressed that it is in fact a major factor in the decline of cocoa exports.

Nkamleu et al (2010) investigated on productivity potentials and efficiencies in cocoa production in West and Central Africa (namely Cameroon, Ghana, Nigeria and Cote d'Ivoire). The data and analysis support the view that

technical efficiency in cocoa production is globally low, and technology gap plays an important part in explaining the ability of cocoa sector in one country to compete with cocoa sectors in other countries in the West and Central Africa region.

Effendy et al. (2013) studied on the factors that affected the production and technical efficiency in cocoa farming at Sigi Regency Indonesia**.** Results showed that farmer characteristics such as education, farming experience, and frequency of follow counseling could help to increase the technical efficiency so that the cocoa production could be increased.

Dzene (2010) investigated the determinants of technical efficiency on Ghanaian cocoa farmers for the period 2001 to 2006. The result found demographic factors and non-labour inputs except household size and insecticides to have positive and significant impacts on technical efficiency. Controlling for demographic profile and selected non labour inputs, result suggests that farm level problems including Black pod infestation, mistletoe attack, and termites and other problems, including flooding, weeds and bushfire as affecting technical efficiency among cocoa farmers. Other factors as fertilizer intensity and quality of farm maintenance had positive and significant impacts on technical efficiency.

Onumahet al (2013)analysed the productivity, technical efficiency and its determinants among cocoa producers in the Eastern region of Ghana. Results revealed that exogenous factors such as access to extension services, technical support and credit are found to reduce the level of technical inefficiency among the producers. Also older farmers and male farmers were efficient than younger

and female farmers. Farmers with more experience in cocoa production also produce with technical efficiency.

Oguntadeand Fatunmbi, (2012) examined the effects of farmer field school (FFS) on the Technical Efficiency of cocoa farmers in Cross River and Ondo States, Nigeria. The study therefore concluded that the farmers' field school participants were more efficient in the use of factors of production than their NFFS counterparts.

Adedeji (2011) of Oyo State investigated technical efficiency, determinants of production and the sources of inefficiency in cocoa production. The study revealed that farm size (1%) and fertilizer quantity (1%) were the major factors associated with changes in the output of cocoa production while on the farmer's specific socioeconomic variables, only level of education, extension contact and family size were found to be the significant factors of technical efficiency.

Amos (2007) looked at the productivity and technical efficiency involved in cocoa production in Nigeria and revealed that age of farmers, level of education and family size were the main determinants of technical efficiency.

An investigation by Danso-Abbeamet al (2012) on production efficiency of cocoa farmers in Bibiani-Anhwiaso-Bekwai Municipality revealed that farmer's experience in cocoa production, farmer's participation in the Cocoa Disease and Pest Control (CODAPEC) programme, and household size were the main determinants of technical efficiency with a mean technical efficiency of 49%.

Study by Uwagboe et al., (2012), the decline in productivity of cocoa is attributed largely to pest and diseases. In their research the socio-economic

factors and Integrated Pest Management Utilization among cocoa farmers, systematic sampling used in picking the respondents. Also structure questionnaire was used to elicit information from the respondents, which were presented with charts, frequency, percentages and analyzed with chi-square. The study revealed that out of sixty (60) farmers, ninety (90) percent were males who were in their prime age and 73.3% had formal education. Utilization of Integrated Pest Management was high (75.0%), which signifies that most farmers have adopted the technique. The study further showed that sex, education and memberships of associations contributes to farmer‟s high utilization of Integrated Pest Management (IPM).

Similarly, in the study by Dormon et al., (2004), a diagnostic study was carried out to understand farmers‟ views on the problems of cocoa production in three villages in the Suhum-KraboaCoaltar District, Eastern Region, Ghana. An action research approach was followed to gather and analyze qualitative data. It was concluded that low productivity was identified as the main problem and the causes were classified into biological and socioeconomic factors. The biological factors include the incidence of pests and diseases. The socio-economic causes were indirect and include the low producer price and the lack of amenities like electricity, which leads to migration as a result there is labour shortages and high labour cost. It was further concluded from study that the biological and socio-economic causes of low productivity are related in such a manner that taking them separately will not overcome the problem unless both are tackled in a holistic way.

Kyei et al., (2011) analysed the factors that affect the technical efficiency of cocoa farmers in the Offinso of District in Ghana and the basic

socio-economic variables that affect their performances. Primary data was collected by the use of questionnaires. Statistical tool was used to estimate the stochastic inefficiency determinants based on farmers. Analyses showed that the model of production were statistically significant at 0.00. Input factors stated include labour, quantity of fertilizer, pesticides, modern equipments, age of trees and farm sizes. It was concluded that labour, capital and age of farm would lead to increase in output. Inefficiency would decrease drastically if variable such as educational level, farming experience and family size of the farmer are increased.

In one current study by Asenso-Okyere, et al., (2013), logistic regression model was used to determine the factors that significantly affect the decision to let a child attend school exclusively or do some work on the cocoa farm in cocoa communities in Ghana. The study was based on 2007 cocoa sector survey. In the study, the logistic regression model revealed that the factors that were found to positively and significantly influence farmer‟s decision to let the child attend school exclusively were: main source of drinking water being borehole, sex of a child, age of a child, and household heads living in the Ashanti cocoa region.

In another study by Mapa et al., (2012), logistic regression model was used to show what determines the states of high poverty in the Philippines. The model showed that a onepercent increase in agricultural output in the previous quarter reduces the probability of being in the high state of poverty by about eight (8) percentage points, all things being the same. Again the study showed that poverty incidence in the country is dynamic and frequent monitoring through self rated poverty surveys is important in order to assess the effectiveness of the government programs in reducing poverty. It was finally

concluded in the study that self-rated poverty surveys can complement the official statistics on poverty incidence.

At Imo state in Nigeria, Amanze, et al., (2010) developed a logistic regression model todetermine the factors influencing the use of fertilizer in arable crop production amongsmallholder farmers, and determined socio-economic characteristics of smallholder arable crop production farmers. A multistage random sampling technique was adopted in selecting six Local Government Areas (LGAs), two communities from each selected LGA, two villages from each selected communities and five farmers from each selected village and data were collected with the aid of a well-structured questionnaire from one hundred and twelve farmers. Results of the logistic regression model showed that output of crop, level of education, farm size and price of fertilizer were important factors influencing farmers‟ use of fertilizer in arable crop production while gender, age and household size were not

Abeniyi, et al., (2010) investigated the usage of fertilizer for cocoa production at the Cross River State in Nigeria. In their study, purposive random sampling technique was used to select three cocoa producing Local Government Areas (LGAs) in the study area. Also simple random sampling technique was used to select one hundred and seven (107) respondents from the three LGAs in the state. However, data collected were analysed using descriptive statistics and logistic regression model. Results showed that 98.13% of the respondents were not using fertilizer for cocoa production. Also, results from the logistic regression model revealed that farmer‟s level of education ($p<0.01$), cocoa farm size ($p<0.01$), association membership of farmers ($p<0.1$) and cocoa output ($p<0.01$) are significant factors determining the probability of a farmer to use

fertilizer for cocoa production. Moreover, they further concluded that majority of cocoa farmers in the study area do not use fertilizer for cocoa production and it is therefore recommended that farmers should be enlightened on the need to use fertilizer (when required) to enhance their production.

