CHRISTIAN SERVICE UNIVERSITY COLLEGE KUMASI,

IMPACT OF COCOA REHABILITATION PROGRAMME ON PRODUCTIVITY AND ECONOMIC STATUS OF COCOA FARMERS IN THE OFFINSO DISTRICT, 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: Emelia Serwaa Boateng

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 Christian Service University College.

Supervisor Signature:  Date: 29/09/2023

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ABSTRACT

The study sought to examine the impact of cocoa rehabilitation programme on the productivity and economic status of cocoa farmers of Offinso District in the Ashanti Region of Ghana. In this research, the descriptive research design was adopted with a sample size of 217 farmers using closed questionnaire. The study used both descriptive statistics and regression models in its analysis. the study concluded that 50.2 percent of the cocoa farmers, were between 10-20 years old. A further analysis revealed that 88.7 percent of the farmers make contact with agricultural extension officers for their services regarding their farms, 27.6 percent of cocoa farmers make contact with the agricultural extension officers for their services regarding their farms 3 times in a month, 74.10 percent of the cocoa farmers received other agricultural related training, 76.4 percent of the farmers were prepared to cut cocoa trees for complete rehabilitation. The study revealed that shaded agroforestry system, no-shaded monocropping and cocoa Agronomists of the cocoa rehabilitation program helps to cultivate large scale, undertaking early intercropping, shade regulation, replanting in stages and selective replanting of trees to regulate cocoa crown's shape and size. This was found to account for more than 43.3% of the level of output of cocoa production. The study revealed key challenges of the rehabilitation programme including inadequate credit facilities, unsatisfactory loan agreement conditions by creditors and unfamiliarity with modern methods of farming. The study made key recommendation. Key among this is that district agricultural extension offices should pay more visit to the cocoa farms to educate them more on modern methods of farming.

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DEDICATION

I dedicate this dissertation to my husband Mr Samuel Akumoa Boateng and my daughter Abdul-Naana Adwuwah Boateng and my good friend Emmanuel Adjei mensah for being supportive to me throughout my study. I have acquired a wealth of knowledge during my time at the University.

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CHAPTER ONE

INTRODUCTION

Background to the Study

Primary production has become the mainstay of most economies around the world especially Sub-Saharan Africa where raw materials production and export is the order of the day. Sustaining agricultural development has been a good field for research considering the critical role agriculture plays in the provision of food, incomes, employment, raw materials to feed industries, provision of employment, incomes, and food to feed many mouths (Somarriba & López-Sampson, 2018). Unfortunately, the problems of deforestation, land degradation, biodiversity loss, apathy of some stakeholders and weakness of relevant state institutions persist. Enuoh and Bisong (2014) observed that agriculture and livelihoods that rely on it are undermined seriously across the globe (Somarriba & López-Sampson, 2018).

Cocoa production has become the mainstay of many economies especially in Africa which is the leading producer continent. The global production of cocoa stands at about 3.8 million metric tons per annum (US $73 billion dollars) (Lanaud, Fouet, Clément, Boccara, Risterucci, Surujdeo-Maharaj & Argout, 2009; Riedel, Kägi, Armengot, & Schneider, 2019). Out this, West Africa alone accounts for about 70% and nearly one million people, who are mostly smallholder farmers, derive their livelihood from the crop (Oyekale, 2020). For instance, Ghana and Côte d'Ivoire produce approximately 17% and 41% respectively of the world output, followed by Cameroon and Nigeria, each contributing approximately 5% of world cocoa production (Kroeger, Koenig, Thomson, Streck, Weiner & Bakhtary, 2017). One of the agricultural activities that livelihoods largely depends on in Ghana is the cocoa farming, which contributes about 21% of the world's cocoa production in 2009–2010,

make her the second largest producer of cocoa in the world (Boateng, Cudjoe & Ofori, 2014; Aminu, Ayinde, Sanusi & Olaiya, 2019). For instance, Aminu, Ayinde, Sanusi and Olaiya (2019) in their study underscored the significant position Ghana's cocoa production is placed in the world cocoa trade and industry and this success can be largely attributed to smallholder farmers (Vanhove, Vanhoudt & Van Damme, 2016). Apart from employment provision, the second largest export commodity after gold since 1992 is cocoa, which contributes about 7.3% to Gross Domestic Product (Ayenor, Van Huis, Obeng-Ofori, Padi, & Röling, 2007; Anang, 2011**;** Codjoe, Ocansey, Boateng & Ofori, 2013b).

Again, in 2013, earnings from cocoa constituted approximately 16.48% of total agriculture export (ISSER 2014). The cocoa sector in Ghana use about 1.5 million hectares of land in the production and employs over one million (100,000) smallholder farm families (Danso-Abbeam, Setsoafia, & Ansah, 2014). Cocoa also contributes about 70–100% of the household income of cocoa farmers annually (Abankwah, Aidoo & Osei, 2010; Kwaw-Nimeson & Tian, 2019).

Several factors have however, militated against the production of cocoa in Ghana. Key among these constraints is the incidence of pests and diseases, which according to Ntiamoah and Afrane (2008), has been the major cause of downward dwindling in cocoa production yields and subsequent negative effects on the economy as a whole**.** According to Fosu-Mensah, Okoffo, Darko, & Gordon (2016), the use of pesticides to rehabilitate cocoa farms has become a necessity to increase cocoa production in Ghana despite the recommendation of the use of nonchemical means of controlling pests and diseases in order to avert health problems.

Despite Ghana's position in the world's cocoa production, the level of production keeps declining year in year out (Mahrizala, Lanier, Bruce & Dixonc, 2013). This continuous decline is partly due to lower low yields per hectare, low producer price decreasing areas under cultivation, and non-adoption of research recommendations (Somarriba, Peguero, Rolando Cerda, R., Orozco-Aguilar, López-Sampson, Leandro-Muñoz, Jagoret, & Sinclair, (2021). Compared to leading producers like Indonesia (770 kg/ha) and Cote d'Ivoire (580 kg/ha), Mahrizala, et al., (2013) in their study found that Ghana's average annual cocoa yield (330 kg/ha) for over 50 years is among the lowest in the world. They cited among others the aging tree stocks as the main reason for the declining productivity. they also asserted that, though cocoa trees can yield fruits up to 50 years, however, after the 25th year, there is diminish in the yields they bring (Asamoah, Ansah, Anchirinah & Agyapong, 2013; Fosu-Mensah, Okoffo, Darko & Gordon, 2016). This therefore calls for Rehabilitation to increase farm productivity and enhance economic status of farmers. Unfortunately, since poor cocoa farmers value revenue potential as much as they do for revenue stability, they find it difficult to forgo immediate income for improved long-term benefits. This has therefore made a bit more difficult to advice farmers to rehabilitate their cocoa farms. However, through a series of sector-specific and economic policy reforms, including the multiplication and distribution and manipulation of new varieties and government backed cocoa farm rehabilitation programmes since 1984, has propelled recovery and now reversing or reversed the previous decline in the industry (Eghan, Awuah & Santo, 2017).

Ghana has about 1,400,000 ha area of land cultivated to cocoa. The target of Government was to increase cocoa production from 1.2 million to 1.5 million MT by the year 2020 and to about 2.0 million MT per year by 2025 (Fosu-Mensah, Okoffo,

Darko & Gordon, 2016; Denkyirah et al., 2016). Key strategies were therefore adopted and rehabilitation of old cocoa farms using improved and new planting materials became key (Asare, Ohemeng, Seco & Asante, 2010; Mahrizala et al., 2013; Somarriba et al., 2021). Andres et al. (2017) estimated that the full adoption of the new cocoa hybrid varieties developed in Ghana has the potential of increasing productivity by about 50%. Notwithstanding the continuous rehabilitation of the cocoa farms, Kwaw-Nimeson and Tian (2019) observed that there are many old and abandoned cocoa farms in the Ashanti Region, that still require rehabilitation. And we are with the view that knowledge of the impact of rehabilitated cocoa farms (RCF) can be key to motivating farmers to submit especially their old and abandoned cocoa farms to rehabilitation, and also helping to forecast what to expect from the sector in the near future.

The Cocoa Rehabilitation Project (CRP) was a Government of Ghana initiative and part of the Economic Recovery Program (ERP) package under the supervision of the International Monetary Fund (IMF) and the World Bank (WB). It was funded by a number of institutions and it was the first Agricultural Development Bank (ADB)/Agricultural Development Fund (ADF) financed cocoa project in Ghana. The project value was 100 UA million from start to completion (Riedel, Kägi, Armengot, & Schneider, 2019).

According to ADB/ADF OPEV (2002), the project came about as a result of factors relating to the drastic reduction in production of cocoa from 400,000 tons to about 180,000 tons in the 1970s. This sharp decline was attributed to factors such as the persistent weakness in the internal market, unfavorable government control measures over cocoa purchasing and exports, the fall in producer prices which acted as a disincentive to cocoa farmers, high marketing and administrative costs and export

duties and low outputs due to diseases, pests and aging cocoa trees (Riedel, Kägi, Armengot, & Schneider, 2019).

Despite the many studies on cocoa rehabilitation, there is little or no information on the impact of rehabilitated farms on coca output, productivity and the economic status of cocoa farmers in the Offinso District in the Ashanti region of Ghana. This study thus, aims at examines the impact of cocoa rehabilited farms on the productivity and economic status of cocoa farmers in the Offinso District in the Ashanti Region of Ghana.

Problem Statement

Cocoa production in Ghana has experienced a sharp fall in production since the 1970s. This continues decline can be attributable to such factors as aging cocoa trees, invasion of cocoa farms by pests and diseases, decline in producer prices which act as a disincentive to cocoa farmers, unfavorable government control measures over cocoa purchasing and exports, high marketing and administrative costs and export duties, and persistent weakness in the internal market (Kwaw-Nimeson & Tian, 2019). Considering the quantum of investment the government of Ghana has made towards cocoa production, it is expected that the sector would have witnessed phenomenal growth and development than it is today. This lag can be attributed to bad weather, outbreak of pest and diseases, and more importantly aging trees (Anang, 2015; Oyekale, 2020). These challenges being witnessed in the cocoa production adversely affects productivity and the economic status of cocoa farmers. Despite the many studies on cocoa rehabilitation, there is little or no information on the impact of rehabilitated farms on coca output, productivity and the economic status of cocoa farmers in the Offinso District in the Ashanti region of Ghana.

Not quite long, Ghana's cocoa output dropped from 1,047,000 metric tons in 2020/2021 to 689,000 metric tons in 2021/2022 and 750, 000 metric tons in 2022/2023 fiscal years (Shahbandeh, 2023). That is, Ghana's crop, which is the second world's biggest, was slashed down from 114,000 tonnes to 696,000 tonnes representing 22% slump year on year out (Daryl, 2015). The International Cocoa Organization (ICO) attributed this to structural factors and further noted that the reasons behind the fall remain unclear (ICO, 2018).

Cocoa agronomists and other agricultural researchers have proposed protocols and methods to help to decide how and when to rehabilitate a cocoa farm (Kwaw-Nimeson & Tian, 2019). Most of these methods were based on the assessment of whether three key variables have passed or reached critical threshold levels: (1) planting density (e.g. less than 800 plants ha−1), (2) age of cacao (e.g. more than 40 years) and (3) yields (e.g. less than 500 kg ha−1 year−1). Quiroz and Amores (2002) as cited in Kwaw-Nimeson and Tian (2019), also consider shade levels, the height of the cocoa tree, and disease and pest status when deciding on rehabilitation interventions. The main limitation of these protocols is that only the density-age-yield relationships of cocoa are taken into consideration in the rehabilitation decision-making and implementation process, disregarding the impact of cocoa rehabilitation (Somarriba et al., 2021) have on cocoa farmers' productivity and economic status in Ghana. In view of this, the government of Ghana introduced the cocoa rehabilitation program in all cocoa growing areas in Ghana. However, cocoa yield is still reported to be low. While several studies have been conducted on cocoa production in Ghana, a review of literature revealed that, there is little data on the economic impact of the cocoa rehabilitation program.

Thus, this study assesses the economic impact of cocoa rehabilitation programme on cocoa farmers in the impact of cocoa farmers' productivity and economic status of cocoa farmers in the Offinso District in the Ashanti Region of Ghana.

Objectives of the Study

The main objective of the study is to examine the impact of cocoa rehabilitation programme on the productivity and economic status of cocoa farmers of Offinso District in the Ashanti Region of Ghana.

Specific Objectives

1. To identify the characteristics of cocoa farms in the Offinso District of the Ashanti Region of Ghana.
2. To determine the effects of the cocoa rehabilitation programme on level of output and productivity of cocoa production in the Offinso District of the Ashanti Region of Ghana.
3. To determine the effects of the cocoa rehabilitation programme on economic status of cocoa farmers in the Offinso District of the Ashanti Region of Ghana
4. To evaluate the internal and external challenges of cocoa rehabilitation programme in the Offinso District of the Ashanti Region of Ghana.

Research Questions

1. What are the characteristics of cocoa farms in the Offinso District of the Ashanti Region of Ghana?
2. What is the effect of cocoa rehabilitation programme on the level of output and productivity of cocoa production in the Offinso District of the Ashanti Region of Ghana?

3. What is the effect of the cocoa rehabilitation programme on economic status of cocoa farmers in the Offinso District of the Ashanti Region of Ghana?
4. What are the internal and external challenges of cocoa rehabilitation progamme in the Offinso District of the Ashanti Region of Ghana?

Significance of the Study

The importance of this study cannot be overemphasized. This study findings will help in improving the rehabilitation process of the cocoa farms for farmers in the country. With the current state of cocoa farms coupled with low incentives for farmers, bad road network across the farming communities and lack social programs, this study will provide a system involving diagnosis, design of innovations, and the formulation and implementation of an action plan to boast cocoa production among cocoa farmers in the country**.** For instance, in 2015, report has it that thousands of cocoa farms were affected by either pesticides or lack transported from some producing districts in the Western Region of Ghana and this was due to the collapse of two main bridges and bad roads (Moses, 2014).

Furthermore, the recommendations from this study findings will be of a help to Ghana's cocoa sector and other trading entities in the world. Practical and theoretical contributions will also be drawn from this study. Practically, the various partners of the cocoa farming sector will also become enlightened to challenges which were unidentified. Theoretically, the results from this study are expected to deepen the understanding of Government or COCOBOD in knowing the critical areas in the cocoa production process and procedures in the cocoa sector. This research result will serve as a guide for the government of Ghana and managements of COCOBOD against challenges identified facing the cocoa production in Ghana**.** This expected outcome will help improve the industry's attractiveness to both the cocoa farmers,

marketers and buyers and other shareholders while ensuring profitability for the sector.

Delimitations of the Study

This study mainly focuses on the economic importance of the rehabilitation programme of cocoa on the cocoa farmers in the Offinso district in the Ashanti region of Ghana. Specifically, this study focuses on assessing the increased in production by the farmers through the rehabilitation programme. This study also places emphasis on assessing the improvement in farmers economic status through the rehabilitation programme. Another focus of this research is to assess the problems farmers encounter in their rehabilitation process in Ghana.

Limitations of the Study

As it is with every research, this is not without limitations. One limitation of this study will be that of the respondents (Cocoa farmers) attitude in responding to questions during interviews in collecting information for the study. Many of the respondents are likely not to provide the requisite information in their respective fields. As a result, literatures focusing on this study area in examining the economic importance of the rehabilitation programme on the farmers may become limited information to be provided. However, the researcher intends to vividly explain the purpose and importance of the study to each respondent in order to broaden their understanding of the demands of the questions and to allay their fears in providing information.

Another major limitation anticipated in this study is financial resources problem which is expenses the researcher and his assistants will incur in travelling to work on questionnaires in the cocoa farms. This limitation may affect the time frame

in which the sample size chosen will help in achieving the aim the study. This may also make it difficult to assess and establish the impact of rehabilitated farms on the cocoa farmers in Ghana in ensuring sustainable production and practices in the cocoa sector.

The research would require a lot of money to undertake activities such as transport, telecommunication, surfing internet, and printing or binding documents. However, in order to overcome this challenge, the researcher will do everything humanly possible to increase his financial provisions from parents, siblings, relatives, friends among other unknown sources.

Last but not least, due to the nature of the research, the research will require a lot of time to be dedicated towards the research activities however to overcome this problem the researcher drafted a time table which will be strictly followed.

Organization of the Study

This study will be organized into five main chapters. Chapter one will present the introduction, which comprises of the study background, problem statement, objectives of the study (main and specific), research questions, significance of the study, scope of the study, limitations of the study and the organization of the study. Chapter two will review the literature pertaining to the subject matter by defining key concepts, theoretical review where theories relating the study will be reviewed, the conceptual framework, and the empirical evidence. Chapter three outline the research methodology comprising the research design, study area or population, source of data and data collection tolls, the research techniques and data analysis. Chapter four will present the study results and discussions of the results. Finally, Chapter five will

comprise of the summary of the research findings, conclusion and recommendations thereof.

CHAPTER TWO

LITERATURE REVIEW

Introduction

This chapter reviews proposed literature on the various concepts and definition related to cocoa rehabilitation in Ghana. It reviews various theories that are related to the subject matter. It further reviews literature on the conceptual framework for the study and the empirical evidence relating to the study subject matter.

Historical Background of Cocoa Production in Ghana

According to Grossman-Greene and Bayer (2009) as cited in Kwaw-Nimeson and Tian (2019), cocoa as a cash crop emanated from the Middle America, where it was cultivated by the Aztecs who used the seeds of cocoa to produce chocolate drinks and for barter trade. The Danish who came into the country through missionary activities introduced the crop to Ghana in 1857. The first attempt to plant the cocoa seedlings did not yield results as the young trees could not withstand the environment and died shortly after planting. However, on a second attempt, one tree survived and spread among other mission stations in the country but the rest that were planted were destroyed by pests and insects (Grossman-Greene & Bayer, 2009). The first successful maturing of cocoa trees took place in the Eastern Region in 1879 and since then the crop survived and yielded on the soil of Ghana. As time went on, Ghana became the leading exporting country of cocoa in the 20th century (Grossman-Greene & Bayer, 2009). Today, cocoa remains one of the most important agricultural export products in the country (Barrientos & Asenso-Okyere, 2012; Aminu, Ayinde, Sanusi & Olaiya, 2019).

Ghana being the second world's largest producer of cocoa, derives most of her income from the production and export of cocoa beans. For instance, Ghana produced

approximately 840,000 tonnes of cocoa in 2015/2016 (www.statista.com) and the country's output is still growing regardless the general fall in production in Africa. The cocoa sector contributes about 57 per cent of overall agricultural export and worth about 30 per cent of all revenue from export. Over the years, cocoa production has sustained the Ghanaian economy in many ways. In terms of employment, the production of cocoa beans has employed approximately 6.3 million Ghanaians (Aminu et al., 2019). Notwithstanding the increase in exports of gold and oil, cocoa is still considered the most important commodity to the country. Had it for cocoa production, the unemployment rate in Ghana could have been worse. Through, cocoa production, farmers are enabled to cater for their families and households, and through the devise of innovative schemes farmers are lifted out of poverty (Aminu et. al., 2019). Cocoa contributes about 57 per cent of overall agricultural export and is worth about 30 per cent of all revenues derived from exportation (Awuah- Gyawu, Brako & Adzimah, 2015).

In response to market opportunities and the development of infrastructure in Ghana, commercial farmers largely develop cocoa. Revenues from the crop have been used in constructing clinics and other facilities in places like Accra, Kumasi and mostly in cocoa growing areas (Barrientos et. al., 2012). Also, through the Cocoa Roads Improvement Project, revenues generated from the cocoa sector goes into the maintenance and construction of road infrastructure (Awuah- Gyawu et al., 2015).