Abdulai and Rieder (1995) cited in Quarmine et al (2014) investigated the determinants of the cocoa supply in Ghana using error correction model. They found out that cocoa supply was significantly related with the real producer price of cocoa, the supply of finished goods and the real exchange rate in the country. More so, their results showed that the supply of cocoa was inelastic both in the short and long runs,

. A research conducted by Kyere (2016) in the forest-savanna transitional zone of Ghana revealed that planting more plantain suckers as a protective shield over cocoa seedlings against excessive sunshine is one of the major adaptation strategies practiced by the farmers due to deforestation that has left large parts of the land bare.

Aneani&Ofori-Frimpong (2013) analysed the yield gap and some factors of cocoa yield in Ghana and found that planting poor cocoa varieties have negative impacts on cocoa yield. This they indicated, can reduce cocoa yield by 28.1 (kg/h) due to the highly genetic variations among the cocoa varieties.

Huda (2015) used the advanced Ricardian Model on a farm-level panel data of rice farming in the coastal area of Bangladesh to study the economic implications of alternative farming activities relating to climate change. The study found out that there would be an adverse effect on farm net income as

climate change is a continuous process that relates to global economic development using its estimated climate variability model.

Conceptual Framework

Conceptual framework adopted in this is a collection of interrelated ideas based on literature review on cocoa production globally. The researcher conceptualized decline in cocoa production and it implications as the dependent variable and factors such as, commercial risk factors, effect of climate change, logistic challenges, and farm related factors as independent variables The researcher assumed that the identified independent predictors had either a positive or negative influence on cocoa production and it economic and financial implications on a micro farmer leading to macro economic and financial policies in the Ghana. The conceptual framework or model is shown in figure 1.

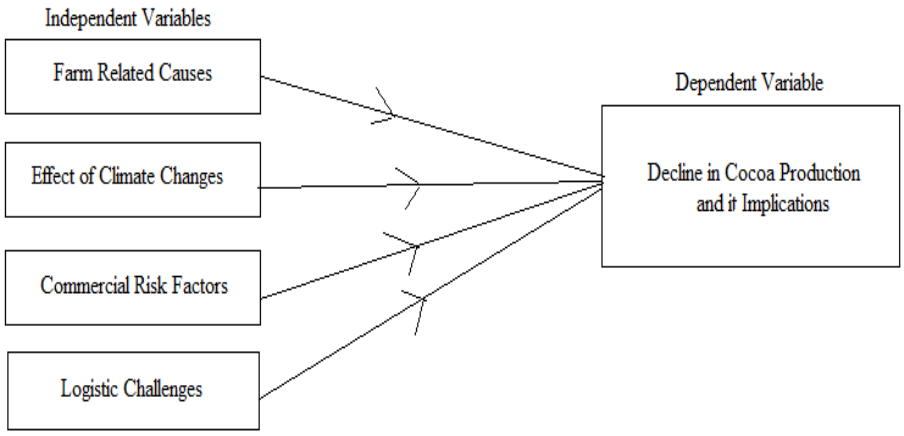

*Figure 1***:** Cocoa beans production and it economic and financial implications

Source: Authors construct (2020)

Chapter Summary

Various theoretical frameworks have explained the role of cocoa production to economy. The researcher has discussed three theories or models

under theoretical framework namely: Ricardian Theory, Crop Yield Response Theory and Models of Cocoa Production. The researcher has also discussed background of cocoa industry in Ghana, economic and financial implications of cocoa in Ghana, causes of fluctuation and decline in cocoa production.

The underlying literature on both international and local on decline of cocoa production touched on the age of cocoa trees, unsatisfactory land tenure system, inadequate credit facilities, pests and diseases, effect of climate changes, logistic related challenges and high cost of financing. Again local studies focused their work on national, metropolitan and other municipals to the neglect of Drobo municipal in Ghana as a gap. The researcher then focuses on this area of study where no empirical study has been stated.

CHAPTER THREE

RESEARCH METHODS

Introduction

This chapter looks at the research method that was used to undertake the study. Research methods entail research design, study area, population, sampling and sampling procedure, data collection instrument, data collection procedure, validity and reliability , data analysis and ethical issues.

Research Design

Research design shows a plan to how data relating to given problem is collected and analyzed. It represents an outline that guide a researcher to conduct a study into a phenomenon (Amadahe & Gyamfi, 2016). This study employed non experimental research designs (Case Study approach) together with cross sectional survey method to collect quantitative data from cocoa farmers in Jaman South Municipality in the Bono Region specifically Drobo. Case study design was used because the study intend to assess and probe to bring more light into causes of decline in cocoa production in the municipality and it economic and financial implications.

Study Area

The study assessed the economic and financial implications of decline in cocoa production in Jaman South Municipality in the Bono region of Ghana, specifically Drobo . The Jaman South Municipal is one of the 260 Metropolitan, Municipal and District Assemblies (MMDAs) in Ghana, and forms part of the 12 Municipalities and Districts in the Bono Region. Located at the north western part of the region, the Jaman South Municipality has its capital as Drobo (CDD, 2018). It is located between latitudes $7^0 35'$ N and $7^0 58'$N and longitudes $2^0 47'$

W and 2^0 78'W. It shares borders with the Jaman North District in the north, Berekum Municipal in the south-east, Dormaa Municipal in the south-west and La Cote d'Ivoire in the west. The Municipal has a total land area of about 1,500 square kilometers and about 130 settlements most of which are rural dwellers. The municipal has a number of basic and second cycle institutions. The major food crops grown are maize, cassava, plantain, cocoyam and yam. The major cash crops cultivated include is cocoa follow by cashew, coffee, oil palm and citrus respectively. Major livestock produced include poultry and cattle.

There are two major types of vegetation in the district. These are the semi-deciduous forest and savanna woodland. Parts of the original semi-deciduous forest have become secondary type of vegetation as a result of extensive lumbering and agricultural activities. This secondary type of forest is made up of shrubs and grasses with few original tree species of Odum, Wawa and Mahogany. The savanna woodland is located at the northern part of the municipality where it shares boundaries with the Jaman North district and parts of La Cote d'Ivoire. It is characterized by elephant grass, shrubs and a few scattered trees.

Population

The study selected a sample from a group of cocoa farmers, termed population to make inferences about the general population. Amedahe and Gyamfi (2016) defines a population as entire individuals' persons, objects, or items from which samples are selcted for measurement or as the entire aggregation of cases that meet a designated set of criteria. The target population of this study was made up of all cocoa farmers in the capital of Jaman South Municipality.

Sampling Procedure

The study used a sample size of 100 prominent cocoa farmers in the Jaman South municipality, specifically Drobo the municipal capital. Purposive sampling technique (non-probability sampling) was used to select the respondents who possessed knowledge in cocoa farming techniques. This was so because they were the key cocoa farmers in the municipality, and were perceived by the researcher to have the information relevant to the study. In purposive sampling technique, the selection of the respondents to form the sample was based on judgment of the researcher, such that those selected are the key individuals who can give the information required for the study.

Data Collection Instruments

The study adopted primary sources of data collection techniques. Primary sources are original sources from which the researcher directly collects data that have not been collected previously. Primary data were collected through questionnaires related to the variables in the research objectives. The questionnaires were designed into sections. Section A and B of the questionnaire consist of respondents' characteristics and Likert scale items soliciting the causes of decline in cocoa production in the study area. Section C examined respondents' average production yield from 2014 to 2018 and section D contain Likert-type items relating to economic and financial implications of decline in cocoa production

Likert scale items were rated from 1= strongly disagree to 5 = strongly agree to assess respondent's opinions. This was adopted in the sense that, according to Taherdoost (2016) it is psychometrics scale devised in order to measure and quantify subjective preferential thinking and feeling of a subject

through social interactions. Validity and reliability of questionnaires were assessed by an expert knowledgeable in matters of cocoa production to ascertain that test items are valid measure of their construct.

Data Collection Procedure

The data collection procedure involved pre-testing of the questionnaire and the main data collection exercise. In carrying out the study, to have access to information from respondents, a letter of consent was first sent to the Assembly Member and the leaders of cocoa farmers in order to obtain permission to carry out the study. With the permission granted, the questionnaires were distributed to respondents at the shop during lunch break. The questionnaires were self-administered. Data was collected from the respondents for two weeks. The researchers were present for the data collection on the first day. The two-week period allocated for the study gave all selected respondents an opportunity to take part in the study.

Questionnaire

Questionnaire was sent personally to the respondents in order to afford the researcher the opportunity to establish rapport with the respondents within the period of data collection. Questionnaires were given to the respondent on the first visit. The researcher took advantage to brief the respondents on the objective of the study and also explain each item on the questionnaire, as well as offer any assistance that is needed by the respondents. A time lapse of two days was allowed to enable respondents to complete the questionnaires. The respondents were assured the confidentiality of the information they provided.

Data Analysis

Data collected were edited to reduce errors and coded before analyzing. Data collected were analysed using Statistical Package for Social Sciences (SPSS) version 23. Percentages were used to analyse the socio-demographic characteristics of the respondents. Means and standard deviation were employed to analyse all the research questions. Mean was used on the bases that it is the measures of central tendency and it describes the nature or condition of the present situation of the data. Standard deviation employed measures the homogenous or the heterogeneous responses of the respondents around the means. Bar chart was used to depict pictorially the causes of decline in cocoa production and one way analysis of variance was used to test the hypothesis of the research question two.

Ethical Consideration

The researcher followed ethical standards as expected in research studies. Respondents were assured that participation is voluntary and that they can withdraw participation willingly. To avoid invasion of their privacy, their consent were sought. As respondents are more inclined to share the perception that their privacy is been invaded, they were assured of confidentiality of data. Again, respondents were assured that data collected would be limited to academic purposes.

Chapter Summary

This study employed case study as a research design. The general population for the study was all cocoa farmers in the Jaman Municipality. Purposive sampling techniques (non-probability sampling) were used to select the respondents to form the sample size. This sampling techniques were used to

identify respondents with inform knowledge of cocoa farming to respond to issues of declining cocoa production and it economic and financial implications. Percentages were used to analyse the socio-demographic characteristics of the respondents. Means, standard deviation and bar chart were employed to analyse all the research questions. Research hypothesis were tested using one way analysis of variance (ANOVA).

CHAPTER FOUR

RESULTS AND DISCUSSION

Introduction

This chapter presents the results of the findings and discusses them in the light of the research questions that guided this study. The specific objectives of the study were to identify the causes of production decline in cocoa yield in the study areas, examine the difference in the mean cocoa yield production and determine the economic and financial implication of production decline in cocoa on farmers in the study area.

The chapter begins with the bio-demographic data of the respondents, followed by sections that answer the research questions of the study. The findings were presented using descriptive statistics, frequencies, percentages, mean and standard deviations, tables and bar charts.

Socio-Demographic Characteristics

This section discusses the socio-demography characteristics of the respondents and the variables were sex, age, marital status and qualifications as shown in table 3

Table 1: Socio-Demographic Characteristics of Respondents

Variables	Category	Frequency	Percentages
Gender	Male	78	78.0
	Female	22	22.0
Age	20 – 29	6	6.0
	30 – 39	19	19.0
	40 – 49	39	39.0
	50 +	34	34.0
Marital Status	Married	81	81.0
	Single	6	6.0
	Widow	10	10.0
	Divorce	3	3.0
Qualification	No Formal	9	9.0
	Basic Education	30	30.0
	Secondary Education	37	37.0
	Tertiary Education	17	17.0
	Others	7	7.0

Source: Field survey (2020)

Table 1 revealed that out of the 100 respondent's 78% of the respondents were males while 22% were females, which is a clear case of sex imbalance of the respondents into cocoa farming in the municipality.

On age distribution of the respondents, Table 1 indicates that majority of the respondents were relatively old, with the age bracket of 49-39, representing 39% of the respondents' 34% were at age range of 50+, 19% were at age range of 30-39 and 12 and 6% of them were at age range of 20-29. The results further indicated that about 73% of the respondents were above the age 40 years.

With respect to the level of qualification, the results indicates that majority of the respondents representing 37% had secondary education, 30% of

them had basic education, 17% of them had tertiary education, 9% of them had no formal education and 7% of them had other education. Respondents with no formal education questionnaires were guided and assisted by the researcher to complete them. The educational level of the respondent's indicates about 93% of the respondents' had education in one way or the other

Also, on marital status of the respondents', the results indicated majority and about 81% of them are married while 6% of them are single. 10% of them are widowed and 3% of them are divorce. The marital distributions of the respondents indicates the characteristic of Ghanaian cocoa farmer in the sense their spouses are to assist them on their farms if the need arises

Causes of Decline in Cocoa Production in Jaman South Municipality (Drobo)

This section assessed the causes of decline in cocoa production in the study. Respondents were asked to rate their levels of agreement using a Likert scale questions of 1-5 with 1 showing least agreement and 5 showing strong agreement. The constructs under which the researcher assessed the causes are; farm related causes, logistic challenges, effect of climate changes and commercial risk factors. For analysis purposes the mean and standard deviation of the responses given by the respondents were computed. The mean score closer to 4 and above were interpreted as agreement, those closer to 2 and below were interpreted as disagreement, whereas those equal to or closer to 3 were neutral. The results are shown from table 2 through to table 5

Table 2: Farm Related Causes

Variables	Mean	Std
Is it because the cocoa tree are too old and bush burning	4.68	0.98
Is it due to unsatisfactory land tenure systems	3.81	1.25
No regular weed control and application of fertilizers	2.97	1.33
Farmers are unable to reinvest into their farms	3.68	1.28
Regular mistletoe removal	3.86	1.35
Due to cultivation of other cash crops/raising animals	4.86	0.57
Because of delay in harvesting	2.86	1.52
Less knowledge in pruning for sunshine penetration	4.57	1.04
Smuggling by farm hands or employees	4.61	0.77
Grand Mean	3.99	1.12

Source: Field survey (2020)

Results as shown in table 2 indicated that due to cultivation of other cash crops/raising animals was rated as the most influential factor as the causes of decline of cocoa production under farm related causes. It obtained a mean score of 4.86, indicating that respondent's agreement and a standard deviation value of 0.57, which revealed homogeneity of views expressed by the respondents. Cocoa tree are too old was rated the second influential factor as the causes of decline of cocoa production under farm related causes. It recorded a mean score of 4.68, which signified respondents' agreement to it. The standard deviation value was 0.98, which demonstrated the fact that respondents share similar views on it.