Infrastructure such as bridges, roads, schools, community clinics are being constructed by the government. Wards of cocoa farmers are offered scholarships in their second cycle education. This helps reduce the financial burden of cocoa farmers and also help them to save and seek for credit facilities from financial credit institutions (Barrientos et. al., 2012). Over the years, cocoa as major cash crop has

played a vital role in generating household incomes, government revenues and foreign earnings. The contribution of cocoa to rural development in Ghana cannot also be over emphasized. Any community which joined the band wagon of cocoa producing communities invite into itself an effective business, especially through the many cocoa purchasing companies whose spending powers can change the whole economy (Awuah- Gyawu et al., 2015).

It is estimated that, COCOBOD invests an amount of GHc2million annually in cocoa scholarship for relatives of cocoa farmers with a huge number of beneficiaries accessing the scheme annually (Awuah- Gyawu et al., 2015). Also, relatives of cocoa farmers receive free medical care at Cocoa Clinic which is instituted in Accra. Again, because cocoa has not been lacking, the private sector also invests into various spheres of the nation. Millions of cedis are invested by the private sector into the development of deprived cocoa communities. For example, the Armajaro Traceable Foundation in partnership with COCOBOD has invested close to $2 million in education, health, sanitation and water developmental projects in rural cocoa communities (Awuah- Gyawu et al., 2015). The Cadbury Cocoa Partnership for example is also an investment programme, worth about £30 million which is supposed to be over a ten-year period, aimed at transforming the lives of more than half a million cocoa farmers. A cocoa farming group in the Ashanti region known as Kuapa Kokoo has over the years invested millions of cedis into the construction of school buildings, potable water, and community clinics in some cocoa communities (Awuah- Gyawu et al., 2015).

Over the years, the production of cocoa emerges as the major cash crop that contributes massively to Ghana’s GDP. It is the main sustenance crop of Ghana's economy and the most significant agricultural commodity Ghana produces. Ghana's

second leading foreign exchange earner is cocoa and it accounts for about 57 per cent of overall agricultural export and it is worth about 30 per cent of all revenue from export as well as exports 22 percent of the world's cocoa. The overall agricultural contribution to the Ghana's GDP in 2015/2016 was 19 per cent and Cocoa alone contributed 14.6 per cent. This made the growth performance of the cocoa sector in 2015/2016 soar up to 3 per cent (Ghana Statistical Services 2016 Budget). The significance of macroeconomic management is that, the level of competition achieved on both the export and import side of producing countries enables the economy to identify its weakness and strength and the ability to sustain quality standard of living of Ghanaians.

Because of cocoa production, funds and development assistance are derived from overseas countries such as America, Europe and of late China in a form of grants and loans. As a developing country, Ghana tends to use some of its natural resources in exchange for foreign donors in her bid to develop. Grants and loans acquired through the cocoa sector are used to support the cocoa farmers to boost production (Aminu et. al., 2019). Also, both the cocoa sector actors and policymakers are been equipped through these grants and loans. The crop enables the farmers to also seek for loans from financial institutions and other cooperative societies. Globally, consumers' choices of chocolate or cocoa beverages in preference to other substitutable products are highly influenced by their perception of vital elements including social, health concern, and environmental factors (Denkyirah, Okoffo, Adu, Aziz & Ofori, 2016).

Thus, the question here is that, what would have been the state of Ghana's economy without cocoa? Probably, many macroeconomic factors would decline. For instance, under development of infrastructure, incredible loss of revenue and foreign

exchange, a high probability job loss of two million thereabout, and a huge sinking and shrinking of Ghana's economy.

Cocoa Output and Productivity in Ghana

Due to the high-quality standard of Ghana's cocoa, the Ghanaian economy benefits a lot from the cocoa industry in terms of social and economic advantages. It has been argued that, the cocoa industry is the backbone of Ghana's economy (Canatus & Darkoa, 2009; Kwaw-Nimeson & Tian, 2019). Also, Tutu (2011) observed that cocoa is the largest foreign exchange earner for Ghana, contrary to economic indices which place gold as the largest foreign exchange earner. Tutu (2011) further stated that, an investment of one dollar ($1.00) in the cocoa sector earns about seventeen dollars ($17.00), however, an investment of same one dollar in the minerals sector will earn two dollars ($2.00). Again, the cocoa industry is estimated to employ over 800,000 farmers with about 6,121 staff of COCOBOD and 3.2 million farmhands. Meanwhile, the mining sector is estimated to employ only a little over 27,481 workers with an estimated 500,000 small scale miners (Tutu, 2011).

Tutu (2011) noted that, the environmental problem from cocoa can only be seen in the conversion of forest into cocoa farms and even with that it has added benefit of tree cover that compensates partly for the initial conversion. However, the environmental and social problems from gold include diseases like respiratory problems, schistosomiasis, malaria, resettlement problems, soil and water pollution, soil erosion, land degradation and deforestation. While cocoa has higher social and economic benefits compared to timber and gold, the environmental cost of the latter is serious. In addition to the above advantage, the cocoa sector caters for many Ghanaians as evident by the remarkable increases in cocoa production and producer prices over the years (Denkyirah et. al. 2016).

Characteristics of Cocoa Production

Cocoa yield in the dry region are usually significantly lower than the mid and wet regions with mean cocoa yields of 288, 712 and 849 kg ha^{-1} yr^{-1}, respectively. The age of cocoa farmers decrease from dry to mid and wet regions, with significant difference between the dry and wet regions (Abdulai et al., 2018). This trend is sometimes positively correlated with household size, as old farmers had significantly larger family sizes. Though differences in cocoa farm are not pronounced

The dry region dominates by farms having been previously used for cocoa, but with a short fallow combined with annual crops such as maize and vegetables in-between cocoa cycles. The mid and wet regions have common characteristics of being converted from primary and secondary forests. Expectedly, the highest proportion of mature cocoa farms established after deforestation of primary forest occur in the wet region leading to most cocoa expansion (Abdulai et al., 2018).

The size of young cocoa farms (< 5 years) are significantly smaller in the wet than in the mid and dry regions. The differences in size between young and mature farms per region are not noticeable. Planting material are usually in the form of cocoa seedlings or pods, with the source being either hybrid from the Seed Production Unit (SPU) of the Ghana Cocoa Board (COCOBOD), or from farmers' own selections.

The perceived farmer's perception of drought effect on cocoa production varied across regions and these include a yield decrease, an increase in pests and diseases incidence and decrease in pod and bean quality with fire being an additional burden in the dry region (Aminu et. al., 2019).

Shade tree density, diversity and percentage shade are higher in the dry than in the mid and wet regions. The most common shade tree species in the dry and mid

regions is avocado (Persea Americana) fruit tree, whilst the most common shade tree species in the wet region is the timber species, Terminalia superba. In the dry region, apart from Antiaris toxicaria, other most common species are two fruit trees, i.e. P. americana and Citrus sinensis. The Cocoa Research Institute of Ghana (CRIG) has listed eight desirable and ten undesirable shade tree species for cocoa cultivation in Ghana (Denkyirah et. al., 2016). The percentage of planted shade trees on farmers' fields decrease from the dry to the wet region, but the overall share of planted trees was low, indicating that farmers rely mainly on assisted natural regeneration for maintaining shade trees in cocoa farms (Asante, Acheampong, Kyereh & Kyereh, 2017).

Economic Status of Cocoa Framers

The economic status of cocoa farmers is paramount to them and for that matter will only engage on that farming business that will enhance their status economically. Incomes derived from cocoa production are used to cater for family and personal needs. Proceeds from cocoa farms are used to meet other obligatory expenses such as funding wards education, paying utility bills, among others. The cocoa farms themselves serve as collateral to the farmers in accessing credit facilities from financial institutions or individuals (Abdulai, 2018).

For instance, Peprah (2015) examined the sustainability of cocoa farmer livelihood by investigating the factors that increase or derail the sustainability of cocoa farmer livelihood. The study results indicated that cocoa farmer livelihood provides larger secondary livelihoods for labour-sellers, petty traders and staff of cocoa marketing companies.

Cocoa Rehabilitation Program on Cocoa Framers

Rehabilitation (Rh) of a cocoa program (either a shaded agroforestry system or a no-shade monocrop) is a complex decision-making process that involves diagnosis, design of innovations, and the formulation and implementation of an action plan. Cocoa agronomists have developed protocols and techniques to help decide on how and when to Rh a cocoa program (Quiroz & Amores, 2002). Most of these methods are based on the assessment of whether three key variables have passed critical threshold levels: (1) age of cacao (e.g. more than 40 years), (2) yields (e.g. less than 500 kg ha−1 year−1), and (3) planting density (e.g. less than 800 plants ha−1). Others also consider shade levels, the height of the cocoa tree, and pest and disease status when deciding on Rh interventions (Quiroz & Amores, 2002). Critical levels for each variable are context and site specific and must be determined for each locality. For example, in the case of small Ghanaian producers, an unproductive tree is the one whose yield is 30% of the average highest yield of an adult cocoa plant, i.e. about 125 kg ha−1 year−1 (Olaiya et al. 2006). The main limitation of these protocols is that only the age–yield–density relationships of cocoa are taken into consideration in the Rh decision-making and implementation process, disregarding the contributions and influence that the production of other agroforestry products from the same program (Cerda et al. 2014) have on Rh diagnosis, design and implementation.

Cocoa agronomists and farmers have at their disposal an extensive list of programs for rehabilitation and renovation (Lass, 1985). This list includes early intercropping, shade regulation, stumping, replanting, complete replanting of the orchard, replanting in stages, selective replanting of trees, reconstructing cocoa tree crowns using basal suckers, planting new cacao under old cacao used as temporary shade, with or without grafting them, propagating elite trees, various types of pruning

and pollarding to regulate cocoa crown's shape and size, etc. (Asare & David, 2010; Ogunniyi & Osuolale 2015; Akinnagbe, 2017). Several authors have provided lists of the different models for rehabilitation and renovation, and their variants, in different cocoa-growing regions (Quiroz & Amores 2002; Assiri et al. 2003; Ogunniyi & Osuolale 2015; Olaiya et al. 2006).

Rehabilitation programs include (1) complete removal of the crown by pollarding to remove diseased tissue or to reduce tree height (Quiroz and Amores 2002; Olaiya et al. 2006); (2) restocking the orchard by direct seeding, planting nursery seedlings, rooted stakes or grafted plants at empty planting sites (Asare et al., 2018); (3) stumping combined with top or patch grafting (with a new cocoa genotype) on the regenerated suckers; and (4) stumping and sucker selection to regenerate the crown of the cocoa tree (Akinnagbe 2017; Riedel et al. 2019). In Western Region, the rehabilitation programs adopted by farmers are largely responsible for the presence of very old cocoa agroforestry systems that continue to be exploited today. The continuous replacement of dead cocoa trees and the cutting back of senescent cocoa trees rejuvenate the cocoa stand (Jagoret et al. 2018). Farmers' management of shade trees is in continuous evolution, in terms of both species composition and density. Species selection is based on minimizing competition and promoting complementarity between cocoa trees and associated tree species. The rehabilitation of a commercial, clonal, open-sun cocoa plantation in Malaysia using agroforestry and soil amendments has been documented by Vanhove et al. (2016).

Cocoa Rehabilitation in Ghana

Pest and disease outbreaks (e.g. cocoa swollen shoot virus, CSSV) have been a major driving force in Rh decisions in the Ghana and Côte d'Ivoire (Ameyaw et al. 2014; Andres et al. 2017). For instance, in Côte d'Ivoire, the Quantity-Quality-Growth

(2QG) programme (2014–2023) was set up by the Ministry of Agriculture and Rural Development (MINADER) and the Conseil Café-Cacao (CCC) to rehabilitate and renovate 800,000 ha of degraded cocoa plantations, including 150,000 ha destroyed by the CSSV. Recommended practices include the introduction of new cocoa varieties (drought-resistant, good-quality chocolate, high-yielding), crop protection measures, maintenance pruning, fertilizer application, and regeneration by grafting (Dzahini-Obiatey et al. 2010; Andres et al. 2018). The CSSV outbreak was also the driving factor that led to the Government of Ghana and the World Bank to invest USD 100 million to rehabilitate and renovate 17,900 ha of CSSV-infected cocoa farms (Kwaw-Nimeson & Tian 2019). Rehabilitation and renovation is recommended in current projects under Ghana and Cote d'Ivoire's Cocoa and Forestry Initiative (CFI), in partnership with the major cocoa and chocolate companies (represented by the World Cocoa Foundation), international NGOs (IDH, in this case), and other stakeholders. The CFI simultaneously targets increasing incomes from increased cocoa yields, preventing deforestation, and promoting the cultivation of cocoa in agroforestry systems to diversify and sustain rural incomes and to restore previously deforested land (Schroth et al., 2015a; Kroeger et al., 2017). Renovation of cocoa orchards poses a risk to deforestation, given the preference of farmers to establish new cocoa orchards in forest areas to take advantage of high soil fertility (Clough et al., 2009; Vaast & Somarriba, 2014; Somarriba & López-Sampson, 2018). Large-scale Rh programmes have been implemented across West Africa (Ghana, Ivory Coast, and Cameroon) in two main waves (1970 and 1990) but with low success rate due to farmers' lack of financial resources to fully implement such interventions (Lockwood, 1976). Such programmes have typically integrated research and extension services to transfer improved planting materials and dissemination of best agronomic practices.

The financing of such programmes has been completely or heavily subsidised (Jagoret et al. 2011; Dalberg, 2015). Currently, the cocoa private sector is supporting several Rh programmes to improve yields and secure a steady supply of cocoa beans (Dalberg, 2015). These programmes are being implemented on over 1.2 million ha of cocoa orchards and focus on two areas: (1) providing a Rh package including inputs, high-quality planting material and high-quality agronomical training and (2) setting up a business-driven provision of extension services (Asante et. al., 2019).

Cocoa Rehabilitation Examples in Cocoa-Producing Countries

Rehabilitation implementation processes and decision-making are highly context specific. As exemplified by rehabilitation initiatives in Ghana, Indonesia, Cote d'Ivoire, Brazil, Peru, Ecuador, and Dominican Republic, there are no general recipes, so each process needs tailored solutions.

i. Large-scale Rh/Re programmes have been implemented across West Africa (Ghana, Ivory Coast and Cameroon) in two main periods, 1970 and 1990. However, this was with a low success rate as a result of farmers' lack of financial muzzle to fully implement such interventions (Lockwood 1976; Somarriba, Peguero, Rolando Cerda, Orozco-Aguilar, López-Sampson, Leandro-Muñoz, Jagoret, & Sinclair, 2021). Such programmes integrated extension services and research to dissemination and transfer improved planting materials of best agronomic practices. According to Dalberg (2015), the financing of such programmes were either fully or greatly subsidised. Currently, the cocoa private sector is supporting several rehabilitation programmes to secure a steady supply of cocoa beans and improve yields. These programmes are being implemented on over 1.2 million ha of cocoa orchards and focus on two areas: (1) setting up a business-driven provision of

extension services and (2) providing a rehabilitation package such as high-quality agronomical training, high-quality planting material, and inputs (Somarriba et al., 2021).

ii. In Indonesia, disease infestation, low yielding and aging plantations triggered rehabilitation interventions on more than 0.8 million ha of cocoa orchards. Between 2000 and 2010, the Government of Indonesia became heavily involved in rehabilitation programmes through the provision of subsidised inputs and loans to cocoa farmers. And from that time onwards, several development agencies, private companies, and other public–private partnerships have been implementing ambitious rehabilitation programmes to soar up and complement former efforts (Thau Yin 2004; Somarriba et al., 2021). The ultimate aim of these rehabilitation interventions in Indonesia was to increase yields from the current average of 400–450 kg ha−1 to 1.5 Mt ha−1 in order to outcompete alternative cash crops such as palm oil.

iii. In Ghana and Cote d'Ivoire, pest and disease outbreaks such as the cocoa swollen shoot virus (CSSV) have been the main driving force in rehabilitation decisions in the two major global cocoa producing countries (Andres et al. 2017; Somarriba et al., 2021). For example, in Côte d'Ivoire, the Quantity-Quality-Growth (2QG) programme (2014–2023) was set up by the Ministry of Agriculture and Rural Development (MINADER) and the Conseil Café-Cacao (CCC) to rehabilitate and renovate 800,000 ha of degraded cocoa plantations, including 150,000 ha destroyed by the CSSV. Recommended practices included crop protection measures; regeneration by grafting; fertilizer application; maintenance pruning; and the introduction of new cocoa varieties, which are drought-resistant, high-yielding, and good-quality chocolate;

(Dzahini-Obiatey et al. 2010; Andres et al. 2018). The CSSV outbreak was also the driving factor that led to the Government of Ghana and the World Bank to invest USD 100 million to rehabilitate and renovate 17,900 ha of CSSV-infected cocoa farms (Kwaw-Nimeson and Tian 2019). Rehabilitation and renovation is recommended in current projects under Ghana and Cote d'Ivoire's Cocoa and Forestry Initiative (CFI), in partnership with international NGOs, the major cocoa and chocolate companies (represented by the World Cocoa Foundation) and other stakeholders. The CFI simultaneously targets restoration of previously deforested land, preventing deforestation, sustaining rural incomes, promoting the cultivation of cocoa in agroforestry systems to diversify and increasing incomes from increased cocoa yields (Schroth et al. 2015a; Kroeger et al. 2017). Renovation of cocoa orchards especially poses a risk to deforestation, given the preference of farmers to establish new cocoa orchards in forest areas to take advantage of high soil fertility (Vaast and Somarriba 2014; Somarriba and López-Sampson 2018; Somarriba et al., 2021).

iv. Similarly in Brazil, the devastating outbreak of Witches' Broom popularly known as the Moniliophthora perniciosa, in the late 1980s (Teixeira et al. 2015; Poelmans & Swinnen 2016) brought about several rehabilitation initiatives aimed at increasing production, restoring yields and the promotion of a set of good management practices, such as the replacement of the susceptible, traditional cocoa genotypes by new ones, disease- and drought-resistant, high-yielding, and fine favour cocoa cultivars, combined with low carbon cultivation practices, agroforestry, and integrated pest management practices (Pekic 2014; Schroth et al. 2016a; Somarriba et al., 2021).

v. Rehabilitation initiatives in Peru have been associated to USAID's logistic and financial support to either to promote cocoa as a licit, alternative crop to sustain rural livelihoods or eradicate coca plantations, Erythroxylon coca (Scott et al. 2015; Kieck et al. 2016). Example included the Alianza Cacao Perú programme, USAID's 10-year programme in the Provinces of San Martin, Ucayali and Huanuco (Kieck et al. 2016).

vi. Again, in Ecuador, most rehabiliation interventions have been part of a government-backed programme with local financial institutions as lenders (Quiroz and Amores 2002). The Ministry of Agriculture claimed to have rehabilitated more than 100,000 ha of low-yielding cocoa plantations heavily affected by pest and diseases or reaching the end of their life expectancy over a 10-year period (2006–2015).

vii. Last but not least, recurrent hurricanes and the availability of new technologies to increase crop yield have been the two major driving forces in rehabilitation initiatives in the Dominican Republic. Major farmers' organisations, Government, and private companies have engaged in rehabilitation initiatives. In the late 1960s for example, a rehabilitation programme led by the government introduced selected, high-yielding clones from Costa Rica, Jamaica, Ecuador, and Trinidad (Batista 2009). In 2006, the government promoted side grafting to rehabilitate unproductive and old cocoa trees in pioneer cocoa fronts (Siegel & Alwang 2004), and in 2017 launched a 10-year National Action Plan in partnership with the UNDP's Green Commodities Program (Cuello et al. 2015). CONACADO, an emblematic, small farmers' organisation, in partnership with Equal Exchange (an NGO), and with funding

from USAID, is currently engaged in rehabilitating their organically grown cocoa orchards.