Smuggling by farm hands or employees was identified as the third factor as the causes of decline of cocoa production under farm related causes. Rating

on the scale shown that it obtained a mean score of 4.61. The standard deviation score of 0.77 shown a homogeneous view expressed by the respondents. Again, less knowledge in pruning for sunshine penetration was seen as the fourth factor as the causes of decline of cocoa production under farm related causes. It recorded a mean score of 4.57 and a standard deviation of 1.04 which demonstrated that respondents had heterogeneous views on the variable.

Regular mistletoe removal was considered the fifth fourth factor as the causes of decline of cocoa production under farm related causes. It recorded a mean value of 3.86, which signified that the respondents agreed on the item. The standard deviation mark was 1.35, showing a divergence of views shared by the respondents on the variable. Unsatisfactory land tenure systems was rated the sixth factor as the causes of decline of cocoa production under farm related causes. It recorded a mean value of 3.81, which signified that the respondents agreed on the item. The standard deviation mark was 1.25, showing a divergence of views shared by the respondents on the variable. Farmers are unable to reinvest into their farms was considered the seventh factor as the causes of decline of cocoa production under farm related causes. It recorded a mean value of 3.68, which signified that the respondents agreed on the variable. The standard deviation mark was 1.28, showing a divergence of views shared by the respondents on the variable.

No regular weed control and application of fertilizers was considered the eight factor as the causes of decline of cocoa production under farm related causes. It recorded a mean value of 2.97, which signified that the respondents agreed on the variable. The standard deviation mark was 1.33, showing a divergence of views shared by the respondents on the variable. Last but not the

least factor delay in harvesting. It had a mean mark of 2.86. The rating on the scale was closer to 3.00, which depicted that the respondents were neutral on the item. The standard deviation value was 1.52, connoted some minimal level of divergence on the variable. The grand mean and standard deviation values were 3.99 and 1.12 respectively.

Table 3: Logistic Challenges

Variables	Mean	Std
Inadequate extension officers to provide technical assistance	4.62	0.62
Inadequate farm implements, fertilizers and other materials	3.76	1.26
Inadequate pest and diseases control insecticides	3.54	1.34
Inadequate tractors to convey cocoa seeds for drying	4.56	0.57
Deplorable roads leading to farming communities	4.37	0.54
Inadequate storage facilities for farmers	4.36	0.96
Lack of modern cocoa farming practices	4.22	0.62
Grand Mean	4.21	0.84

Source: Field survey (2020)

Table 3 shows results on logistic challenges. It indicated that inadequate extension officers to provide technical assistance were rated as the most influential factor as the causes of decline of cocoa production under logistic challenges. It obtained a mean score of 4.62, indicating that respondent's agreement and a standard deviation value of 0.62, which revealed homogeneity of views expressed by the respondents.

Inadequate tractors to convey cocoa seeds for drying was rated the second influential factor as the causes of decline of cocoa production under

logistic challenges. It recorded a mean score of 4.56, which signified respondents' agreement to it. The standard deviation value was 0.57, showing respondents similar views on it. Deplorable roads leading to farming communities was identified as the third factor as the causes of decline of cocoa production under logistic challenges with mean value of 4.37 and standard deviation of 0.54. This shows homogeneous views expressed by the respondents. Again, inadequate storage facilities for farmers were seen as the fourth factor as the causes of decline of cocoa production under logistic challenges. It recorded a mean score of 4.36 and a standard deviation of 0.96 which demonstrated that respondents had homogeneous views on the variable.

Lack of modern cocoa farming practices was considered the fifth fourth factor as the causes of decline of cocoa production under logistic challenges. It had a mean value of 4.22, which signified that the respondents agreed on the variable. The standard deviation mark was 0.62, showing a similar views shared by the respondents on the variable. Inadequate farm implements, fertilizers and other materials was rated the sixth factor as the causes of decline of cocoa production under logistic challenges. It recorded a mean value of 3.76, which signified that the respondents' agreement. The standard deviation mark was 1.26, showing a divergence of views shared by the respondents on the variable. Farmers are unable to reinvest into their farms was considered the seventh factor as the causes of decline of cocoa production under logistic challenges. It recorded a mean value of 3.68, which signified that the respondents agreed on the variable. The standard deviation mark was 1.28, showing a divergence of views shared by the respondents on the variable.

Last but not the least factor is inadequate pest and diseases control insecticides. It had a mean mark of 3.54 and standard deviation value was 1.34 indicating respondents' divergence views on the variable. The grand mean and standard deviation values were 4.21 and 0.84 respectively.

Table 4: Effect of Climate Changes

Variables	Mean	Std
Unpredicted rainfall pattern disturb planting time	4.59	0.62
No enough sunshine to dry seedling for transportation	3.46	1.31
The temperature margin in the municipality is not stable	4.36	0.85
Soil texture in the municipality is not good for cocoa	2.63	1.48
Prolong dry season affect cocoa seedling	3.80	1.18
Grand Mean	3.77	1.08

Source: Field survey (2020)

Table 4 summarizes results climate changes. It indicated that unpredicted rainfall pattern disturb planting time was rated as the most influential factor as the causes of decline of cocoa production under effect of climate change. It had a mean score of 4.59, indicating that respondent's agreement and a standard deviation value of 0.62, which revealed homogeneity of views expressed by the respondents. The temperature margin in the municipality is not stable was rated the second influential factor as the causes of decline of cocoa production under effect of climate change. It recorded a mean score of 4.36, which signified respondents' agreement to it. The standard deviation value was 0.85, which demonstrated the fact that respondents share similar views on it.

Prolong dry season affect cocoa seedling was identified as the third factor as the causes of decline of cocoa production under effect of climate change. Rating on the scale show that it obtained a mean score of 3.80. The standard deviation score of 1.18 shows a divergence views expressed by the respondents. Again, no enough sunshine to dry seedling for transportation was seen as the fourth factor as the causes of decline of cocoa production under farm effect of climate change. It recorded a mean score of 3.46 and a standard deviation of 1.31 which demonstrated that respondents had heterogeneous views on the variable.

Last but not the least factor issoil texture in the municipality are not good for cocoa. It had a mean mark of 2.63, which depicted respondents' disagreement. The standard deviation value was 1.48, showing divergence views on the variable. The grand mean and standard deviation values were 3.77 and 1.08 respectively

Table 5: Commercial Risk Factors

Variables	Mean	Std
Price Volatility that can cover fermenting and drying expenses	2.60	1.31
Inadequate credit facilities to support the farmers	4.62	0.59
Margin paid by government to farmers are woefully inadequate	2.04	1.25
The cost of borrowing is high for the farmer	4.57	0.52
Excessive power of cocobod	2.65	1.35
Grand Mean	3.29	1.01

Source: Field survey (2020)

Table 5 shows results on commercial risk factors. Inadequate credit facilities to support the farmers were rated as the most influential factor as the causes of decline of cocoa production under commercial risk factor. It obtained a mean score of 4.62, indicating that respondent's agreement and a standard deviation value of 0.59, which revealed homogeneity of views expressed by the respondents.

Cost of borrowing is high for the farmer was rated the second influential factor as the causes of decline of cocoa production under commercial risk factor. It recorded a mean score of 4.57, which signified respondents' agreement to it. The standard deviation value was 0.52, showing respondents similar views on it. Excessive power of cocobod was identified as the third factor as the causes of decline of cocoa production under commercial risk factor with mean value of 2.65 and standard deviation of 1.35. This shows heterogeneous disagreement expressed by the respondents. Again, price volatility that can cover fermenting and drying expenses were seen as the fourth factor as the causes of decline of cocoa production under commercial risk factors. It recorded a mean score of 2.60 and a standard deviation of 1.31 which demonstrated that respondents had heterogeneous disagreement views on the variable.

Last but not the least factor is margin paid by government to farmers are woefully inadequate. It had a mean mark of 2.04 and standard deviation value was 1.25 indicating respondents' divergence disagreement on the variable. The grand mean and standard deviation values were 3.29 and 1.01 respectively.

The study further drew the bar chart of all the grand means of the related causes of decline in cocoa production in the study area. Figure 2 below shows the bar chart of the grand means.

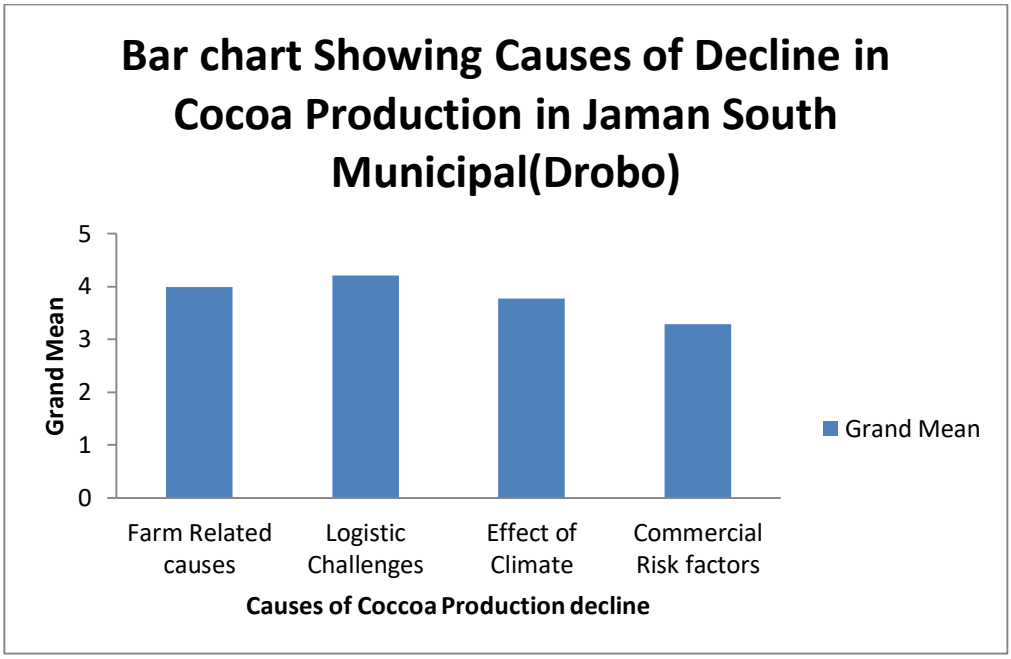

Figure 2: Bar chart of causes of decline in cocoa production

Source: Field survey (2020)

Figure 2 indicates that the most influential cause of decline in cocoa production in the study area is logistic challenges, followed by farm relate causes and the next is effect of climate change. The least applicable cause is balancing commercial risk factors

Respondent's Mean or Average Farm Yield for the Year 2015 to 2018

This section examined mean or average cocoa production during the years 2015 to 2018. Respondents were asked to state their yield in kilo or tons between 2015 to 2018. For analysis purposes the mean and standard deviation of each year were computed. The mean score enables the researcher to examine the decline in production trend among cocoa producers in the municipality. The mean differences in yields among the years were tested using one way analysis of variance (ANOVA) for existence of differences or not to accept or reject research question two. The results of mean yields in tons and kilos are shown in table 6

Table 6: Mean or Average Farm Yields for the Year 2015 to 2018

Years	Mean Yield (Tons & Kilo)	Std
2015/2016	12.33	5.26
2016/2017	11.61	4.51
2017/2018	11.11	4.57
2018/2019	10.46	4.26

Source: Field survey (2020)

Table 6 shows mean production of cocoa for the respondents. The results indicates that on the average 12 tons 33 kilo were produce in 2015/2016, 11 tons 61 kilos were produce in 2016/2017, 11 tons 11kilos were produce in 2017/2018 and 10 tons 46 kilos were produce in 2018/2019. The mean results clearly show that there is decline in production. Figure 3 below shows the linear decline trend in average production of cocoa in Jaman South Municipality (Drobo).

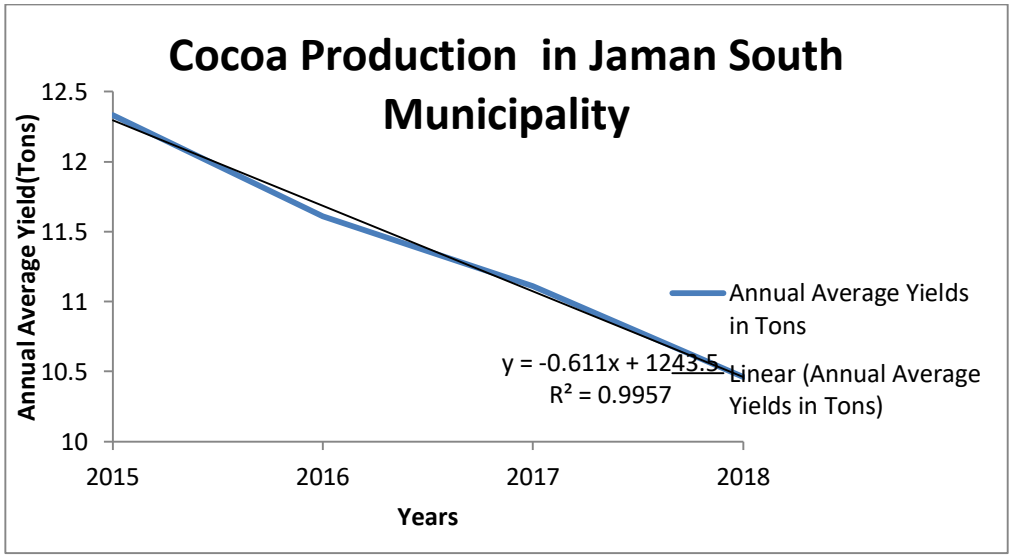

Figure 3: Linear of graph of cocoa production in Jaman South Municipality (Drobo)