Types of Risks in Rehabilitating Cocoa Farms

Technology Risk

Bessis (2002), describes the technology risk in the cocoa industry as the imperfections of information systems and systems failures caused by poor system integration and lack of skills. Crouhy, Galai and Mark (2006) point out that principal technology risk falls into the operational risk category. Application of low technology in cocoa rehabilitation can result in low yields while high or modern application of technology can enhance the fortunes of a rehabilitated cocoa farm.

Operational Risk

According to the occupational safety and environmental and health risk assessment policy of the public safety Act (Act 2006), operational risk involves the direct or indirect losses suffered by an organisation due to deficient or abortive internal processes, systems and people or from external environmental factors. This description is in line with several other opinions that the operational risk can be related to the likelihood of inverse effects on the rehabilitated cocoa farm performance due to inadequate internal processes, staff members' negligence, and inapt management information systems or undesirable and unpredictable external events (Hameed, 2006; Fayyaz, 2006; Saunders & Cornett, 2008; Kanchu & Kumar, 2013). The operational risk mostly emerges from the inside activities of production sector unlike some other forms of risks. However, a number of sources of operational risk come from the external environment such as competitive actions, natural disasters (such as drought, outbreak of diseases, floods) which are largely unpredictable and uncontrollable by banks (Crouhy, Galai and Mark, 2006; Fayyaz, 2006). The Ghana

cocoa industry takes efforts in order to reduce and control operational risk by: making investment in advanced technology (system's capacity building); initiating training and development programmes for employees (staff capacity building); and developing backup systems and contingency plans (Tahir, 2006; Hussain, 2006; Saunders and Cornett, 2008).

Legal and Regulatory Risk

This risk comes from the non-fulfilment of regulatory requirements by the cocoa industry. Bessis (2002) takes it as the risk of disputes emerging from the different laws at play in production institutions. This risk arises from negligence or violations of, or non-fulfilment of legal procedure, regulations, ethical standards and requirements in rehabilitating a cocoa farm for instance (Schroeck, 2002; Tahir, 2006; Fayyaz, 2006). For example, Sokolov (2007) explains that industries involved in land litigations can experience legal and regulatory risk with regard to ownership and usage of land issues. In case of failure to provide adequate privacy protection as per rules, industries may face financial losses in the form of payment of damages, fines, civil money penalties, and the termination of contracts. Furthermore, this risk has also the potential to create an adverse impact on the reputation which may lead to lower the business opportunities or reduce industry's growth and may generate liquidity issues within the sector (Crouhy, Galai and Mark, 2006; Sokolov, 2007).

Market Risk

This risk is indirectly connected to the change in assets value due to systematic factors. The market risk in the agricultural sector emerges from different sources including instruments and equipment or of interest rate or foreign exchange risk (Schroeck, 2002; Ishfag, 2006; Crouhy, Galai & Mark, 2006). For instance, this risk is associated with the unfavourable change in the market value of the trading

portfolio, caused by market movements, over the transaction's liquidation period (Bessis, 2002; Saunders and Cornett, 2008). The international market fluctuation influences the local cocoa prices which usually pose as a risk to farmers. This affects how the farmers rehabilitee their farms.

Foreign Exchange Risk

This risk arises due to an erratic transition in the foreign exchange rate resulting into a negative impact on the obligations of the COCOBOD (Tahir, 2006). Several factors such as inflation, political stability, public debt and market speculation may serve as driver to the down turn of the cocoa industry (Ishfaq, 2006). All the foreign exchange transactions with counter-parties located outside the home country contain this risk. Saunders and Cornett (2008) describe foreign exchange risk as the threat that variation in foreign exchange rate could have inverse effect on the value of assets or liabilities reported in foreign currencies. Similarly, Bessis (2002) defines foreign exchange risk as bearing losses due to unfavorable changes in the foreign exchange rates. These losses may come as a result of an imbalance between the market value of specific assets or liabilities in the local and foreign currency. The volatility in foreign exchange may disrupt the return of pricey on the overseas investments, and simultaneously involve the cocoa industry in a competitive disadvantage to its foreign competitors (Crouhy, Galai, & Mark, 2006). They further explain that the adverse foreign exchange volatility may also generate immense operation losses and lead to inhibit investment.

Commodity Price Risk

This risk arises due to negative change in the market value of commodities kept by businesses (Bessis, 2002). The fluctuation in the world cocoa market price with sometimes uncertainty leads to loss of capital or earnings. This risk is either

systematic or unsystematic in industry operations. The earlier is associated with the price volatility of portfolio's values due to change in the overall prices and the later refers to the sensitivity of portfolio's value based upon the industry specific characteristics (Jagoret, & Sinclair, 2021).

Reputation Risk

This risk is associated with the trusts and beliefs of customers and other stakeholders of the industry (Arby, 2006). According to Basel Committee (2009), reputation risk is the possibility of losses emerging from a negative perception on the side of investors, shareholders, customers, counterparties, market analysts, regulators and other concerned parties. This risk can have an unfavourable impact on industry's ability to develop new business affairs or to sustain existing businesses in order to maintain a continuous source of obtain funding (Ishfaq, 2006).

Political Risk

This risk is related to cross border transactions. Crouhy, Galai and Mark (2006), describe political risk as the risk that an obligor may not be able to fulfil its obligations owing to cross-border constraints on the availability or convertibility of an agreed currency. Political risk also refers to the risk of a crisis in a country due to political instability, an economic downturn or a fall in the value of the home foreign currency in terms of the country's base currency (Bessis, 2002). Lack of political will to execute or continue with projects can pose a risk to the cocoa industry.

Challenges of the Cocoa Rehabilitation Program

Challenges in different forms do occur in the supply chain of the production of cocoa in Ghana, including challenges related to production, challenges associated with the use and distribution of farm inputs and commercial risks (Ishfaq, 2006).

Production challenges associated to cocoa production in Ghana include aged workforce and aged cocoa trees, unsatisfactory land tenure policies in Ghana, pests and diseases logistics- related challenges (Tutu, 2011). Improper distribution of farm inputs (funds, pesticides, fertilizers, etc.) from Licensed buying companies to farmers or government; improper sorting of the cocoa beans; poor transportation; and poor handling, packaging and storage of the cocoa beans. Commercial risks associated to cocoa supply chain include cocoa price volatility, inadequate credit facilities, excessive power of COCOBOD, and high cost of financing (Jagoret, & Sinclair, 2021).

Environmental challenges such as floods, bush fires, 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, etc. (Aminu et. al., 2019)

Production Challenges Associated to Cocoa Production in Ghana

Aged Workforce and Aged Cocoa Trees

The old age of farmers, their farms and the cocoa trees has contributed significantly to the recent low yields in cocoa production Ghana is witnessing today (Laven, 2010). Generally, the productivity of cocoa trees declined after a period of 20 years. This can partly be attributed to the fact that cocoa production is labour intensive. Farmers perceive that the cost of maintaining old trees is lower than the cost of destroying old plants and replanting new ones. Also, the old age and lack of enough strength by most farmers makes them decline to do replanting.

Unsatisfactory Land Tenure Policies in Ghana

One other challenge that poses as a serious obstacle to the rehalitation of cocoa farms in Ghana is the land tenure policy. Most of the lands in the traditional areas are owned by chiefs while most of the farmers are either sharecropping farmers or immigrants (Laven, 2010). The policies around the possession and use of the land in most cases are unjust to the ordinary farmer who toils so much to produce the yield. Policies such as: 'abunan' or 'abusa', 'abunu' systems which represent a ratio of 4:1, 3:1, 2:1 respectively representing the ratio of share of yield between farmer (s) land owner respectively de-motivate the farmer who at most times feel cheated looking at their level of investment into the production.

Pests and Diseases

Basso et al. (2012) observed that cocoa plantations are susceptible to many kinds of pests and diseases, which destroy about 30-40% of the world cocoa production every year. Pests and diseases pose as one of the biggest challenges in the production of cocoa in Ghana. However, Kolavalli and Vigneri (2011) noted that, farmers may find it more economical to rehabilitate than replant old and diseased trees, because it takes twice as long to clear an old farm than to clear new forest lands (Kwaw-Nimeson & Tian 2019).

Logistics- Related Problems

Many LBCs find it difficult 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 (Gyamera, 2007; Kwaw-Nimeson & Tian 2019). Access to tractors to easily convey cocoa beans for drying on sheds pose serious challenges to many farmers. What makes it worse is the deplorable roads leading to farming communities, which compel farmers 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 (Kwaw-Nimeson & Tian 2019).

Problems Associated to the use and Distribution of Farm Inputs

Due to the fact that, many cocoa farmers in Ghana have little or no education, there are risks of use of farm inputs such as pesticides and fertilizers (Crouhy et. al., 2006). The number of agricultural extension officers is woefully inadequate, considering the number of cocoa farmers in the country. Thus, farmers are mostly grouped to receive training together at a predetermined venue. For lack of funds and the 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 or combine various pesticides which give different reactions to the crop thus negative effects on productivity (Kwaw-Nimeson & Tian 2019).

Also, distribution and use of quality farm inputs is very crucial to ensuring high cocoa production in the cocoa industry (Tutu, 2011). However, there are a lot of problems linked to the distribution of these inputs. For example, 932 tractors were imported by the Ministry of Food and Agriculture to boost productivity of the sector in 2008 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 (Mark, 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, 2015).

Commercial Risks Associated to Cocoa Supply Chain

Inadequate Credit Facilities

Lack of adequate credit facilities for cocoa farmers is another serious problem facing the cocoa industry. Small-scale cocoa farmers more especially find it difficult if not impossible obtain farm inputs for their farms. Some farmers who seek financial assistance from some purchasing clerks sometimes feel cheated as they try to dictate unfair terms and conditions to these farmers. This results in a very little profit being achieved at the end of the day and de-motivate other cocoa farmers to expand the size of their farms or rehabilitate their old farms for lack of funds (Laven, 2010).

Volatility or Cocoa Price

Volatility of cocoa price One major challenge associated with cocoa production in Ghana is the. 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 (Kwanashie et al., 1994). 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. This is reversed when international prices fall, as the margin between the sales price and the price paid to the farmer decreases. According to the World Bank Report in 2011, during crisis years, the margin sometimes even turn negative. International prices of cocoa rose steadily throughout the 2013/14 season, gaining 24% to reach US$ 3,313/MT at the end of September, 2014, however, by October 29th in the same year, the price dropped to

US$3,000/MT. Kwanashie et al. (1994), maintained that the degree of fluctuation in prices is a major concern to the cocoa industry and either farmers or LBCs COCOBOD end up being cheated.

High Cost of Financing

The fact that cost of borrowing is very expensive in Ghana purging interest rate stands at 29.00% (BOG, February, 2023), 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.

Excessive Power of COCOBOD

Some LBCs complain that COCOBOD exerts excessive power over them which affect their efficiency. Policies from CMC and QCD 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 no or little flexibility, some LBCs feel quite overstretched.

Benefits of Cocoa Rehabilitation Program

Cocoa rehabilitation program is a complex decision-making process that involves diagnosis, design of innovations, and the formulation and implementation of an action plan. The benefits that can be derived from adopting risk management during cocoa rehabilitation have been explored before, both within the context of developed and developing countries (Enshassi et al., 2009; Aje et al., 2009). For example, a study conducted by Aje et al. (2009) established that, farmer's management capability to have a significant impact on cost and time performance of undertaking a program. Similarly, Ahmed et al. (2007) identified retention of organisational knowledge and provision of a completive advantage among the

benefits of usage of risk assessment principles during rehabilitation. Mills (2001) also observed that systematic risk management helps the quantification of uncertainty during rehabilitation. In Mok et al. (1997) study on the perception of benefits of using risk management in rehabilitation program, the majority of the respondents observed that among the main benefits, it provided a useful insight into the program. Thuyet et al. (2007) identified inefficient and poor performance of farmers as one of the significant risks affecting the cocoa industry. The continuous changes and interference during the rehabilitation stage is a factor that undermines performance of cocoa. Hence rehabilitation programmes are sine-gua-non to the growth and development of the cocoa industry.

Theoretical Review

The Stakeholder Theory

The stakeholder theory (Freeman, 1984) focuses clearly on the symmetry of stakeholders' interests as the foremost determinant of the corporate policy. The most important contribution towards the rehabilitation process is an addition of implicit contracts theory from employment to other contracts (Klimczak, 2007). In certain businesses, such as high-tech industries, customer confidence on firms is very important to carry on offering their services in the future and can considerably contribute to firms' values. On the other hand, the value of such implied claims is extremely sensitive to estimated costs of bankruptcy and financial distress. Since the rehabilitation process in a firm induce a reduction in these estimated costs, its value increases (Klimczak, 2007).

Hence, the above discussion implies that the rehabilitation can be witnessed in the cocoa industry: to fulfill the regularity requirements; to align the interests of managers with their shareholders interest; to reduce expected tax payments of the

shareholders; to lower the probability of financial distress, business failures or bankruptcy; to safeguard specific investments of the organization; to help the cocoa industry in developing financial plans and investment activities; and to maximize the shareholders' value of the industry. In addition, it is also obvious from the aforementioned propositions that rehabilitation is also useful within the cocoa industry to control different kinds of risks and to mitigate the possible negative effects of these exposures. However, Hudin and Hamid (2014) suggest that the adoption of a single theory is not sufficient to explain the rational of impact assessment. Therefore, this study also takes two theoretical considerations such as agency theory and institutional theory to do impact assessment of the rehabilitation in Ghana's cocoa industry.

The Agency Theory

This theory has been used by various scholars in their studies to provide theoretical base to assess the impact of phenomena especially in risk management (Smith & Stulz, 1985; Tufano, 1998; Fatemi & Luft, 2002). This theory helps to examine a social phenomenon from a principal-agent (investor-manager) perspective. Jensen and Meckling (1976), described this agency relationship as: A contract under which one or more persons (the principals)) engage another person (the agent) to perform some service on their behalf which involves delegating some decision-making authority to the agent. (Jensen & Meckling, 1976:308).

This agency theory has two fundamental assumptions (Jensen & Meckling 1976). First, the principal as well as the agent pursue to maximize their own interest. Second, the interest of the agent may differ from the interest of the principle and the agent is not likely to perform in the best interest of the principal. Hence, a conflict of interests may emerge between principal and agent.

Smith and Stulz (1985), have applied agency issues in corporate risk management and indicate that, the managers (agents) attitudes toward risk taking and hedging is very crucial. Afterwards, Fite and Pfleiderer (1995) have also applied agency theory and describe the significance of hedging policies on firm value. Tufano (1998) has also made an argument for risk management based on agency theory. He argues that managers go for hedging as much as they can without considering the interest of their shareholders. The rationale behind such conduct is the difference between the levels of risk aversion of shareholders and managers. The level of managerial risk aversion is generally more advanced than the risk aversion level of the shareholders as managers has more exposure to the market threats (Tufano, 1998). However, the proponents of agency theory consider that wealth of shareholders transfers to managers because of much extensive hedging and oppose such risk management practices (Fatemi & Luft, 2002). Tufano (1998) states that the risk management in organisations somewhat enhances agency problems and costs between its shareholders and managers. The relevance of this this theory to the current study is that cocoa farmers are the principals here and their farm managers or COCOBOD are the agents. When the agents act in the interest of the principals, the impact of cocoa rehabilitation will be positive for both parties.

The Institutional Theory

Institutionalization refers to, "the process through which components of formal structure become widely accepted, as both appropriate and necessary, and serve to legitimate organisations" (Tolbert & Zucker, 1983:25). A number of branches are involved in institutional theory (Collier & Woods, 2011). However, several literatures (Meyer & Rowan 1977; DiMaggio & Powell, 1983; Tolbert & Zucker, 1983; Powell and DiMaggio, 1991; Scott, 1995; Collier & Woods, 2011; Hudin and

Hamid, 2014) are more related to the business and organizational studies. Institutional theory focuses on the rules and regulations which are forced on organizations by the outsiders, particularly by the government regulatory bodies; and all the norms and values which are incorporated in roles by means of a part of socialization processes or procedures (Meyer & Rowan 1977; DiMaggio & Powell 1983; Powell & DiMaggio 1991; Scott 1995).

Several studies use the institutional theory in explaining the phenomenon of risk management implementation (Collier & Woods, 2011; Hudin & Hamid, 2014). It is proposed that institutionalization prevails when the risk management activities in organizations becomes highly homogeneous. This homogeneity can be attained via the coercive isomorphic mechanism by which legitimacy, political, or regulatory pressures are exercised on firms in the forms of invitation, direction, persuasion (DiMaggio & Powell, 1983; Powell & DiMaggio 1991; Scott 1995; Hudin & Hamid, 2014). For example, in the Ghanaian context, all the cocoa industry has been directed by the COCOABOD to develop an active framework for risk management, rehabilitation processes. Considering the homogeneity assumption of institutional theory, the fundamental principles relating to cocoa rehabilitation are applied by every aspect of the industry irrespective of their roles and complexities. For that reason, the current theory provides an important insight into promising rationale for rehabilitation in the cocoa industry.

Conceptual Framework

Conceptual framework is defined as the extent to which researchers conceptualize the relationship between the research variables and indicate the relationship diagrammatically or graphically (Kaplan & Norton, 2007). The relationship in the conceptual framework describes the existing relationship between

the independent variables and dependent variable(s). This study assesses the impact of cocoa rehabilitation on cocoa farmers in the Offinso District in the Ashanti Region of Ghana. Cocoa rehabilitation practices is taken as the independent variable and impact on cocoa farmers taken as dependent variable as shown in figure 1 below.