Source: Field survey (2020)

Table 7: (ANOVA) Testing Equality of Average Yield from 2015 to 2018

	Sum of Squares	df	Mean Squares	F	p-value
Between Groups	182.826	3	60.943	2.697	0.046
Within Groups	8744.00387		22.594		
Total	8926.86		390		

Source: Field survey (2020)

One way analysis of variance was employed to test the significant difference between the means productions yields of cocoa in the Jaman municipality. Table 7 shows that there is actual significant difference in the means of cocoa production from 2015 to 2018, since F value (2.697) is obtained with a small significant p-value < 0.05. Hence hypothesis two is rejected and concludes that there is significant difference between the means of cocoa production yield in the study area .

Economic and Financial Implications of Decline in Cocoa Production in the Municipality

This section determined economic and financial implications of decline in cocoa production. Respondents were asked to rate their levels of agreement using a Likert scale questions of 1-5 with 1 showing least agreement and 5 showing strong agreement. The constructs under which the researcher determines the implications are, financial and economic implications. For analysis purposes the mean and standard deviation of the responses given by the respondents were computed. The mean score closer to 4 and above were interpreted as agreement, those closer to 2 and below were interpreted as disagreement, whereas those equal to or closer to 3 were neutral. The results are shown from table 7 through to table 8

Table 8: Financial Implications

	Sum of Squares	df	Mean Squares	F	p-value
Between Groups	182.826	3	60.943	2.697	0.046
Within Groups	8744.00387		22.594		

Source: Field survey (2020)

Results as shown in table 8 indicated that net balances after expenses are not encouraging was rated as the most influential of financial implications of decline of cocoa production. It obtained a mean score of 4.63, indicating that respondent's agreement and a standard deviation value of 0.59, which revealed homogeneity of views expressed by the respondents. Retirement savings after farming operations are affected was rated the second influential factor of financial implication of decline of cocoa production. It recorded a mean score of 4.52, which signified respondents' agreement to it. The standard deviation value was 0.74, which demonstrated the fact that respondents share similar views on it.

No saving after yearly operations was identified as the third factor of financial implications of decline of cocoa production with mean 4.50 and standard deviation of 0.70. This shows a homogeneous views expressed by the respondents. Also wages and salaries of farm hands and other family are affected was seen as the fourth factor of financial implication of decline of cocoa production. It recorded a mean score of 4.48 and a standard deviation of 0.77 which demonstrated that respondents had similar views on the variable.

Loan repayment to credit institution and banks are affected was considered the fifth factor of financial implication of decline of cocoa production. It recorded a mean value of 4.41, which signified that the

respondents' agreement. The standard deviation mark was 0.62, showing a similar views shared by the respondents on the variable. Net annual income is affected was rated the sixth factor of financial implications of decline of cocoa production. It recorded a mean value of 4.37, which signified that the respondents agreed on it. The standard deviation mark was 1.05, showing a divergence of views shared by the respondents on the variable. Amount for insecticides and chemicals are affected was considered the seventh factor of financial implications of decline of cocoa production. It recorded a mean value of 4.36, which signified that the respondents agreed on the variable. The standard deviation mark was 0.85, showing a homogeneous views shared by the respondents on the variable.

No surplus amount to work on machinery for the next season was considered the eight factor of financial implications of decline of cocoa production. It recorded a mean value of 4.33, which signified that the respondents agreed on the variable. The standard deviation mark was 0.88, showing a homogeneous views shared by the respondents on the variable. Increase in farmers borrowing rate due to less annual income was considered the ninth factor of financial implications of decline of cocoa production. It recorded a mean value of 3.95, which signified that the respondents agreed on the variable. The standard deviation mark was 1.12, showing divergence views shared by the respondents on the variable.

Nonfarm business income to set aside are affected was considered the tenth factor of financial implications of decline of cocoa production. It recorded a mean value of 3.02, which signified that the respondent's midway opinion on the variable. The standard deviation mark was 0.92, showing close views shared

by the respondents on the variable. Last but not the least factor isroyalties for land tenure arrangement is affected. It had a mean mark of 2.56 and standard deviation of 0.91. The grand mean and standard deviation values were 4.11 and 0.85 respectively.

Table 9: Economic Implications

Variables	Mean	Std
Income on food and household supplies are not realized	4.10	0.94
Employment in the sector are reduce as a result decline	4.24	1.02
Asset possessions of the farmer's are not achieved	4.61	0.61
Shops selling cocoa chemical and insecticides are affected	4.52	0.74
Chemical and distribution companies are affected	4.11	1.27
Cocoa farmers loan delinquency are increase	4.41	0.62
Grand Mean	4.33	0.86

Source: Field survey (2020)

Results as shown in table 5 indicated that asset possessions of the farmer's are not achieved was rated as the most influential of economic implications of decline of cocoa production. It obtained a mean score of 4.61, indicating that respondent's agreement and a standard deviation value of 0.61, which revealed homogeneity of views expressed by the respondents. Shops selling cocoa chemical and insecticides are affected was rated the second influential factor of economic implication of decline of cocoa production. It recorded a mean score of 4.52, which signified respondents' agreement to it. The standard deviation value was 0.74, which demonstrated the fact that respondents share similar views on it.

Cocoa farmers loan delinquency are increase was identified as the third factor of economic implications of decline of cocoa production with mean 4.41 and standard deviation of 0.62. This shows a homogeneous views expressed by the respondents. Employment in the sector are reduce as a result decline was seen as the fourth factor of economic implication of decline of cocoa production. It recorded a mean score of 4.24 and a standard deviation of 1.02 which demonstrated that respondents had divergence views on the variable.

Chemical and distribution companies are affected was considered the fifth factor of economic implication of decline of cocoa production. It recorded a mean value of 4.11, which signified that the respondents' agreement. The standard deviation mark was 1.27, showing a divergence views shared by the respondents on the variable. Last but not the least factor is income on food and household supplies are not realized. It had a mean mark of 4.10 and standard deviation of 0.94. The grand mean and standard deviation values were 4.33 and 0.86 respectively.

Discussion of Results

Cocoa farmers' opinions on farm related causes of declining cocoa production in study area. Out of nine measurements variables four were rated higher by the respondents with mean [mean > 4] in Table 2, such as; cultivation of other cash crops/raising animals, cocoa tree are too old, smuggling by farm hands or employees and less knowledge in pruning for sunshine penetration are the most influential causes. The overall grand mean of farm related causes indicates that cocoa farmers have the opinion that farm related causes exist in the study area This results colloborates with (Laven, 2010) who pointed out that cocoa yields in Ghana are relatively low partly because of the old age of farmers

and the cocoa trees. It again is in line with Armah (2008) who contended in his report, the current boom in cocoa exports from Ghana is primarily the result of the reversal of price incentives to smuggle Ghana cocoa to Cote D'Ivoire and not due to gains in the Ghana cocoa supply chain

On logistic challenges in relation to causes of declining cocoa production in the study area, out of seven measurements variables four were rated higher by the respondents with mean [mean > 4.3] in table 3, such as; inadequate extension officers to provide technical assistance, inadequate tractors to convey cocoa seeds for drying, deplorable roads leading to farming communities and inadequate storage facilities for farmers. The overall grand mean shows that the logistic challenges are highly agreed by the respondents in the study area. This is in line with (Dankyi et al, 2007) who indicated that many local buying companies (LBCs) are unable to provide adequate storage facilities for farmers and even at the port, difficulties in storage often times becomes very difficult and contributes to traffic congestion at the port. It again collaborate with Onumahet al (2013) whoanalysed the productivity, technical efficiency and its determinants among cocoa producers in the Eastern region of Ghana and indicated that exogenous factors such as access to extension services, technical support and credit are found to reduce the level of technical inefficiency among the producers leading to decline in production. It further support the study of Dormon et al., (2004), who performed diagnostic study to understand farmers" views on the problems of cocoa production decline in the Suhum-KraboaCoaltar District, Eastern Region, Ghana. Their study concluded that producer price and the lack of amenities like electricity, which leads are the main causes of low productivity.

On the effect of climate in relation to causes of declining cocoa production in the study area. Out of five measurements variables three were rated higher by the respondents with mean [mean > 3.5] in Table 4, the influential factors are; unpredicted rainfall pattern disturb planting time, temperature margin in the municipality is not stable and prolong dry season affect cocoa seedling. The overall grand mean shows that respondents' agreed on the effect of climate to reduce cocoa yields in the study area. The results support a research conducted by Kyere (2016) in the forest-savanna transitional zone of Ghana and revealed that planting more plantain suckers as a protective shield over cocoa seedlings against excessive sunshine is one of the major adaptation strategies practiced by the farmers due to deforestation that has left large parts of the land bare. It again supports (Sarr, 2012) who indicated that rising temperatures coupled with variable and highly unpredictable rainfall patterns have negative impacts on agricultural activities across Africa and the developing world. The results of the study further supports Oyekale, et al, (2009) they indicated cocoa is highly sensitive to changes in climate, from hours of sunshine to rainfall. It is also very sensitive to the soil moisture condition and, particularly, to temperature due to effects on sunshine.

On commercial risk factors to cause decline in cocoa production in the study area. Out of five measurements variable two were rated higher by the respondents with mean [mean > 4] in Table 5 the influential factors are; inadequate credit facilities to support the farmers and cost of borrowing is high for the farmer. This collaborates with Kwanashieet. Al, (1994) cited in Saunders, (2009) indicated the degree of fluctuation in prices is a major concern to the cocoa industry. Farmers, as any other rationale producers, respond to price

by changing the intensity with which they tend their farms.The overall grand mean in shows respondents' had a midway opinion on commercial risk factors are causes of decline in cocoa productions in the study area..

Respondents in the study area cocoa production rate were assessed to determine their increasing or decreasing trend of cocoa production. It was established that mean production rate in tons declined from 2015 to 2018 in the study area as shown in figure 2. One way analysis of variance was performed to establish the mean difference, and the result in table 7 indicates that there is difference among the means of production. The significance of the mean difference indicates that the difference do not occur by chance. The results of the decline in mean production level of cocoa farmers' is attributed to the causes of the decline of production they spelt out in the previous sections of this study

On the issues of financial implications of decline in cocoa production in the study area. Out of eleven measurements variables eight were rated above 4 [mean > 4] in Table 8, the most appealing financial implications identified by the respondents' are; net balances after expenses are not encouraging, retirement savings after farming operations are reduce, no saving after yearly operations, wages and salaries of farm hands and other family are not met, loan repayment to credit institution and banks are not achieved, net annual incomes are affected, no surplus amount to work on machinery for the next season and amount for insecticides and chemicals are seriously affected. The overall grand mean shows that decline in cocoa productions really have associated financial implications in the study area. The result collaborates with Knudson (2007) who shows that income from cocoa is still the determining factor for most households. It further support Gockowski et al. (2011) who indicated that cocoa sector provides

income for more people engaged in input supply, production, marketing, transportation and processing activities.

With regards to economic implications of decline in cocoa production in the study area. All measurements variables were rated above 4 [mean > 4] in Table 9, the most appealing economic implications identified by the respondents are; economic asset of the farmers are not achieved, shops selling cocoa chemical and insecticides are affected, cocoa farmers loan delinquency are increase., employment in the sector are reduce, chemical and distribution companies are affected and income on food and household supplies are not realized. The overall grand mean shows that decline in cocoa productions really have associated economic implications in the study area. The result collaborates withKnudson (2007) who shows that income from cocoa is still the determining factor for most households. It further support Gockowski et al. (2011) who indicated that cocoa sector provides income for more people engaged in input supply, production, marketing, transportation and processing activities. It further support Achterbosch et al, (2014) who indicated that cash crops are seen as an integral part of a strategy to improve the food security in countries with a substantial agricultural sector. Additionally the result of the study is in line with perfume Mossu, (1992) cited in Kenny et al, (2004) who indicated cocoa is used in Ghana for the production of products such as chocolate powder, biscuits, and bars of chocolate for economic purposes.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMENDATIONS

Introduction

This chapter summarizes the main findings of the study in relation to the research questions, conclusions and gives recommendations based on the findings of the study.

Summary

This study examined economic and financial implications of decline in cocoa production in Bono region specifically Jaman South Municipality (Drobo) under the following research questions: What are the causes for the decline in cocoa production in the study areas?How differences are the mean cocoa production within the study area?What are the economic and financial implications of cocoa production decline on farmers in the study area?

The research design employed in this study was non experimental research designs (Case Study approach) together with cross sectional survey method to collect quantitative data from cocoa farmers in Jaman South Municipality, specifically Drobo. The total population for the study comprised cocoa farmers. The study included sample of 100 respondents who were purposively selected. Data were collected by means of 5-point Likert type questionnaire rating from 1-5, indicating 1 as the least rating and 5 as the highest rating. Data were analyzed using statistics package for social science version 23 (SPSS) by employing mean, standard deviation, bar chart, percentages and one way analysis of variance(ANOVA).

Data collected and analyzed indicated that most of the respondents were male, above the age of 40 years, married and had formal education at from basic education.