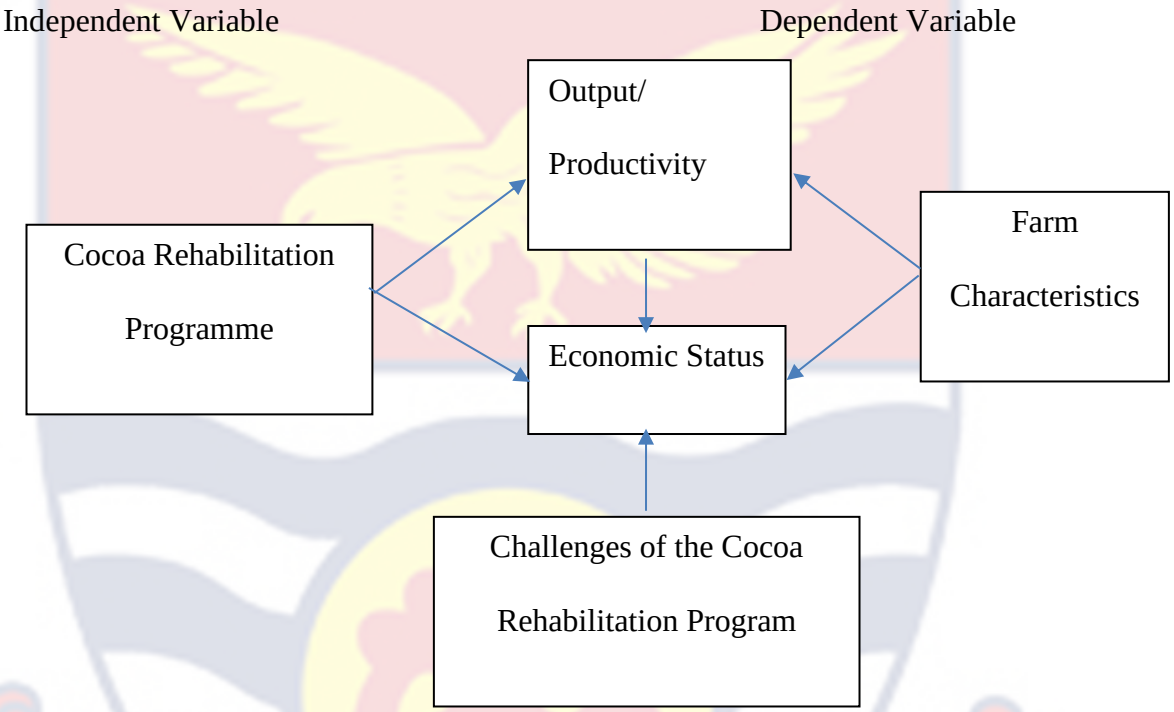

Figure 1 Conceptual Framework

Source: Author's Own Construction, 2023

Cocoa Rehabilitation Programme

Rehabilitation (Rh) of a cocoa program (either a shaded agroforestry system or a no-shade monocrop) is a complex decision-making process that involves diagnosis, design of innovations, and the formulation and implementation of an action plan. Cocoa agronomists have developed protocols and techniques to help decide on how and when to Rehabilitate a cocoa farm. Most of these methods are based on the assessment of whether three key variables have passed critical threshold levels: (1) age of cacao (e.g. more than 40 years), (2) yields (e.g. less than 500 kg ha−1 year−1),

and (3) planting density (e.g. less than 800 plants ha−1). Others also consider shade levels, the height of the cocoa tree, and pest and disease status when deciding on Rh interventions (Quiroz & Amores, 2002). Critical levels for each variable are context and site specific and must be determined for each locality. For example, in the case of small Ghanaian producers, an unproductive tree is the one whose yield is 30% of the average highest yield of an adult cocoa plant, i.e. about 125 kg ha−1 year−1 (Olaiya et al. 2006). The main limitation of these protocols is that only the age–yield–density relationships of cocoa are taken into consideration in the Rh decision-making and implementation process, disregarding the contributions and influence that the production of other agroforestry products from the same program (Cerda et al. 2014) have on Rh diagnosis, design and implementation.

Cocoa agronomists and farmers have at their disposal an extensive list of programmes for rehabilitation and renovation (Lass, 1985). This list includes early intercropping, shade regulation, stumping, replanting, complete replanting of the orchard, replanting in stages, selective replanting of trees, reconstructing cocoa tree crowns using basal suckers, planting new cacao under old cacao used as temporary shade, with or without grafting them, propagating elite trees, various types of pruning and pollarding to regulate cocoa crown's shape and size, etc. (Asare & David, 2010; Ogunniyi & Osuolale 2015; Akinnagbe, 2017). Several authors have provided lists of the different models for rehabilitation and renovation, and their variants, in different cocoa-growing regions (Quiroz & Amores 2002; Assiri et al. 2003; Ogunniyi & Osuolale 2015; Olaiya et al. 2006).

Rehabilitation program include (1) complete removal of the crown by pollarding to remove diseased tissue or to reduce tree height (Quiroz and Amores 2002; Olaiya et al. 2006); (2) restocking the orchard by direct seeding, planting

nursery seedlings, rooted stakes or grafted plants at empty planting sites (Asare et al., 2018); (3) stumping combined with top or patch grafting (with a new cocoa genotype) on the regenerated suckers; and (4) stumping and sucker selection to regenerate the crown of the cocoa tree (Akinnagbe 2017; Riedel et al. 2019). In Western Region, the rehabilitation practices adopted by farmers are largely responsible for the presence of very old cocoa agroforestry systems that continue to be exploited today. The continuous replacement of dead cocoa trees and the cutting back of senescent cocoa trees rejuvenate the cocoa stand (Jagoret et al. 2018). Farmers' management of shade trees is in continuous evolution, in terms of both species composition and density. Species selection is based on minimizing competition and promoting complementarity between cocoa trees and associated tree species. The rehabilitation of a commercial, clonal, open-sun cocoa plantation using agroforestry and soil amendments has been documented by Vanhove et al. (2016).

Cocoa Farm Characteristics

Five main characteristics underlines cocoa farmers into Rh/Re. First is the need for the productive capacity a cocoa orchard that is still productive to be restored after a period of abandonment that may be due to difficulties in the transmission of hereditary rights over the orchard (Jagoret et al. 2018), social–political causes (Assiri et al. 2003; Ofori-Bah and Asafu-Adjaye 2011), and the invasion of diseases and pests and the prolonged falling of cacao prices (Dzahini Obiatey et al. 2006).

Second is the fall in cocoa yields due to the combined effect of increased incidence of diseases and pests, the reduction in cocoa population density, and plant ageing (Adebiyi and Okunla 2013; Mahrizal et al. 2014; Akinnagbe 2015; Wessel and Quist-Wessel 2015). Third is social processes linked to availability of labour and migration. For instance, in Ghana, when the sons and daughters emigrate, their

parents turn to sharecropping their land with young immigrants who have interest in rapid and high returns and usually choose to rehabilitate the traditional, old cocoa orchards and replace it with hybrid cocoa, using agrochemicals and in full sun in order to increase output and productivity (Ruf, 2011). Fourth is farmers' expectations of access to incentives and good cocoa prices for a sufficient length of time (Akinnagbe 2015) that prompt them to replace their low-yielding, old orchard with a high-yielding, new one (Akinnagbe, 2017). Fifth is subsidies and incentives such as operational, financial and technical support among other incentives (Wessel and Quist-Wessel 2015; Aneani et al. 2017; Asare et al. 2018).

Dalberg (2015) and Akinnagbe (2015) maintained that rehabilitation or renovation of a cocoa orchard is a costly and risky task. This may the reason why farmers usually feel reluctant to engage in Rh/Re (Aneani & Padi 2016). The reasons why farmers' may not rehabilitate or renovate their farms include but not limited to the following: the understanding of what constitute 'acceptable yields' differ among agronomists and farmers (Danquah 2003). For instance, a 30–35 years old cocoa farm which production cost involved is basically the cost of harvesting, and as long as the yield covers this minimum cost and generates some surplus may be considered productive by a farmer and he will not see the need to rehabilitate such a farm (Olaiya et al. 2006). Farmers also believe that extension agents do not understand their cocoa farming and household realities (Andres et al. 2017); Farmers also value the cultural, personal or family factors over the value of economic losses from cocoa. For example, typical cocoa farmers in Ghana will find it difficult to clear an old cocoa farm started by their grandfather many years ago, even if it does not produce any cocoa and this may affect their productivity and the economic status of the farmer; Akinnagbe (2015) found lack of trust for a new technology, especially under a

changing climate, in terms of its efficacy; The high investments usually made in the rehabilitation of the old farms or the establishment and management of a new one (Asare et al. 2018); and the fact that, there are significant losses of earnings for several years before the new farms start production (Riedel et al. 2019). Most often, farmers feel reluctant to Rh/Re due to subsidies and incentives (Adebiyi & Okunla 2013; Ogunniyi & Osuolale 2015).

Effect of Rehabilitation Program on Output/Productivity and Cocoa Farmers Economic Status

Cocoa rehabilitation program as a complex decision-making process involves diagnosis, design of innovations, and the formulation and implementation of an action plan. The effects of adopting risk management during cocoa rehabilitation have been explored before, both within the context of developed and developing countries (Enshassi et al., 2009; Aje et al., 2009). For example, a study conducted by Aje et al. (2009) established that, farmer's management capability to have a significant impact on cost and time performance of undertaking a program. Similarly, Ahmed et al. (2007) identified retention of organisational knowledge and provision of a completive advantage among the benefits of usage of risk assessment principles during rehabilitation. Mills (2001) also observed that systematic risk management helps in the quantification of uncertainty during rehabilitation. In Mok et al. (1997) study on the perception of benefits of using risk management in rehabilitation program, the majority of the respondents observed that among the main benefits, it provided a useful insight into the program. Thuyet et al. (2007) identified inefficient and poor performance of farmers as one of the significant risks affecting the cocoa industry. The continuous changes and interference during the rehabilitation stage is a factor that undermines performance of cocoa farmers thus low output and productivity. Hence

rehabilitation programmes are sine-gua-non to the economic growth and development of cocoa farmers.

Challenges with the Cocoa Rehabilitation Programme

Challenges in different forms do occur during a rehabilitation program of cocoa in Ghana, including challenges related to production, challenges associated with the use and distribution of farm inputs and commercial risks. Production challenges associated to cocoa production in Ghana include aged workforce and aged cocoa trees, unsatisfactory land tenure policies in Ghana, pests and diseases logistics-related challenges. For instance, the old age of farmers, their farms and the cocoa trees has contributed significantly to the recent low yields in cocoa production Ghana is witnessing today (Laven, 2010). Generally, the productivity of cocoa trees declined after a period of 20 years. This can partly be attributed to the fact that cocoa production is labour intensive. Farmers perceive that the cost of maintaining old trees is lower than the cost of destroying old plants and replanting new ones. Also, the old age and lack of enough strength by most farmers makes them decline to do replanting. Again, many LBCs find it difficult 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 (Gyamera, 2007; Kwaw-Nimeson & Tian 2019). Access to tractors to easily convey cocoa beans for drying on sheds pose serious challenges to many farmers. What makes it worse is the deplorable roads leading to farming communitie, which compel farmers 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 (Kwaw-Nimeson & Tian 2019).

Also, improper distribution of farm inputs (funds, pesticides, fertilizers, etc.) from Licensed buying companies to farmers or government; improper sorting of the cocoa beans; poor transportation; and poor handling, packaging and storage of the cocoa beans. Commercial risks associated to cocoa supply chain include cocoa price volatility, inadequate credit facilities, excessive power of COCOBOD, and high cost of financing. Due to the fact that, many cocoa farmers in Ghana have little or no education, there are risks of use of farm inputs such as pesticides and fertilizers. The number of agricultural extension officers are woefully inadequate, considering the number of cocoa farmers in the country. Thus, farmers are mostly grouped to receive training together at a predetermined venue. For lack of funds and the 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 or combine various pesticides which give different reactions to the crop thus negative effects on productivity. The distribution and use of quality farm inputs is very crucial to ensuring high cocoa production in the cocoa industry. However, there are a lot of problems linked to the distribution of these inputs. Similarly, farmers blamed COCOBOD's officials for a massive corruption in the distribution of fertilizers as farmers are rather normally forced to pay for them whilst others had to show political party cards in order to benefit (Mark, 2015).

Environmental challenges such as floods, bush fires, 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, etc.

Lack of adequate credit facilities for cocoa farmers is another serious problem facing the cocoa industry. Small-scale cocoa farmers more especially find it difficult

if not impossible obtain farm inputs for their farms. Some farmers who seek financial assistance from some purchasing clerks sometimes feel cheated as they try to dictate unfair terms and conditions to these farmers. This results in a very little profit being achieved at the end of the day and de-motivate other cocoa farmers to expand the size of their farms or rehabilitate their old farms for lack of funds (Laven, 2010).

The above challenges among others may make it difficult for farmers to rehabilitate their farms even if the spirit is there.

Empirical Evidence

Characteristics of Cocoa Farms

Fosu-Mensah, Okoffo and Mensah (2022), assessed the types of pesticides used by cocoa farmers in Ghana, sources and knowledge on application rate, frequency of application and factors that could influence farmers' choice of source of pesticides, knowledge on application rate, and frequency of application. Two hundred and forty cocoa farmers from the Dormaa West District of Ghana were interviewed from December 2014 to February 2015 using a pre-tested questionnaire. The results showed that farmers sourced pesticides from agrochemical shops and fellow farmers, with some benefiting from the government of Ghana's ''free mass cocoa spraying'' program. A majority (51.2%) of the farmers sprayed more than three times per cocoa season. In addition, 35% of the farmers dangerously mixed two or more different pesticides together when spraying. Gender, age, educational level, and income from cocoa farming significantly influenced the choice of source of pesticide while knowledge on pesticides application rate was significantly influenced by educational level of farmers, access to extension services, presence of agrochemical shop, membership of a farm-based organization, and age of a farmer. Frequency of pesticides application was significantly influenced by educational level of farmers,

access to extension services, presence of agrochemical shop, membership of the farmer-based organization, knowledge of Ghana COCOBOD recommendation on pesticides application rate, income from cocoa farming, and age of farmers. The study recommended training of farmers on the safe use of pesticides by the Ghana COCOBOD to effectively manage pests and diseases and reduce environmental pollution.

Oyekale (2020) assessed farmers' perception of climate change, their adaptation methods and the factors explaining involvement in the renovation/rehabilitation of old cocoa farms. The data were collected from 378 cocoa farmers in Ahafo Ano North District in the Ashanti region. The data were analysed with Principal Component Analysis (PCA), Ordinary Least Square regression, Negative Binomial regression and Two-stage Probit regression. The results showed that the majority of the farmers were older than 50 years and attained primary education. High temperature (64.29%), too stormy rainfall (64.29%) and too much rainfall (61.90%) were largely perceived by cocoa farmers in 2015. The farmers were adapting to climate change through diversification into other crops (70.63%), planting of hybrid varieties (71.69%), commitment to spray cocoa pods regularly (74.87%) and initiation of some changes in the planting and harvesting times (71.96%). The adaptation was significantly influenced ($p < 0.05$) by cocoa farming experience, number of children under the age of 5 years, perception of extremely high temperature, perception too low rainfall, perception of delay in commencement of rainfall, cultivation of cocoa as the primary crop, perception of delay in rainfall stop and delay in regular farm clearing and rented farm. Cocoa rehabilitation decision was influenced by climate change adaptation indicator, monthly income, perception of extreme temperature and sharecropping.

Ali, Awuni and Danso-Abbeam (2018) examined fertilizer adoption decisions using data collected from 226 smallholder cocoa farm households in the Western region of Ghana. The Heckman's two-stage model was employed to estimate the probability and the extent of fertilizer application in the Ghanaian cocoa farms. The result of the study found that the likelihood of fertilizer adoption was influenced by factors such as the value of productive farm assets, family and hired labour, farm size, extension contacts, and farmers' engagement in off-farm economic activities. On the other hand, factors like family labour, household size, farm size, marital status, support received from Non-Governmental Organizations (NGOs), and number of years working as a cocoa farmer (experience) significantly influence the extent of fertilizer adoption. Hence, improving extension services to farmers and encouraging the ownership of farm assets could be useful for fertilizer adoption.

Abdulai et al. (2018) characterized current cocoa production, income diversification and shade tree management along a climate gradient within the cocoa belt of Ghana. The objectives were to 1) compare existing production and income diversification between dry, mid and wet climatic regions, and 2) identify shade trees in cocoa agroforestry systems and their distribution along the climatic gradient. The results of their study showed that current mean cocoa yield level of 288kg $ha^{-1}yr^{-1}$ in the dry region was significantly lower than in the mid and wet regions with mean yields of 712 and 849 kg ha^{-1} yr^{-1}, respectively. It was also revealed that, in the dry region, farmers diversified their income sources with non-cocoa crops and off-farm activities while farmers at the mid and wet regions mainly depended on cocoa (over 80% of annual income). Two shade systems classified as medium and low shade cocoa agroforestry systems were identified across the studied regions. The medium shade system was more abundant in the dry region and associated to adaptation to

marginal climatic conditions while the low shade system showed significantly higher yield in the wet region but no difference was observed between the mid and dry regions.

Aneani and Padi (2017) did a baseline survey to obtain the perception of farmers in target communities on the possibility of re-introduction of cocoa in denuded and marginal areas which were previously cropped to cocoa, but now food crops; determine farmers‟ interest in planting new cocoa varieties; and determine farmer behavior in the use of technologies of cocoa farm establishment and maintenance. The survey was conducted in the period starting from 10th December, 2013 to 5th July, 2014 at Asesewa (Konkoney) in the Eastern Region, Akomadan and Afrancho in the Ashanti Region, as well as Kenyasi (Atwidie), Bechem (Breme) and Acherensua (Kokontreso) in Brong-Ahafo Region. The project sites and 192 respondents were purposively sampled. A standard questionnaire was employed to interview the respondents. Data analysis indicated that 40.0% of the respondents would want their farms to be rehabilitated whereas 60.0% indicated they would not. Also, 98.4% of them reported a higher possibility of re-introduction of cocoa in the denuded and marginal areas whilst 1.6% indicated that it was impossible. Additionally, 79.6% of the respondents expressed interest in testing any new cocoa varieties on their farms as part of the project while 20.4% were disinterested. In conclusion, the survey has indicated that re-introduction of cocoa in marginal and denuded area is highly probable.

Taiwo, Ogunlade, Ayegboyin, Famaye, Adeniyi, Oyedokun, Adeosun & Adejobi (2015) in their study reported on the factors affecting the practice of cocoa rehabilitation in Nigeria. Questionnaire was the main tool for primary data collection. The results of the study indicated that, most of the farmers are aged with less than 1

ha of cocoa farm land. Also, majority of the cocoa farmers were aware of cocoa rehabilitation techniques and coppicing form of rehabilitation was widely practiced. Level of education (5% level of significance), farm size and farmers experience (1% level of significance) were found to be the determinants for rehabilitation practice among the farmers, which were all positively correlated to rehabilitation program.

Effects of the Cocoa Rehabilitation Programme on Level of Output and Productivity of Cocoa Production

Kwaw-Nimeson and Tian (2019) employed the co-integration approach to measure the impact of the factors that influenced cocoa export performance in Ghana after the cocoa rehabilitation project was introduced into the cocoa sector from 1988 to 1993. They analyzed the relevant time series data from 1988 to 2018. The results of the analyses showed that all the variables used in the study do not substantially influence cocoa exports in the long run.

Ansah, Ofori and Siaw (2018) in their article assessed the major quality control practices instituted in ensuring quality cocoa in the domestic cocoa market. Both qualitative and quantitative methods were employed to analyse responses obtained from a sample size of ninety-five (N=95) involving 10 District Managers (DM's) and 85 Purchasing Clerks (PC's) of Cocoa Merchant Ghana Limited (CML). The study maintained that, major quality control practices (QCP's) such as constant education and training of farmers on proper fermentation and all along the supply chain, efficient packaging, storage and haulage of goods in transit, drying, picking of placenta and foreign matter were instituted. Also, CML ensures that DMs encourage PCs to present good quality cocoa beans for grading and sealing to the QCC as well as provision of good storage facilities; pallets, tarpaulins etc. to farmers. CML concentrates much effort to ensuring physical quality to the neglect of biochemical

and process quality. This implies that efforts be marshalled to encapsulate the other cocoa quality types.

Eghan, Awuah and Santo (2017) in their study, assessed the yield performance of rehabilitated cocoa farms in the Assin North municipality. The study adopted a descriptive survey in which data was obtained with questionnaires and administered by interviewers. A total of 115 farmers were purposively drawn from 5 communities in the district. The study found that the rehabilitated cocoa farms (RCFs) were planted with hybrid varieties and starts yielding in the 3rd year. Recorded average yield of 533kg/ha in the 4th year and 742kg/ha in the 5th year are 33% and 85% higher than the national average of 400kg/ha. Productivity was positively correlated with age of trees and tree survival rate but negatively correlated to farm size. Farmers described growth rate, general appearing (vigour), pest and disease resistance, and yield to be significantly better than the old crop.

Effects of the Cocoa Rehabilitation Programme on Economic Status of Cocoa Farmers

Peprah (2015) examined the sustainability of cocoa farmer livelihood. Emphasis was laid on investigating the factors that increase or derail the sustainability of cocoa farmer livelihood. Quantitative and qualitative data were sourced from relevant state institutions and 264 farmers drawn from 774. The study results indicated that cocoa farmer livelihood provides larger secondary livelihoods for labour-sellers, petty traders and staff of cocoa marketing companies. The study further revealed that cocoa farmer livelihood was facing threats from the newly oil found, service and industry and that the initial capital assets invested in cocoa farming were poor. One can therefore conclude that farmers are made vulnerable by land

degradation, corruption in the internal cocoa marketing and inflation, thus eroding their capital assets and savings (incomes)

Internal and External Challenges of Cocoa Rehabilitation Programme

Manikin-Gabion (2019) investigated the challenges of cocoa purchasing process on the income and livelihood of district marketing officers and purchasing clerks. The study specifically investigated the challenges of purchasing clerks and marketing officers and how these challenges affect their livelihood. The study employed the qualitative case study method. The study identified challenges of low quality of cocoa beans purchased from farmers and purchasing clerks and marketing officers to include inadequate logistics. The study also identified additional challenges in the cocoa sector which undermine the roles of purchasing clerks and marketing officers and affect their livelihood to include low margin payment to LBCs by COCOBOD and poor storage facilities to keep cocoa beans. It therefore can be said that the government should increase the level of margins paid to LBCs. Also, social programs should be organized for smallholder cocoa farmers to educate them on right practices of cultivation and storage of cocoa beans.

Awuah- Gyawu, Brako and Adzimah (2015), assessed the challenges facing cocoa production in Ghana in selected licensed cocoa buying companies in Ashanti Region- Ghana. Their research aimed at identifying the challenges from the perspective of farmers, staff and management of some selected Licensed Buying Companies and COCOBOD. The effects of the challenges were also assessed accordingly. After the study, the researchers identified the following challenges: unfamiliarity of modern methods of farming, late distribution of farm inputs by government, land degradation by 'galamsey' operators, etc. The researchers

recommended a greater collaboration of all partners of cocoa production in order to meet all challenges confronting the sector.

CHAPTER THREE

RESEARCH METHODOLOGY

Introduction

This chapter presents the methodology that will be used for the study. It presents the tools that that will be used to describe and analyze data collected for the purpose of this research. It will also specifically explain the research design, the population of the study, sample size, sample techniques and sampling procedures, data collection instrument, sources of data collection, the methods for data analysis as well the validity and reliability of data collected and the ethical considerations.

Study Area Profile

The Offinso Municipal District is one of the forty-three districts in the Ashanti Region of Ghana. It was originally created as an ordinary district assembly in 1988 when it was known as Offinso District, which it was created from the former Offinso District Counsil, until the northern part of the district was later split off to create Offinso North District on 29 February, 2008, while the remaining part was elevated to municipal district assembly status on the same year to become Offinso Municipal District. The municipality is located in the northern part of the Ashanti Region and has Offinso as its capital town.

Research Design

A research design is the complete strategy which the researcher implements by formulating answers to the research questions to ascertain and explain both the objectives and aims of the study. This must remain logical, comprehensive, and attainable as well as maintain the capability to define the research aim through a manner that does not cause any form of misunderstanding.

In this research, the descriptive research design will be adopted. The study will also adopt quantitative approach. The basic aim of gathering data is to create an accurate definition of vital findings that relate to a national population at any specific point in time, which is fundamental to descriptive research, which help provide accounts of a set topic in an accurate and descriptive manner.

Moreover, descriptive approach is specifically relevant to the present research, as an accurate and authentic description is fundamentally required in the impact assessment of rehabilitated farms on the cocoa farmers in the Offinso District of the Ashanti Region of Ghana. In all, the descriptive research characteristics have been characterised by a variety of different notions (Cresswell, 2003). Firstly, they are invariably limited to acquiring facts without attempting to explain the reasons why reality is presented in a certain manner. Secondly, descriptive research differs from prescriptive research as through description it becomes objective in nature. Finally, the explanations are conducted by the reader or in relation to other disciplines through descriptive research that provides standard inventories as its most central point. Therefore, overall data is seldom objective in its entirety through analysis and interpretation, as human beings are prone to involuntarily instill bias within the research concepts that they work upon, even though they are guided by descriptive intentions.

Population of the Study

A population is a group of persons, individuals, units, or objects from which samples can be drawn for measurement (Saunders et al., 2009). The population under study is usually termed as the target population (Mann, 1995). The target population for this study will consists of only the cocoa farmers as the research has been structured to do impact assessment of rehabilitated farms on the cocoa farmers. That

is, 1300 male and female cocoa farmers will be identified as the population for the study. Questionnaires will be administered to this category of people.

Sample Size Determination

In determining sample size, there are two approaches, which include the non-probability and probability approach. In determining the sample for the study, a number of factors will be considered, type of analysis of the data, the study objectives. The study, however, will employ probability sampling technique to determine the sample size with the deployment of the Miller and Brewer (2003), and Saunders et al. (2007) to avoid bias. Thus:

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

Where:

N = Population, α = level of significance or margin of error, n = required sample size, 1= constant. In order to have a fair representative sample size, the sample size is determined at a 90% confidence level (at a 0.1 significance level). For the farmer population of 1300 target farmers, the sample is calculated below.

$$n = \frac{1300}{1+1300(0.1)^2}$$

$$n = 216.66 \approx 217$$

Sample Techniques and Sampling Procedure

For the purpose of this study, a simple random technique was used to select the cocoa farmers. Simple random sampling technique allows for every prospective respondent to stand the chance of being included in the study. Thus, 217 farmers were selected randomly based on their availability and willingness to take part in the

study. Only the perception of key implementers of the cocoa rehabilitation program, farmers were sought for the purpose of this study.

Data Collection Instruments

The researcher will use closed ended questionnaire to collect primary data. The questionnaire will have items aimed at answering the study questions and objectives. The choice of this tool for data collection is guided by the time available and the objectives of the study. The questionnaire will be handed over to the respondents by the researcher after explaining to them individually the purpose of the study. The researcher will use research assistants to distribute by hand the questionnaires to be completed by the selected respondents. It is assumed that the respondents will complete the questionnaires honestly by themselves but the researcher will give assistance in interpreting the questions whenever a respondent require such assistance.

Upon completion of the questionnaire by the respondents, the research assistants will collect them and ensure that they are fully completed and returned back.

Sources of Data

In order to obtain sufficient data for the current study, two main sources have been used in the process of data collection, which are noted as primary and secondary sources:

Primary Sources

The primary sources of data will be obtained through questionnaire. The present study uses a questionnaire as the principle tool for primary data, which also incorporates a design to the specific objectives of the study and an in-depth

description that provides an explanation and justification for the contents of both tools, as well as to provide additional descriptions in relation to the sources. A 'face to face' discussion and the administration of questionnaires coupled with a 'face to face' will afford the researcher the opportunity to easily compare and contrast all the responses of the respondents. Again, all the questions will be of the closed ended type which will allow respondents to choose one response out of several as a result of the low literacy levels of most of the respondents. The questionnaire will consists of both categorical and scale-type question items. Likert scale question type will help the researcher in gathering and measuring the perceptions of the respondents.

Secondary Sources

The secondary sources of data will be gotten from published and unpublished journals and articles, the internet and books. Scientific books, previous studies, and research that have been published in scientific journals and periodicals aid a researcher in the process of an investigation, which relate to secondary sources, and define the concepts that are addressed throughout the research. The overall work within the current study has been designed through theoretical aspects that have been enabled by new constructs that have been obtained from secondary sources in order to define a clearer detailed background, and to stipulate specific implemented measurements in the process of primary data collection.

Pre-Testing of Questionnaire

The questionnaire will be pre-tested using a selected group of respondents from the target population to ensure validity and reliability of the responses to the questions. In this case, 10 questionnaire will be selected for piloting. This is to ensure that the instruments measure what the study intends to measure before taking it to the field. The piloted results will then be analysed to check its validity and realiability

Data Analysis

The data will be analyzed, after computer entry and processing, with Statistical Package for Social Science software (SPSS, Version 19) using quantitative analytical techniques such as percentages, frequencies, cross-tabulations, etc.

All data will be coded and analysis will be done using descriptive statistics where Microsoft Excel and Statistical Package for Social Sciences (SPSS) will be used to measure the mean and standard deviations of perceptions obtained from respondents. The T-test will be used to measure relationship between the impact of cocoa rehabilitation on male cocoa farmers and that of female cocoa farmers.

The data will presented in tables to help simplify analysis, and the analysis will mainly done using descriptive analysis where issues of similarity and dissimilarities of responses will be compared. The descriptive statistical tools will enable the researcher to have a good quantitative comparative analysis of responses. The number of respondents to a question will be represented by 'N' whilst 's.d' was used to represent standard deviation.

Validity and Reliability of the Study

Validity and reliability are essential in measuring the instrument of every study. It guarantees the variables that is been measured adequately and of standard. To ensure the validity of the questionnaire, the designed questionnaire will be given to the supervisor for assessment. The remarks and recommendations of the supervisor will be accurately noted and immediately effected to ensure that it represent the true meaning of what the study intends to measure. Pretest of the instrument will also be conducted to identify gaps in the content and standard of the questionnaire. The pretest will identify some errors in interpretation of the questions by the participant

and measures will be taken to address it for better data collection and reliability of same.

Ethical Considerations

The researcher will take into consideration good ethical principles before undertaking this study. Brynard, et al. (1997) maintained that, researchers should at all times and under all circumstances report the truth and should never present the truth in a biased manner. Participants will be informed about the purpose of the research and be assured that their views will remain anonymous. This strategy will help in ensuring that people open and be honest with their comments, without fear or favour. Maila (2006) indicates that interested parties often claim access to information obtained during the research. He argues that regardless of how much such requests are intended, it would be unethical to disclose such information to them. The selected methods and techniques will be correctly applied and the resulting data analysis presented in a logical manner.

CHAPTER FOUR

RESULTS AND DISCUSSION

Introduction

The study examines the impact of cocoa rehabilitation programme on the productivity and economic status of cocoa farmers of Offinso District in the Ashanti Region of Ghana. The chapter present the personal information of respondents such as sex, age, marital status, educational level, and number of years engaged in the institution. It also presents results on the characteristics of cocoa farms in the Offinso District of the Ashanti Region of Ghana. It presents the results on the effects of the cocoa rehabilitation programme on level of output and productivity of cocoa production in the Offinso District of the Ashanti Region of Ghana. It also presents results on the effects of the cocoa rehabilitation programme on economic status of cocoa farmers in the Offinso District of the Ashanti Region of Ghana. It further presents the results on the internal and external challenges of cocoa rehabilitation programme in the Offinso District of the Ashanti Region of Ghana.

Background Information of Respondents

This section of the report looked at the various characteristics of the participant who took part in the study. It further gives detailed as to the portion of the respondents with setting percentage as against the other respondents. These characteristics are gender, age, and educational level of the respondents.

Gender of Respondent

The analysis of the study results shows that, majority of the respondents were males and that represented 60.10 percent and the rest representing 39.90 percent were females. This mean that female representation in the cocoa rehabilitation program is less as compared to their male counterparts, which is not reflective of the total

population of the country in terms of proportion of females as shown in figure 2 below.

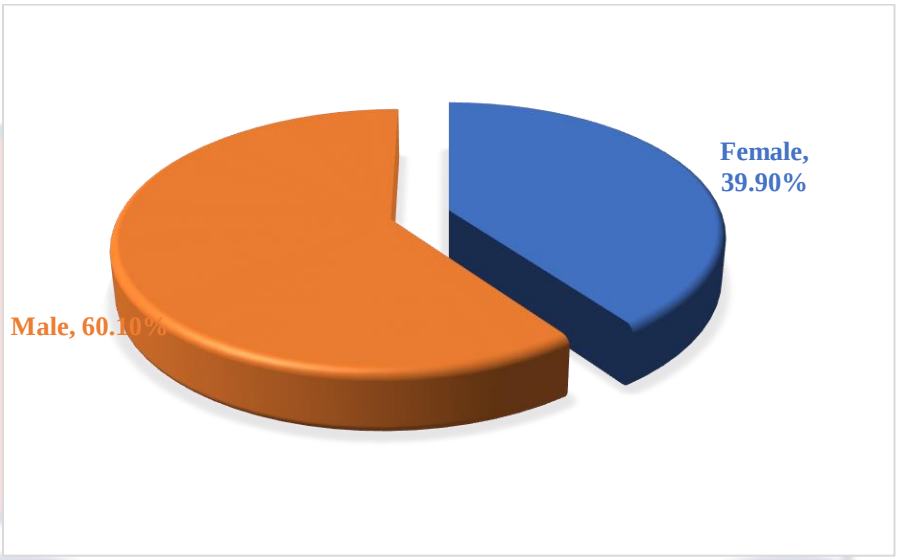

Figure 2 Gender of Respondents

Source: Filed Survey, 2023

Age of the Respondents

The study results revealed that, majority of the respondents, 108 representing 35.9 percent, fell within the age bracket of 51-60 years, followed by those above 60 years representing 27.6 percent. Those within age 41-50 years were 17.9 percent and age 31-40 years were 13.0 percent. However, the least number of respondents in terms of age fell under age 20-30 representing 5.6 percent. This means that the cocoa industry has less young farmers who can work for the next 20 years. It also implies that the cocoa industry needs old and experience farmers to rehabilitate cocoa farms in order to increase productivity and enhance their economic status as indicated in table 4.1 below.

Table 1 Age of the Respondents

	Frequency	Valid Percent
20-30 years	17	5.6
31-40 years	39	13.0
41-50 years	54	17.9
51-60 years	108	35.9
Above 60 years	83	27.6
Total	**301**	**100**

Source: Field Survey, 2023

Level of Education of Participants

On the educational level of the participants, the study results indicate that majority of the respondents, representing 42.90 percent, had JHS education. Also, the data shows that 33.60 percent of the participants had only primary education. However, 13.3 percent of the respondents had no formal education and 7.60 percent of them had either SHS/Technical/Vocational. It was also revealed that, 2.30 percent of the respondents had their education up to first degree but none of the respondents had either masters or PhD education. This is illustrated in figure 3 below.

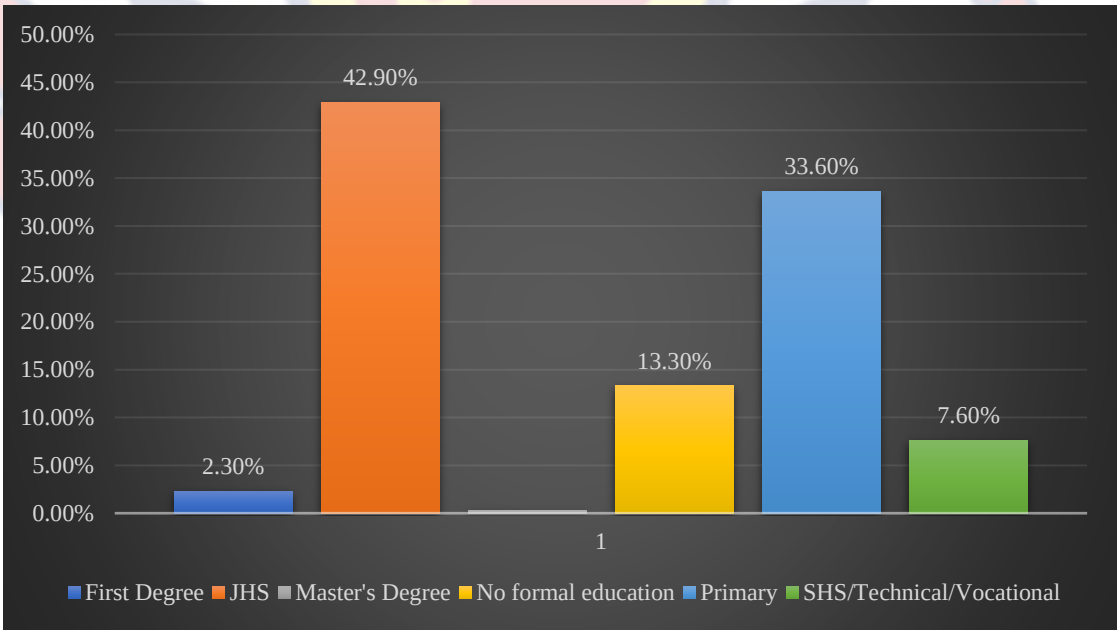

Figure 3 Level of Education of Participants

Source: Field Survey, 2023

Years of working experience

The study further looked at years of working experience. Findings from the study revealed that 34.9 percent of the respondents had worked between 8-11 years, 24.9 percent of the respondents worked between 5-7 years, 21.3 percent of the respondents had worked for 21 or more years, while 18.9 percent of the respondents had worked for only 2 or 3 years as shown in figure 4 below.

Table 2 Years of Working Experience

Years	Frequency	Valid Percent
2-4 years	57	18.9
5-7 years	75	24.9
8-11 years	105	34.9
12+ years	64	21.3
Total	**301**	**100**

Source: Field Survey, 2023

Research Question 1: To identify the characteristics of cocoa farms in the Offinso District of the Ashanti Region of Ghana

Age Cocoa Farm

The study results indicate that, the age of most of the cocoa farms, representing 50.2 percent, were between 10-20 years old. 23.9 percent of the cocoa farms were between 21-30 years of age. Also, 5.3 percent and 3.3 percent of the farms were between ages 31-40 and 41+ years respectively. However, 17.3 percent of the cocoa farms were less than 10 years old. This implies that existing cocoa farms are old enough necessitating their rehabilitation as shown in table 4.3 below.

Table 3 Age of Cocoa Farm

	Frequency	Valid Percent
10-20 years	151	50.2
21-30 years	72	23.9
31-40 years	16	5.3
41+ years	10	3.3
Less than 10 years	52	17.3
Total	**301**	**100**

Source: Field Survey, 2023

Number of Years One Worked on Cocoa Farm

On the number of years one has worked in his or her cocoa farm, it was revealed that 46.5 percent of the respondents had worked in their cocoa farms between 10-20 years and 21.6 percent worked between 21-30 years. However, only 7.6 percent and 4.3 percent of the respondents had worked in their farms for between 31-40 and 41+ years respectively. It also revealed that 19.9 percent of the respondents worked for less than 10 years. This means the number of years one works in his or her farms corresponds with the age of one's farm as illustrated in table 4.4 below.

Table 4 Number of Years One Has Worked on the Cocoa Farm

	Frequency	Valid Percent
10-20 years	140	46.5
21-30 years	65	21.6
31-40 years	23	7.6
41+ years	13	4.3
Less than 10 years	60	19.9
Total	**301**	**100**

Source: Field Survey, 2023

Contact with Agricultural Extension Officers for Their Services Regarding One's Farm

On whether or not one makes contact with agricultural extension officers for their services regarding one's farm, the analysis of the study data show that majority of the respondents, representing 88.7 percent, indicated that yes, they do make contact

with agricultural extension officers for their services regarding their farms. However, only 11.3 percent of the respondents consented that they did not make any contact with agricultural extension officers for their services regarding their farms as shown in figure 4 below.