Research question one was to assess causes for the decline in cocoa production. The study made used of nine variable to determine farm related factors, seven variables for logistic challenges, five variables for effect of climate changes and five variables for commercial risk factors. It was revealed that most influential cause of decline in cocoa production in the study area is logistic challenges, followed by farm related causes and the next is effect of climate change. The least applicable cause is balancing commercial risk factors.

Research Question two was to examine how differences are the mean cocoa production within the study area. It was revealed that there is a decline in cocoa production among the production estimate provided by the cocoa farmers in Jaman South Municipality specifically Drobo. The linear decline trend in average production of cocoa shows decline in production. The study further tested the hypothesis to ascertain the mean difference. The results revealed actual significant difference in the means of cocoa production from 2015 to 2018, rejecting hypothesis two and concludes that there is significant difference between the means of cocoa production yield in the study area.

Research Question three was to identify economic and financial implications of decline in cocoa production. The results revealed that overall grand mean shows that decline in cocoa productions really have associated financial implications in the study area. The most influential financial implications are net balances after expenses are not encouraging and retirement savings after farming operations are reduce. Again it further revealed that

overall grand mean shows that decline in cocoa productions really have associated economic implications in the study area. The most influential economic implications are economic asset of the farmers are not achieved and shops selling cocoa chemical and insecticides are affected severely.

Conclusions

The study concludes that logistic challenges are the main causes of the decline in cocoa production in Jaman South Municiality (Drobo). The study again concludes the respondents felt that their main challenges are due to inadequate extension officers to visit their farms and explain modern farming practices for them to apply. Again the study concludes that cocoa farming roads leading to their farms are deplorable and need urgent rehabilitation for easy transportation of seedlings.

The study again concludes that there is production decline in cocoa productions in Jaman South Municipality. The mean difference in the cocoa production indicates that 2018 production has decline and concludes the ministry of agriculture and cocobod are to intensify effect to mitigate decline as shown in the study trend line.

The study further concludes that there are economic and financial implications of decline in cocoa productions in the municipality. The study also concludes that the level of farmers', average annual income, and level of farmers' wellbeing and possession of basic assets are likely to be influenced by the decline in cocoa productions.

Recommendations

From the findings and the conclusions of the study, the following recommendations were proposed, to augment the decline in cocoa production in the municipality.

Government agencies responsible for extension services and other non-state organizations that are into the provision of agricultural information should offer training programs for farmers related to their farms in the communities. These people will then serve as contact farmers in their various communities. Additionally, routine training of input dealers in the various communities should be undertaken to improve upon their knowledge levels since they are a regular source of agricultural inputs

Investing in the logistic constraints of the farmers should be the priority of ministry of food and agriculture to eliminate the logistic challenges of the farmers in the municipality.

Again the study recommends that the farmers should be trained by extension officers to have knowledge on climate change effect and adjust accordingly. Government should strive to make cocoa agrochemicals available at the right time in the municipal during the cocoa season at subsidized prices. This would make it possible for the farmers to have access to input anytime they want to use it.

Suggestions for Future Studies

Any related future studies on this topic could further look at economic and financial implications of decline in cocoa including Jaman North and Jaman South municipalities as a whole

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APPENDIX A

CHATOLIC UNIVERSITY COLLEGE, FIAPRE

Questionnaire

Dear respondent,

This questionnaire is designed to collect information on the economic and financial implications of decline in cocoa production in Bono region of Ghana. A case Jaman south municipality specifically Drobo. It is purely an academic exercise and I assure you that all information given will be treated confidential and solely for the purpose of this study.

SECTION I: Socio-Demographic Characteristics of Respondent's

1. Sex
   a. [ ] Male
   b. [ ] Female
2. Age
   a. [ ] 20-30.
   b. [ ] 30-40
   c. [ ] 40-50
   d. [ ] 50+
3. What is your marital status?
   a. [ ], Single
   b. [ ], Married
   c. [ ] Widow
4. What is your highest educational level?
   a. [ ] No formal

b. [ ] Basic education

c. [ ] Secondary Education

d. [ ] Tertiary education

e. [ ] Others

Section B: Causes of Decline in Cocoa Production in your Area

5. Please indicate your opinion for the following as the causes of decline in cocoa production in this area, using the scale: SA: Strongly Agree, A: Agree, N: Neutral, D: Disagree, SD: Strongly Disagree

Causes of Decline in Cocoa Production					
Farm Related Causes of Decline	**SD**	**D**	**N**	**A**	**SA**
Is it because the cocoa tree are too old and bush burning					
Is it due to unsatisfactory land tenure system					
No regular weed control and application of fertilizers					
Farmers are unable to reinvest into their farms					
Regular mistletoe removal					
Due to cultivation of other cash crops/raising animals					
Harvesting on time, not when majority of pods are ripe					
Less knowledge in pruning for sunshine penetration					
Smuggling by farm hands or employees					
Logistic Challenges	**SD**	**D**	**N**	**A**	**SA**

Inadequate extension officers to provide technical assistance					
Inadequate farm implements, fertilizers and other materials					
Inadequate pest and diseases control insecticides					
Inadequate tractors to convey cocoa seeds for drying					
Deplorable roads leading to farming communities					
Inadequate storage facilities for farmers					
Effect of Climate Change	**SD**	**D**	**N**	**A**	**SA**
Unpredicted rainfall pattern disturb planting time					
No enough sunshine to dry seedling for transportation					
The temperature margin in the municipality is not stable					
Soil texture in the municipality is not good for cocoa					
Prolong dry season affect cocoa seedling					
Commercial Risk Factors	**SD**	**D**	**N**	**A**	**SA**
Price Volatility that can cover fermenting and drying expenses					
Inadequate credit facilities to support the farmers					
Margin paid by government to farmers are woefully inadequate					
The cost of borrowing is high for the farmer					
Excessive power of cocobod					

SECTIONC

6 Please fill in the table your cocoa farm yield for the years indicated in it

Year	2015	2016	2017	2018
No. of bags				

Section D: Economic and Financial Implications of Decline in Cocoa Production.

7 Please indicate your opinion for the following economic and financial implications on the decline in cocoa production in this area, using the scale: SA: Strongly Agree, A: Agree, N: Neutral, D: Disagree, SD: Strongly Disagree.

Economic and Financial Implications of Decline in Cocoa					
Financial Implication	**SD**	**D**	**N**	**A**	**SA**
Net annual income is affected					
No surplus amount to work on machinery for the next season					
Net balances after expenses are not encouraging					
Wages and salaries of farm hands and other family are affected					
No saving after yearly operations					
Amount for insecticides and chemicals are affected					
Nonfarm business income to set aside are affected					
Retirement savings after farming operations are affected					
Royalties for land tenure arrangement are affected					

Loan repayment to credit institution and banks are affected					
Economic Implication	**SD**	**D**	**N**	**A**	**SA**
Income on food and household supplies are not realized					
Income on food and household supplies are not realized					
Asset possessions of the farmer's are not achieved					
Shops selling cocoa chemical and insecticides are affected					
Chemical and distribution companies are affected					
Cocoa farmers loan delinquency will increase					

Thank You