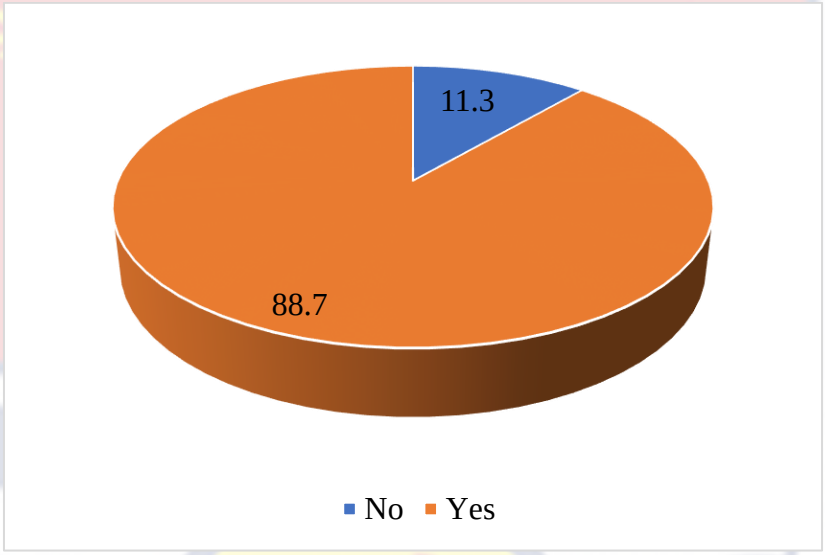

Figure 4 Contact with Agricultural Extension Officers for Their Services Regarding One's Farm

Source: Field Survey, 2023

Number of Times One Makes Contact with the Extension Officers Within a Month

In a follow-up question, the respondents were asked how many times they make contact with the extension officers within a month. The analysis of the data indicate that 44.9 percent of the respondents do make contact with the agricultural extension officers for their services regarding their farms twice in a month. Again, 27.6 percent of them said they make contact with the agricultural extension officers for their services regarding their farms 3 times in a month. 8.6 percent also said they do so 4 times in a month and 3.3 percent of them said they do that more than 4 times a month. However, 15.6 percent of the respondents said they do make contact with the

agricultural extension officers for their services regarding their farms once in a month as depicted in figure 5 below.

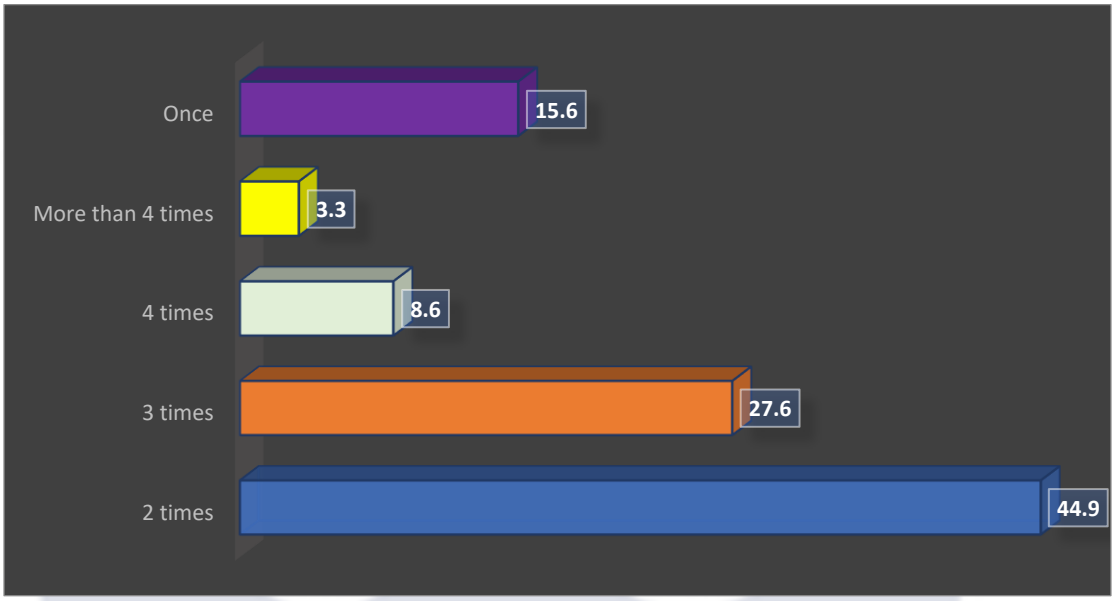

Figure 5 Number of Times One Makes Contact with the Extension Officers within a Month

Source: Field Survey, 2023

Did you receive other agricultural related training?

On the question of whether a respondent receives other agricultural related training, as high as 74.10 percent of the respondents said yes, they received other agricultural related training. However, only 7.70 percent of the respondents said no, meaning they do not perform well in mathematics and 25.90 percent of them said they did not receive any other agricultural related training as shown in Figure 6 below.

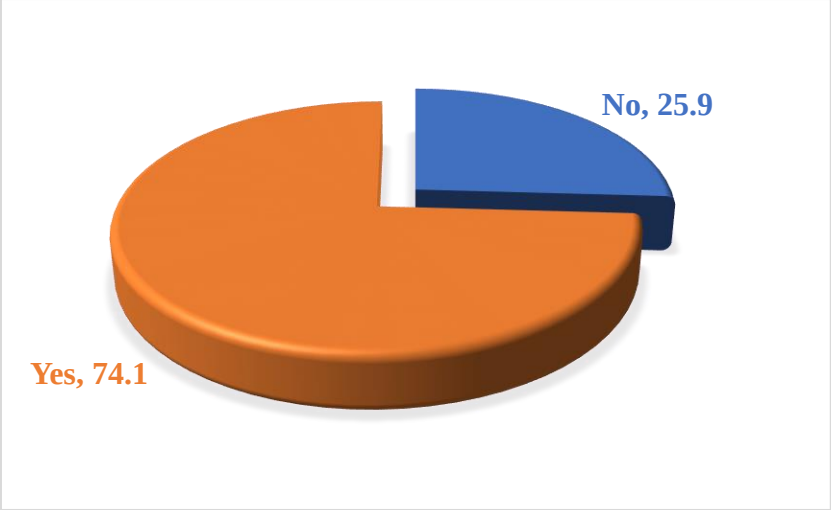

Figure 6 Did you Receive other Agricultural related Training?

Source: Field Survey, 2023

Distance to Farm Plot

The results from the data analysis revealed that, 38.9 percent of the respondents travel between 4-6 kilometers to their farms, 30.9 percent travel between 1-3 kilometers to get to their farms, 17.6 percent do between 7-10 kilometers before getting to their farms, 7.6 percent travel less than a kilometer to their farms and 5.6 percent had to travel 11 or more kilometers to get to their farms.

Table 5. Distance to Farm Plot

	Frequency	Valid Percent
1- 3 kilometers	93	30.9
11+ kilometers	15	5.0
4-6 kilometers	117	38.9
7-10 kilometers	53	17.6
Less than a kilometer	23	7.6
Total	**301**	**100**

Source: Field Survey, 2023

Are You Prepared to Cut Cocoa Trees for Complete Rehabilitation?

The results from the data analysis show that more than half (76.4 percent) of the respondents were prepared to cut cocoa trees for complete rehabilitation while

23.6 percent of the respondents were not prepared to cut cocoa trees for complete rehabilitation as shown in figure 7 below.

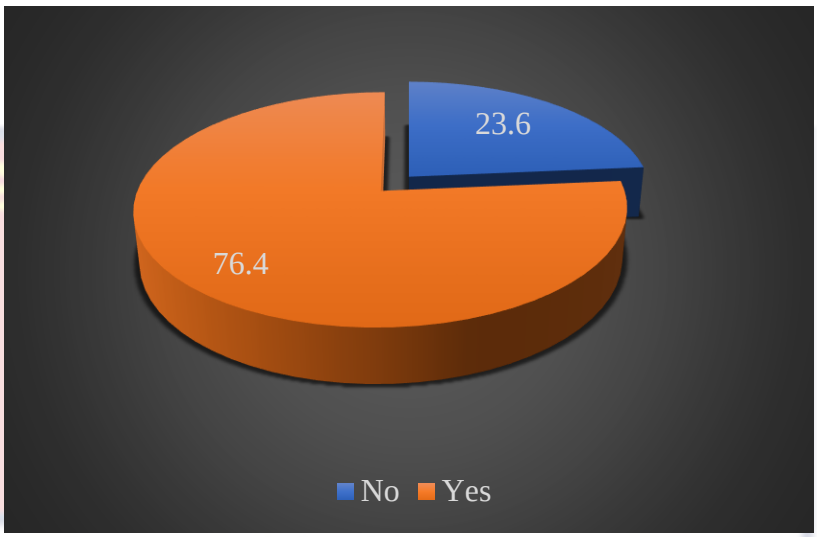

Figure 7 Are You Prepared to Cut Cocoa Trees for Complete Rehabilitation?

Source: Field Survey, 2023

Are you Willing to Pay off Investment with Proceeds from the Farm?

On the question of whether one is willing to pay off investment with proceeds from the farm, as high as 72.80 percent of the respondents said yes, they are willing to pay off investment with proceeds from the farm. However, only 27.20 percent of the respondents said no, meaning they are not willing to pay off investment with proceeds from as shown in figure 8 below.

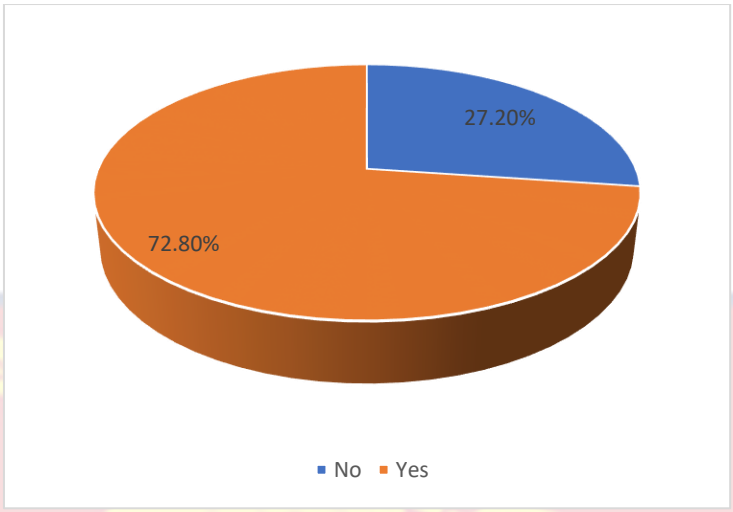

Figure 8 Are you willing to pay off investment with proceeds from the farm?

Source: Field Survey, 2023

Plot/site in the middle of a forest or closer to a natural reserve?

Respondents were also asked if their plot or site was in the middle of a forest or closer to a natural reserve. The results from the analysis show that 74.80 percent of them had their plots or sites in the middle of a forest or closer to a natural reserve. However, 25.20 percent of them said no, their plots sites were not in the middle of a forest or closer to a natural reserve as shown in figure 9 below.

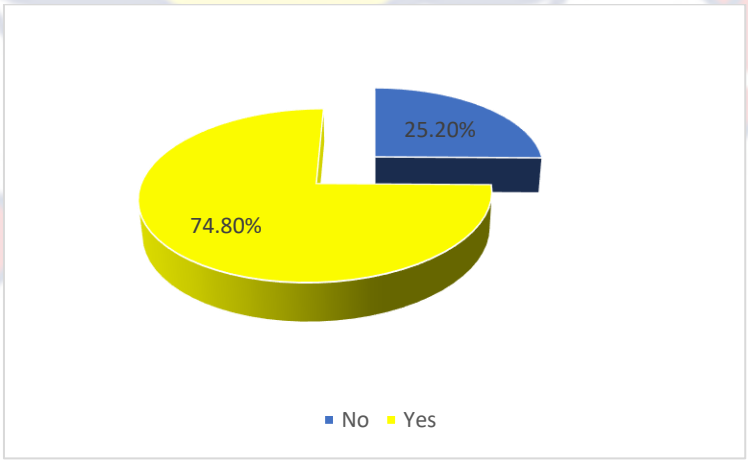

Figure 9 Is your plot/site in the middle of a forest or closer to a natural reserve?

Source: Field Survey, 2023

Do you have the right to cut and replant cocoa farm?

The results of the data analyzed showed that as high as 82.10 percent of the respondents said yes, they do have the right to cut and replant cocoa farm but 17.90 percent said no, they do not have the right to cut and replant cocoa farm as shown in figure 10 below.

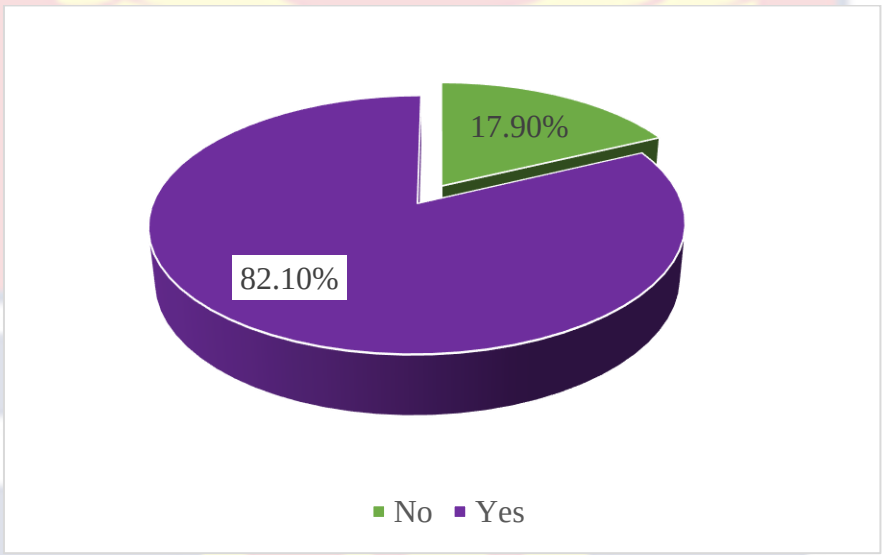

Figure 10 Do you have the right to cut and replant cocoa farm?

Source: Field Survey, 2023

Research 2: To determine the effects of the cocoa rehabilitation programme on level of output and productivity of cocoa production in the Offinso District of the Ashanti Region of Ghana.

On the output and productivity through the rehabilitation programme, the data revealed a mean of 2.59, which is approximately 3, meaning the respondents were not sure as to whether they undertake shaded agroforestry system. The data also revealed a mean of 3.05, which is approximately 3, implying that the respondents were not sure if they undertake no-shaded monocropping whilst a mean of 3.28, which is approximately 3, also means the respondents were not sure as to whether they have an

action plan for their cocoa rehabilitation. Again, a mean of 3.24, which approximates to 3, signifies that the respondents were not sure if cocoa Agronomists have helped to develop protocols and techniques on how and when to rehabilitate their cocoa program.

The study further revealed a mean of 3.36, which is approximately 3, which means that the respondents not sure whether they learn replanting in stages. A mean of 3.57, which is approximately 4, implies that the respondents agree that the rehabilitation program helps them to cultivate on large scale. In addition, respondents were not sure if selective replanting of trees regulate cocoa crown's shape and size as the data revealed a mean of 3.38, which is approximately 3. Moreover, the study revealed a mean of 3.57, which is approximately 4, implying that respondents agree that the rehabilitation program ensures high yield, and a mean of 3.65, which is 4 by approximation, show that respondents agree that rehabilitation programme increases production.

The study revealed a mean of 3.70, which is approximately 4, meaning that respondents agree that the rehabilitation program is more efficient. Also, a mean of 3.62, which is approximately 4, means that the respondents agree that being a member of FBO positively affects production. It was again revealed that, respondents agree that they receive incentives from NGOs as the data showed a mean of 3.60, which is approximately 4. Last but not least, the results from the data revealed a mean of 3.49, which is 4 by approximation, meaning that the respondents agree that they will recommend cocoa rehabilitation to any other farmer any day. Lastly, the study revealed a mean of 3.55, which is approximately 4, indicating that the respondents agree they learn shade regulation of cocoa trees as shown in Table 4.6 below.

Table 6 Output and Productivity through the Rehabilitation Programme

N	N	Min	Max	Mean	SD
I undertake shaded agroforestry system	217	1	5	2.59	1.034
I undertake no-shaded monocropping	217	1	5	3.05	1.085
I have an action plan for my cocoa rehabilitation	217	1	5	3.28	1.244
Cocoa Agronomists have helped to develop protocols and techniques on how and when to rehabilitate my cocoa program	217	1	5	3.24	1.253
Learn replanting in stages	217	1	5	3.36	1.267
The rehabilitation program helps me to cultivate on large scale	217	1	5	3.57	1.246
Selective replanting of trees to regulate cocoa crown's shape and size	217	1	5	3.38	1.323
The rehabilitation program ensures high yield	217	1	5	3.57	1.246
It increase production	217	1	5	3.65	1.261
The rehabilitation program is more efficient	217	1	5	3.70	1.295
Membership of FBO positively affects production	217	1	5	3.62	1.323
I Receive incentives from NGOs	217	1	5	3.60	1.195
I will recommend cocoa rehabilitation to any other farmer any day	217	1	5	3.49	1.276
Learn shade regulation of cocoa trees	217	1	5	3.55	1.312

(1) = Strongly Disagree, (2) = Disagree, (3) = Not Sure, (4) = Agree, (5) = Strongly Agree

Source: Filed Survey, 2023

Correlation Analysis

Correlation analysis was conducted to determine the effects of the cocoa rehabilitation programme on level of output and productivity of cocoa production in the Offinso District of the Ashanti Region of Ghana. The variables include; Level of output of cocoa production (LOCP), Undertake shaded agroforestry system (USAS), Undertake no-shaded monocropping (UNM), Cocoa Agronomists helped to develop protocols and techniques on rehabilitate (CADPT), Rehabilitation program helps to cultivate large scale (RPCLS), Undertaking early intercropping (UDEI), Shade regulation (SRG), Replanting in stages (RPIS) and Selective replanting of trees to regulate cocoa crown's shape and size (SRTR). From Table 4.7, the results showed that Level of output of cocoa production (LOCP) was found to have a positive correlation with all the independent variables; Undertake shaded agroforestry system

(USAS) (r = 0.820, p = 0.01), Undertake no-shaded monocropping (UNM) (r = 0.817, p = 0.01), Cocoa Agronomists helped to develop protocols and techniques on rehabilitate (CADPT) (r = 0.614, p = 0.01), Rehabilitation program helps to cultivate large scale (RPCLS) (r = 0.813, p = 0.01), Undertaking early intercropping (UDEI) (r = 0.761, p = 0.01), Shade regulation (SRG) (r = 0.779, p = 0.01), Replanting in stages (RPIS) (r = 0.680, p = 0.01) and Selective replanting of trees to regulate cocoa crown's shape and size (SRTR) (r = 0.508, p = 0.01).

Table 7 Correlation Analysis

	LOCP	USAS	UNM	CADPT	RPCLS	UDEI	SRG	RPIS	SRTR
LOCP	1								
USAS	.820**	1							
UNM	.817**	.725**	1						
CADPT	.614**	.830**	.573**	1					
RPCLS	.813**	.854**	.789**	.656**	1				
UDEI	.761**	.728**	.540**	.451**	.515**	1			
SRG	.779**	.664**	.800**	.855**	.778**	.629**	1		
RPIS	.680**	.665**	.824**	.728**	.554**	.796**	.781**	1	
SRTR	.508**	.854**	.766**	.501**	.852**	.519**	.542**	.893**	1

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

Source: Filed Survey, 2023

Regression Analysis

This section analyzed the effects of the cocoa rehabilitation programme on level of output and productivity of cocoa production in the Offinso District of the Ashanti Region of Ghana. The following variables; Level of output of cocoa production (LOCP), Undertake shaded agroforestry system (USAS), Undertake no-shaded monocropping (UNM), Cocoa Agronomists helped to develop protocols and techniques on rehabilitate (CADPT), Rehabilitation program helps to cultivate large scale (RPCLS), Undertaking early intercropping (UDEI), Shade regulation (SRG), Replanting in stages (RPIS) and Selective replanting of trees to regulate cocoa crown's shape and size (SRTR) were considered in the analysis. Some variation was

shown in the results indicating the level of output and productivity of cocoa production in the Offinso District of the Ashanti Region of Ghana. A computed R-square value of 0.433 indicates that the independent variables (Undertake shaded agroforestry system (USAS), Undertake no-shaded monocropping (UNM), Cocoa Agronomists helped to develop protocols and techniques on rehabilitate (CADPT), Rehabilitation program helps to cultivate large scale (RPCLS), Undertaking early intercropping (UDEI), Shade regulation (SRG), Replanting in stages (RPIS) and Selective replanting of trees to regulate cocoa crown’s shape and size (SRTR)) accounted for more than 43.3% of the variance in the Level of output of cocoa production (LOCP) with a standard error of estimate of 0.990. The adjusted coefficient of determination (R2) shows that 41.7% of the Level of output of cocoa production (LOCP) was explained by variations in Undertake shaded agroforestry system (USAS), Undertake no-shaded monocropping (UNM), Cocoa Agronomists helped to develop protocols and techniques on rehabilitate (CADPT), Rehabilitation program helps to cultivate large scale (RPCLS), Undertaking early intercropping (UDEI), Shade regulation (SRG), Replanting in stages (RPIS) and Selective replanting of trees to regulate cocoa crown’s shape and size (SRTR). This explains how the variation in Level of output of cocoa production (LOCP) was statistically accounted for by the regression equation. R-squared was statistically significant, with $F = 27.591$ and $p < 0.000$ as shown in Table 4.8. From the results, undertaken shaded agroforestry system (USAS), (-0.023, $p = 0.701$) was negative and statistically insignificant.

LOCP = 0.580 - 0.023X1 + 0.186X2 + 0.040X3 + 0.177X4 + 0.192X5 + 0.156X6 + 0.100X7 + 0.066X8 + e……………………………………1

Table 8: Regression Results

Variables	Coefficient	t-Statistic	Prob.
Constant	0.580	2.431	0.016
USAS	-0.023	-0.384	0.701
UNM	0.186	2.609	0.010
CADPT	0.040	0.631	0.528
RPCLS	0.177	2.749	0.006
UDEI	0.192	3.130	0.002
SRG	0.165	2.538	0.012
RPIS	0.100	1.740	0.083
SRTR	0.066	1.197	0.232
R	0.658		
R-squared	0.433		
Adjusted R-squared	0.417		
S.E. of Estimate	0.990		
F-statistic	27.591		
Prob (F-statistic)	0.000		

Source: Field Survey, 2023

Research Question 3: Improvement in Farmers Economic Status through the Rehabilitation Programme

On the improvement in farmers' economic status through the rehabilitation programme, the data revealed a mean of 3.16, which is approximately 3, meaning that the respondents were not sure whether cocoa rehabilitation is cost effective. The study also revealed a mean of 3.45, which is approximately 4, implying that most of the respondents agree that cocoa rehabilitation saves time. The data further revealed a mean of 3.50, which approximately 4, which means the respondents agree that cocoa rehabilitation retains original knowledge. A mean of 3.57, which approximates to 4, implies that the respondents agree that cocoa rehabilitation provides a competitive advantage. Furthermore, the study revealed a mean of 3.50, which is approximately 4,

meaning that the respondents agree that systematic risk management helps in the quantification of uncertainty during rehabilitation. The data also showed a mean of 3.58, which is 4 by approximation, implying that the respondents agree that cocoa rehabilitation provides a useful insight into the program. The study data further revealed a mean of 3.56, which is approximately 4, meaning that the respondents agree that cocoa rehabilitation leads to inefficient and poor performance of farmers. A mean of 3.43, which by approximation is 3, means that the respondents were not sure if the continuous changes and interference during rehabilitation by COCOABOD staff is a factor that undermine the performance of cocoa farmers.

On the architecture of classroom, the study further revealed a mean of 3.58, which is approximately 4, meaning that the respondents agree that the rehabilitation programme increase their income level, and a mean of 3.58, which is approximately 4, means that the respondents agree that rehabilitation programme increases the price level of their beans. The respondents also agree that their profit margin was increased through the rehabilitation programme as the data showed a mean of 3.60, which is approximately 4. Additionally, the study revealed a mean of 3.61, which is approximately 4, implying that the respondents agree that the rehabilitation programme reduces poverty. The respondents also agree that the rehabilitation programme encourages the use of child labour as the data showed a mean of 3.53, which is approximately 4.

Moreover, the study revealed a mean of 3.64, which is 4 by approximation, which means that respondents agree that the price strategy enhances their competitive position. The study data revealed a mean of 4.04, which is approximately 4, meaning that the respondents agree that they are committed to efficient input or farm utilization. A mean of 3.60, which 4 by approximation, indicates that respondents are

committed to enhancing quality products or services to their customers. The data again revealed a mean of 3.60, which is approximately 4, which means that the respondents agree that their farms have experienced improvement in sales and market share in the last two years and that they are able to meet tax obligations as the data showed a mean of 3.60, which 4 by approximation. Respondents were however not sure whether they have recorded a decrease in the sales cost as the data revealed a mean of 2.46, which is approximately 3.

The study further revealed a mean of 3.60, which is 4 by approximation, implying that respondents agree that they recorded a decrease in the cost for pesticides and disinfectants. Similarly, the respondents agree that they recorded a decrease in the cost for fertilizer as the study data revealed a mean of 3.60, which is approximately 4. The study data revealed a mean of 2.99, which is 3 by approximation, which means that the respondents were not sure if they recorded a decrease in the cost for general input usage.

Last but not least on improvement in farmers' economic status through the rehabilitation programme, the study also revealed a mean of 2.86 mean, which is approximately 3, meaning that the respondents were not sure whether they recorded an improvement in income on sales of cocoa beans. Lastly, the study revealed a mean of 2.90, which is approximately 3, meaning respondents were not sure if they recorded an improvement in the overall farm's profit as illustrated in Table 4.9 below.

Table 9: Improvement in Farmers Economic Status through the Rehabilitation Programme

Statement	N	Min	Max	Mean	SD
Cocoa rehabilitation is cost effective	217	1	5	3.16	1.234
Cocoa rehabilitation saves time	217	1	5	3.45	1.227
Cocoa rehabilitation retains original knowledge	217	1	5	3.50	1.148
Cocoa rehabilitation provides a competitive advantage	217	1	5	3.57	1.267
Systematic risk management helps in the quantification of uncertainty during rehabilitation	217	1	5	3.50	1.213
Cocoa rehabilitation provides a useful insight into the program	217	1	5	3.58	1.193
Cocoa rehabilitation leads to inefficient and poor performance of farmers	217	1	5	3.56	1.170
The continuous changes and interference during rehabilitation by COCOABOD STAFF is a factor that undermine the performance of cocoa farmers	217	1	5	3.43	1.243
The rehabilitation programme increase my income level	217	1	5	3.58	1.224
It increases the price level of our beans	217	1	5	3.58	1.193
My profit margin is increased through the rehabilitation programme	217	1	5	3.60	1.284
The rehabilitation programme reduces poverty	217	1	5	3.61	1.229
The rehabilitation programme encourages the use of child labour	217	1	5	3.53	1.279
The price strategy enhances our competitive position	217	1	5	3.64	1.238
I am committed to efficient input or farm utilization	217	1	5	4.04	1.234
I am committed to enhancing quality products/services to my customers	217	1	5	3.60	1.184
My farm has experienced improvement in sales and market share in the last two years	217	1	5	3.60	1.174
I am able to meet tax obligations	217	1	5	3.60	1.226
I record decrease in the sales cost	217	1	5	2.46	1.267
I record decrease in the cost for pesticides and disinfectants	217	1	5	3.60	1.181
I record decrease in the cost for fertilizer	217	1	5	3.60	1.217
I record decrease in the cost for general input usage	217	1	5	2.99	1.279
I record an improvement in income on sales of cocoa beans.	217	1	5	2.86	1.275
I record an improvement in the overall farm's profit.	217	1	5	2.90	1.327

(1) = Strongly Disagree, (2) = Disagree, (3) = Not Sure, (4) = Agree, (5) = Strongly Agree

Source: Filed Survey, 2023

Correlation Analysis

Correlation analysis was conducted to determine the effects of the cocoa rehabilitation programme on economic status of cocoa farmers in the Offinso District of the Ashanti Region of Ghana. The independent variables include; Economic status of cocoa farmers (ESCF), Cocoa rehabilitation is cost effective (CRCE), Profit margin is increased through the rehabilitation programme (PMI), Price strategy enhances our competitive position (PRSE), Farm has experienced improvement in sales and market share (FEISM), Record decrease in the sales cost (RDSC), Record decrease in the cost for pesticides and disinfectants (RDCPD).

From Table 4.10, the results, Economic status of cocoa farmers (ESCF) was found to have a positive correlation with all the independent variables; Cocoa rehabilitation is cost effective (CRCE) ($r = 0.693$, $p= 0.01$), Profit margin is increased through the rehabilitation programme (PMI) ($r = 0.406$, $p= 0.01$), Price strategy enhances our competitive position (PRSE) ($r = 0.702$, $p= 0.01$), Farm has experienced improvement in sales and market share (FEISM) ($r = 0.613$, $p= 0.01$), Record decrease in the sales cost (RDSC) ($r = 0.528$, $p= 0.01$), Record decrease in the cost for pesticides and disinfectants (RDCPD) ($r = 0.833$, $p= 0.01$). However, there is a weak positive correlation between Economic status of cocoa farmers (ESCF) and Profit margin is increased through the rehabilitation programme (PMI) ($r=0. 406$, $p=0.01$).

Table 4.10 Correlation Analysis

	ESCF	CRCE	PMI	PRSE	FEISM	RDSE	RDCPD
ESCF	1						
CRCE	.693**	1					
PMI	.406**	.611**	1				
PRSE	.702**	.517**	.588**	1			
FEISM	.613**	.731**	.811**	.459**	1		
RDSE	.528**	.707**	.618**	.741**	.435**	1	
RDCPD	.833**	.504**	.781**	.632**	.610**	.582**	1

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

Source: Filed Survey, 2023

Regression Analysis

This section analyzed the regression results of the relations between methods and techniques of record keep to human resource management. The following variables; Economic status of cocoa farmers (ESCF), Cocoa rehabilitation is cost effective (CRCE), Profit margin is increased through the rehabilitation programme (PMI), Price strategy enhances our competitive position (PRSE), Farm has experienced improvement in sales and market share (FEISM), Record decrease in the sales cost (RDSC), Record decrease in the cost for pesticides and disinfectants (RDCPD) were considered in the analysis.

Some variation was shown in the results indicating the relationship between cocoa rehabilitation programme on economic status of cocoa farmers in the Offinso District of the Ashanti Region of Ghana. A computed R-square value of 0.284 indicates that the independent variables (Cocoa rehabilitation is cost effective (CRCE), Profit margin is increased through the rehabilitation programme (PMI), Price strategy enhances our competitive position (PRSE), Farm has experienced improvement in sales and market share (FEISM), Record decrease in the sales cost (RDSC), Record decrease in the cost for pesticides and disinfectants (RDCPD)) accounted for more than 28.4% of the variance in Economic status of cocoa farmers

(ESCF) with a standard error of estimate of 1.121. The adjusted coefficient of determination (R2) shows that 27.0% of the Economic status of cocoa farmers (ESCF) was explained by variations in Cocoa rehabilitation is cost effective (CRCE), Profit margin is increased through the rehabilitation programme (PMI), Price strategy enhances our competitive position (PRSE), Farm has experienced improvement in sales and market share (FEISM), Record decrease in the sales cost (RDSC), Record decrease in the cost for pesticides and disinfectants (RDCPD). This explains how the variation in the economic status of cocoa farmers in the Offinso District of the Ashanti Region of Ghana was statistically accounted for by the regression equation. R-squared was statistically significant, with $F = 19.458$ and $p < 0.000$ as shown in Table 4.11.

From the results, Profit margin is increased through the rehabilitation programme (PMI) (-0.022, $p = 0.727$) was negative and statistically insignificant. However Also, the coefficient of Farm has experienced improvement in sales and market share (FEISM) (0.233, $p = 0.003$) and Record decrease in the cost for pesticides and disinfectants (RDCPD) (0.234, $p = 0.000$) was positive and statistically significant.

$$ESCF = 0.242 + 0.115X1 - 0.024X2 + 0.025X3 + 0.233X4 + 0.059X5 + 0.234X6 + e \quad \ldots\ldots 2$$

Table 11 Regression Results

Variables	Coefficient	t-Statistic	Prob.
Constant	1.133	4.344	0.000
CRCE	0.115	1.690	0.092
PMI	-0.024	-0.349	0.727
PRSE	0.025	0.368	0.713
FEISM	0.233	3.023	0.003
RDSC	0.059	0.807	0.420
RDCPD	0.234	5.051	0.000
R	0.533		
R-squared	0.284		
Adjusted R-squared	0.270		
S.E. of Estimate	1.121		
F-statistic	19.458		
Prob (F-statistic)	0.000		

Source: Field Survey, 2023

Research Question 4: To evaluate the internal and external challenges of cocoa rehabilitation programme in the Offinso District of the Ashanti Region of Ghana.

On challenges farmers encounter in their rehabilitation, the study data revealed a mean of 3.26, which is approximately 3, implies that the respondents were not sure if they face difficulty in obtaining farm inputs. Also, a mean of 3.66, which is approximately 4, show that the respondents agree that there was lack of adequate credit facilities. Again, the study revealed a mean of 3.64, which approximately 4, implying that the respondents agree that there were unsatisfactory loan agreement conditions by creditors. To add to that the data showed a mean of 3.65, which is approximately 4, which means that the respondents agree that there were low cocoa

prices and a mean of 3.64, approximately 4, means that the respondents agree that there was pests and diseases affecting their farms.

Moreover, on challenges farmers encounter in their rehabilitation, the study results revealed a mean of 3.70, which is approximately 4, which means that the respondents agree that they were unfamiliar with modern methods of farming. The data showed a mean of 3.66, which is 4 by approximation, implying that the respondents agree that there was late distribution of farm inputs by government. A mean of 3.64, which is 4 by approximation, was revealed showing respondents agree that there were poor land tenure systems and conditions.

Still on challenges, the study data revealed a mean of 3.54, which is approximately 4, meaning that the respondents agree that bush fires was one of the challenges they encounter in their rehabilitation drive and a mean of 3.70, which by approximation is 4, means that the respondents agree that land degradation by 'galamsey' operators poses as a challenge to them. Flooding was also agreed to be a challenge that farmers encounter as the data revealed a mean of 3.66, which is approximately 4. The study again revealed a mean of 3.63, which is 4 by approximation, implying that the respondents agree that irregular rainfall pattern was a challenge farmers encounter in their rehabilitation. A mean of 3.65 and 3.53, which are approximately 4, means that respondents agree that the experience poor standard of living and poverty respectively.

Last but not least on the challenges, the study data revealed a mean of 3.59, which is approximately 4, implying that the respondents agree that poor road network was a challenge farmers encounter in their rehabilitation, Lastly, a mean of 3.80, which by approximation is 4, means that the respondents agree that lack of adequate

storage facilities was also a challenge to cocoa rehabilitation. This is illustrated in table 4.12 below.

Table 12: Challenges of cocoa production as perceived by farmers

Statement	N	Min	Max	Mean	SD
Difficulty in obtaining farm inputs	217	1	5	3.26	1.152
Lack of Adequate Credit Facilities	217	1	5	3.66	1.146
Unsatisfactory loan agreement conditions by creditors	217	1	5	3.64	1.213
Low cocoa prices	217	1	5	3.65	1.233
Pests and Diseases	217	1	5	3.64	1.336
Unfamiliarity of modern methods of farming	217	1	5	3.70	1.287
Late distribution of farm inputs by government	217	1	5	3.66	1.146
Poor Land Tenure systems and conditions	217	1	5	3.64	1.336
Bush Fires	217	1	5	3.54	1.217
Land degradation by 'galamsey' operators	217	1	5	3.70	1.287
Flooding	217	1	5	3.66	1.258
Irregular rainfall pattern	217	1	5	3.63	1.284
Poor Standard of Living	217	1	5	3.65	1.270
Poverty	217	1	5	3.53	1.300
Poor road network	217	1	5	3.59	1.321
Lack of adequate storage facilities	217	1	5	3.80	1.287

(1) = Strongly Disagree, (2) = Disagree, (3) = Not Sure, (4) = Agree, (5) = Strongly Agree

Source: Filed Survey, 2023

Challenges of cocoa production as perceived by licensed buying companies.

On Challenges of cocoa production as perceived by licensed buying companies, the data revealed a mean of 3.48, which is approximately 4, which means that the respondents agree that licensed buying companies perceived high level of illiteracy among cocoa farmers that affects cocoa production. The study also revealed a mean of 3.68, which is approximately 4, this implies that the respondents agree that licensed buying companies perceived there were aged cocoa farmers which affects cocoa production. The data further revealed a mean of 3.64, which approximately 4, which means that the respondents there were insufficient agricultural extension

officers which pose as challenge of cocoa production as perceived by licensed buying companies.

Moreover, the study revealed a mean of 3.82, which approximates to 3, implying that the respondents agree that poor road network was a challenge of cocoa production as perceived by licensed buying companies. A mean of 3.78, which is 4 by approximation, means that the respondents agree that challenges of warehousing and storage exist. Additionally, the study revealed a mean of 3.61, which is approximately 4, implying that the respondents agree that there was lack of cordial relationship between cocoa farmers and COCOBOD thus affecting cocoa production. The respondents also agree that aging cocoa trees was perceived by licensed buying companies as a challenge to cocoa production, as the data showed a mean of 3.66, which is approximately 4. The study data also revealed a mean of 3.73, which is 4 by approximation, which means that respondents agree that there was high cost of financing farmers as perceived by licensed buying companies. A mean of 3.64, which is approximately 4, means that the respondents agree that inadequate government support was a challenge affecting cocoa production as perceived licensed buying companies.

Moreover, the study data revealed a mean of 3.62, which is 4 by approximation, which implies that the respondents agree that there was difficulty in meeting set target by COCOBOD. Similarly, the data revealed a mean of 3.62, which is approximately 4, means that the respondents agree that cheating on the part of purchasing clerks was a challenge affecting cocoa production. Lastly on mathematics performance, the data showed a mean of 3.79, which is approximately 3, implying that the respondents agree that smuggling was perceived by perceived licensed buying

companies as a challenge affecting cocoa production as illustrated in Table 4.13 below.

Table 13: Challenges of cocoa production as perceived by licensed buying companies

Statement	N	Min	Max	Mean	SD
High Level of Illiteracy of farmers	217	1	5	3.48	1.357
Aged Cocoa farmers	217	1	5	3.68	1.238
Insufficient Agricultural Extension Officer	217	1	5	3.64	1.257
Poor road network	217	1	5	3.82	1.223
Warehousing and Storage Challenges	217	1	5	3.78	1.216
Lack of cordial relationship with COCOBOD	217	1	5	3.61	1.257
Aging cocoa trees	217	1	5	3.66	1.263
High Cost of Financing Farmers	217	1	5	3.73	1.272
Inadequate government support	217	1	5	3.64	1.331
Difficulty in meeting set target by COCOBOD	217	1	5	3.62	1.315
Cheating on the part of Purchasing Clerks	217	1	5	3.62	1.249
Smuggling	217	1	5	3.79	1.270

(1) = Strongly Disagree, (2) = Disagree, (3) = Not Sure, (4) = Agree, (5) = Strongly Agree

Source: Filed Survey, 2023

Challenges of Cocoa Production as Perceived by COCOBOD

On the challenges of cocoa production as perceived by COCOBOD, the data revealed a mean of 3.43, which is approximately 3, meaning the respondents were not sure as to whether there was the challenge of lack of enough motivation for the youth to enter into farming as perceived by COCOBOD. The data also revealed a mean of 3.69, which is approximately 4, implying that the respondents agree that there was the challenge of inadequate funds to buy and distribute farm inputs as perceived by COCOBOD whilst a mean of 3.78, which is approximately 4, also means that the respondents agree that high illiteracy level of farmers was a challenge affecting cocoa production as perceived by COCOBOD. Again, a mean of 3.64, which approximates

to 4, signifies that the respondents agree that insufficient support from government was challenge to cocoa production as perceived by COCOBOD.

The study further revealed a mean of 3.72, which is approximately 4, which means respondents agree that inadequate agricultural extension officers was perceived by COCOBOD as challenge to cocoa production. A mean of 3.69, which is approximately 4, implies that the respondents agree that COCOBOD perceived inadequate agricultural extension officers as a challenge to cocoa production. In addition, respondents agree that poor road network was challenge as the data revealed a mean of 3.68, which is approximately 4. A mean of 3.66, which is 4 by approximation, implies that the respondents agree that inadequate motivation for farmers was a challenge to cocoa production. Land degradation from the activities of 'galamsey' operators was perceived by COCOBOD as a challenge to cocoa production as the study data revealed a mean of 3.79, which is approximately 4, indicating respondents' agreement. The data further showed a mean of 3.69, which is 4 by approximation, which means respondents agree that irregular rainfall pattern poses as a challenge to cocoa production.

To add to that, the results from the data revealed a mean of 3.70, which is 4 by approximation, meaning that the respondents agree that communication gap between COCOBOD and LBCs was challenge to cocoa production. Last but not least on the challenges to cocoa production as perceived by COCOBOD. The study data revealed a mean of 3.79, which is approximately 4, meaning that respondents agree that low collaboration of cocoa supply chain partners challenges cocoa production. Lastly, the study revealed a mean of 3.57, which is approximately 4, indicating that the respondents agree that smuggling was perceived by COCOBOD as challenge to cocoa production as shown in table 4.14 below.

Table 14 Challenges of cocoa production as perceived by COCOBOD

Statement	N	Min	Max	Mean	SD
Lack of enough motivation for the youth to enter into farming	217	1	5	3.43	1.271
Inadequate funds to buy and distribute farm inputs	217	1	5	3.69	1.217
High Illiteracy level of farmers	217	1	5	3.78	1.238
Insufficient support from government	217	1	5	3.64	1.303
Inadequate agricultural extension officers	217	1	5	3.72	1.298
Insufficient storage facilities	217	1	5	3.69	1.327
Poor road network	217	1	5	3.68	1.310
Inadequate motivation for farmers	217	1	5	3.66	1.325
Land degradation from the activities of 'galamsey' operators	217	1	5	3.79	1.246
Irregular rainfall pattern	217	1	5	3.69	1.252
Communication gap between Cocobod and LBCs	217	1	5	3.70	1.256
Low collaboration of cocoa supply chain partners	217	1	5	3.79	1.256
Smuggling				3.57	1.204

(1) = Strongly Disagree, (2) = Disagree, (3) = Not Sure, (4) = Agree, (5) = Strongly Agree

Source: Filed Survey, 2023

Discussions

On the Characteristics of Cocoa Farms, the study concluded that 50.2 percent of the cocoa farmers, were between 10-20 years old. A further analysis revealed that 88.7 percent of the farmers make contact with agricultural extension officers for their services regarding their farms, 27.6 percent of cocoa farmers make contact with the agricultural extension officers for their services regarding their farms 3 times in a month, 74.10 percent of the cocoa farmers received other agricultural related training, 76.4 percent of the farmers were prepared to cut cocoa trees for complete rehabilitation and 72.80 percent of the farmers were willing to pay off investment with proceeds from their farms. This finding is supported by the finding of Oyekale (2020) whose study results showed that the majority of the farmers were older than 50 years and attained primary education. High temperature (64.29%), too stormy rainfall (64.29%) and too much rainfall (61.90%) were largely perceived by cocoa farmers in

2015. The farmers were adapting to climate change through diversification into other crops (70.63%), planting of hybrid varieties (71.69%), commitment to spray cocoa pods regularly (74.87%) and initiation of some changes in the planting and harvesting times (71.96%).

On the effects of the cocoa rehabilitation programme on level of output and productivity of cocoa production in the Offinso District of the Ashanti Region of Ghana. The study concluded that undertake shaded agroforestry system, undertake no-shaded monocropping, Cocoa Agronomists helped to develop protocols and techniques on rehabilitate, Rehabilitation program helps to cultivate large scale, undertaking early intercropping, Shade regulation, Replanting in stages and Selective replanting of trees to regulate cocoa crown's shape and size accounted for more than 43.3% of the Level of output of cocoa production. However, undertaken shaded agroforestry system (-0.023, p = 0.701) was negative and statistically insignificant. This finding is in line with the finding of Fosu-Mensah, Okoffo and Mensah (2022) whose study results showed that farmers sourced pesticides from agrochemical shops and fellow farmers, with some benefiting from the government of Ghana's ''free mass cocoa spraying'' program. A majority (51.2%) of the farmers sprayed more than three times per cocoa season, and that 35% of the farmers dangerously mixed two or more different pesticides together when spraying. Gender, age, educational level, and income from cocoa farming significantly influenced the choice of source of pesticide while knowledge on pesticides application rate was significantly influenced by educational level of farmers, access to extension services, presence of agrochemical shop, membership of a farm-based organization, and age of a farmer. Frequency of pesticides application was significantly influenced by educational level of farmers, access to extension services, presence of agrochemical shop, membership of the

farmer-based organization, knowledge of Ghana COCOBOD recommendation on pesticides application rate, income from cocoa farming, and age of farmers.

On the effects of the cocoa rehabilitation programme on economic status of cocoa farmers in the Offinso District of the Ashanti Region of Ghana. The study concluded that cocoa rehabilitation as cost effective, profit margin is increased through the rehabilitation programme, Price strategy enhances competitive position, Farm experienced improvement in sales and market share, Record decrease in the sales cost, Record decrease in the cost for pesticides and disinfectants accounted for more than 28.4% of the economic status of cocoa farmers (ESCF). Farm experienced improvement in sales and market share (FEISM) (0.233, p = 0.003) and Record decrease in the cost for pesticides and disinfectants (RDCPD) (0.234, p = 0.000) was positive and statistically significant. This finding is in line with the finding of Ali, Awuni and Danso-Abbeam (2018) whose study found that the likelihood of fertilizer adoption was influenced by factors such as the value of productive farm assets, family and hired labour, farm size, extension contacts, and farmers' engagement in off-farm economic activities. On the other hand, factors like family labour, household size, farm size, marital status, support received from Non-Governmental Organizations (NGOs), and number of years working as a cocoa farmer (experience) significantly influence the extent of fertilizer adoption. Hence, improving extension services to farmers and encouraging the ownership of farm assets could be useful for fertilizer adoption.

On challenges farmers encounter in their rehabilitation, the study concluded that cocoa farmers lack of adequate credit facilities, unsatisfactory loan agreement conditions by creditors, low cocoa prices, pests and diseases affecting their farms, unfamiliar with modern methods of farming, late distribution of farm inputs by

government, poor land tenure systems and conditions, bush fires was one of the challenges they encounter in their rehabilitation drive, land degradation by 'galamsey' operators, irregular rainfall pattern was a challenge farmers encounter in their rehabilitation, poor standard of living and poverty respectively, poor road network and lack of adequate storage facilities was also a challenge to cocoa rehabilitation. This finding is supported by the finding of Abdulai et al. (2018) whose study results of their study showed that current mean cocoa yield level of 288kg $ha^{-1}yr^{-1}$ in the dry region was significantly lower than in the mid and wet regions with mean yields of 712 and 849 kg ha^{-1} yr^{-1}, respectively. It was also revealed that, in the dry region, farmers diversified their income sources with non-cocoa crops and off-farm activities while farmers at the mid and wet regions mainly depended on cocoa (over 80% of annual income).

On Challenges of cocoa production as perceived by licensed buying companies, the concluded that licensed buying companies perceived high level of illiteracy among cocoa farmers that affects cocoa production, licensed buying companies perceived there were aged cocoa farmers, poor road network, challenges of warehousing and storage, lack of cordial relationship between cocoa farmers and COCOBOD, aging cocoa trees was perceived by licensed buying companies as a challenge to cocoa production, high cost of financing farmers, inadequate government support, difficulty in meeting set target by COCOBOD, cheating on the part of purchasing clerks and smuggling was perceived by perceived licensed buying companies as a challenge affecting cocoa production. This finding is in line with the finding of Taiwo, Ogunlade, Ayegboyin, Famaye, Adeniyi, Oyedokun, Adeosun & Adejobi (2015) whose study indicated that, most of the farmers are aged with less than 1 ha of cocoa farm land. Also, majority of the cocoa farmers were aware of

cocoa rehabilitation techniques and coppicing form of rehabilitation was widely practiced. Level of education (5% level of significance), farm size and farmers experience (1% level of significance) were found to be the determinants for rehabilitation practice among the farmers, which were all positively correlated to rehabilitation program.

On the challenges of cocoa production as perceived by COCOBOD, the study concluded that there is inadequate funds to buy and distribute farm inputs, high illiteracy level of farmers, insufficient support from government, inadequate agricultural extension officers, inadequate agricultural extension officers as a challenge to cocoa production, inadequate motivation for farmers to engage in cocoa production, land degradation from the activities of 'galamsey' operators, irregular rainfall pattern poses as a challenge to cocoa production, communication gap between COCOBOD and LBCs was challenge to cocoa production, low collaboration of cocoa supply chain partners challenges cocoa production and smuggling was perceived by COCOBOD as challenge to cocoa production. This finding is similar to the finding of Awuah- Gyawu, Brako and Adzimah (2015) whose study identified the following challenges: unfamiliarity of modern methods of farming, late distribution of farm inputs by government, land degradation by 'galamsey' operators, etc. The researchers recommended a greater collaboration of all partners of cocoa production in order to meet all challenges confronting the sector.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

Introduction

Chapter five summarizes the findings, conclusion and recommendations for stakeholders. The study identifies the characteristics of cocoa farms in the Offinso District of the Ashanti Region of Ghana. It also determines the effects of the cocoa rehabilitation programme on level of output and productivity of cocoa production in the Offinso District of the Ashanti Region of Ghana. It again, determines the effects of the cocoa rehabilitation programme on economic status of cocoa farmers in the Offinso District of the Ashanti Region of Ghana. It also To evaluate the internal and external challenges of cocoa rehabilitation programme in the Offinso District of the Ashanti Region of Ghana.

Summary of the Study

Characteristics of Cocoa Farms

On the Characteristics of Cocoa Farms, the study results indicate that, the age of most of the cocoa farms, representing 50.2 percent, were between 10-20 years old. 23.9 percent of the cocoa farms were between 21-30 years of age. Also, 5.3 percent and 3.3 percent of the farms were between ages 31-40 and 41+ years respectively. Also, 46.5 percent of the respondents had worked in their cocoa farms between 10-20 years and 21.6 percent worked between 21-30 years. A further analysis revealed that 88.7 percent of the farmers indicated that they do make contact with agricultural extension officers for their services regarding their farms. It also revealed that. 27.6 percent of cocoa farmers make contact with the agricultural extension officers for their services regarding their farms 3 times in a month. The study again revealed that 74.10 percent of the cocoa farmers received other agricultural related training. The

results from the data analysis show that more than half (76.4 percent) of the farmers were prepared to cut cocoa trees for complete rehabilitation. It also shows that 72.80 percent of the farmers are willing to pay off investment with proceeds from the farm.

Output and Productivity through the Rehabilitation Programme

On the effects of the cocoa rehabilitation programme on level of output and productivity of cocoa production in the Offinso District of the Ashanti Region of Ghana. The study revealed that Level of output of cocoa production (LOCP) was found to have a positive correlation with Undertake shaded agroforestry system (USAS) ($r = 0.820$, $p = 0.01$), Undertake no-shaded monocropping (UNM) ($r = 0.817$, $p = 0.01$), Cocoa Agronomists helped to develop protocols and techniques on rehabilitate (CADPT) ($r = 0.614$, $p = 0.01$), Rehabilitation program helps to cultivate large scale (RPCLS) ($r = 0.813$, $p = 0.01$), Undertaking early intercropping (UDEI) ($r = 0.761$, $p = 0.01$), Shade regulation (SRG) ($r = 0.779$, $p = 0.01$), Replanting in stages (RPIS) ($r = 0.680$, $p = 0.01$) and Selective replanting of trees to regulate cocoa crown's shape and size (SRTR) ($r = 0.508$, $p = 0.01$).

It further revealed that undertake shaded agroforestry system (USAS), Undertake no-shaded monocropping (UNM), Cocoa Agronomists helped to develop protocols and techniques on rehabilitate (CADPT), Rehabilitation program helps to cultivate large scale (RPCLS), Undertaking early intercropping (UDEI), Shade regulation (SRG), Replanting in stages (RPIS) and Selective replanting of trees to regulate cocoa crown's shape and size (SRTR)) accounted for more than 43.3% of the variance in the Level of output of cocoa production (LOCP) and that 41.7% of the Level of output of cocoa production (LOCP) was explained by variations in Undertake shaded agroforestry system (USAS), Undertake no-shaded monocropping (UNM), Cocoa Agronomists helped to develop protocols and techniques on

rehabilitate (CADPT), Rehabilitation program helps to cultivate large scale (RPCLS), Undertaking early intercropping (UDEI), Shade regulation (SRG), Replanting in stages (RPIS) and Selective replanting of trees to regulate cocoa crown's shape and size (SRTR). However, undertaken shaded agroforestry system (USAS), (-0.023, p = 0.701) was negative and statistically insignificant.

Improvement in Farmers Economic Status through the Rehabilitation Programme

On the effects of the cocoa rehabilitation programme on economic status of cocoa farmers in the Offinso District of the Ashanti Region of Ghana. The study shows that economic status of cocoa farmers (ESCF) was found to have a positive correlation with all the independent variables; Cocoa rehabilitation is cost effective (CRCE) (r = 0.693, p= 0.01), Profit margin is increased through the rehabilitation programme (PMI) (r = 0.406, p= 0.01), Price strategy enhances our competitive position (PRSE) (r = 0.702, p= 0.01), Farm has experienced improvement in sales and market share (FEISM) (r = 0.613, p= 0.01), Record decrease in the sales cost (RDSC) (r = 0.528, p= 0.01), Record decrease in the cost for pesticides and disinfectants (RDCPD) (r = 0.833, p= 0.01).

The study also revealed that cocoa rehabilitation is cost effective (CRCE), Profit margin is increased through the rehabilitation programme (PMI), Price strategy enhances our competitive position (PRSE), Farm has experienced improvement in sales and market share (FEISM), Record decrease in the sales cost (RDSC), Record decrease in the cost for pesticides and disinfectants (RDCPD)) accounted for more than 28.4% of the variance in Economic status of cocoa farmers (ESCF) and that 27.0% of the Economic status of cocoa farmers (ESCF) was explained by variations in Cocoa rehabilitation is cost effective (CRCE), Profit margin is increased through the rehabilitation programme (PMI), Price strategy enhances our competitive position

(PRSE), Farm has experienced improvement in sales and market share (FEISM), Record decrease in the sales cost (RDSC), Record decrease in the cost for pesticides and disinfectants (RDCPD). From the results, Farm has experienced improvement in sales and market share (FEISM) (0.233, p = 0.003) and Record decrease in the cost for pesticides and disinfectants (RDCPD) (0.234, p = 0.000) was positive and statistically significant.

Challenges Farmers Encounter in Their Rehabilitation

On challenges farmers encounter in their rehabilitation, the study revealed that respondents agreed that there was lack of adequate credit facilities, respondents agreed that there were unsatisfactory loan agreement conditions by creditors, respondents agree that there were low cocoa prices, respondents agree that there was pests and diseases affecting their farms, respondents agreed that they were unfamiliar with modern methods of farming, respondents agreed that there was late distribution of farm inputs by government, respondents agreed that there were poor land tenure systems and conditions, respondents agree that bush fires was one of the challenges they encounter in their rehabilitation drive, respondents agreed that land degradation by 'galamsey' operators poses as a challenge to them, respondents agree that irregular rainfall pattern was a challenge farmers encounter in their rehabilitation, respondents agree that the experience poor standard of living and poverty respectively, respondents agree that poor road network was a challenge farmers encounter in their rehabilitation, respondents agree that lack of adequate storage facilities was also a challenge to cocoa rehabilitation.

Challenges of Cocoa Production as Perceived by Licensed Buying Companies

On Challenges of cocoa production as perceived by licensed buying companies, the study revealed that respondents agree that licensed buying companies

perceived high level of illiteracy among cocoa farmers that affects cocoa production, respondents agree that licensed buying companies perceived there were aged cocoa farmers which affects cocoa production, respondents agree that poor road network was a challenge of cocoa production as perceived by licensed buying companies, respondents agree that challenges of warehousing and storage exist, respondents agree that there was lack of cordial relationship between cocoa farmers and COCOBOD thus affecting cocoa production, respondents also agreed that aging cocoa trees was perceived by licensed buying companies as a challenge to cocoa production, respondents agree that there was high cost of financing farmers as perceived by licensed buying companies, respondents agree that inadequate government support was a challenge affecting cocoa production as perceived licensed buying companies, respondents agree that there was difficulty in meeting set target by COCOBOD, respondents agree that cheating on the part of purchasing clerks was a challenge affecting cocoa production, respondents agree that smuggling was perceived by perceived licensed buying companies as a challenge affecting cocoa production.

Challenges of Cocoa Production as Perceived by COCOBOD

On the challenges of cocoa production as perceived by COCOBOD, the study revealed that respondents agree that there was the challenge of inadequate funds to buy and distribute farm inputs as perceived by COCOBOD, respondents agree that high illiteracy level of farmers was a challenge affecting cocoa production as perceived by COCOBOD, respondents agree that insufficient support from government was challenge to cocoa production as perceived by COCOBOD, respondents agree that inadequate agricultural extension officers was perceived by COCOBOD as challenge to cocoa production, respondents agree that COCOBOD perceived inadequate agricultural extension officers as a challenge to cocoa

production, respondents agree that poor road network was challenge, respondents agree that inadequate motivation for farmers was a challenge to cocoa production, land degradation from the activities of 'galamsey' operators was perceived by COCOBOD as a challenge to cocoa production, respondents agree that irregular rainfall pattern poses as a challenge to cocoa production, respondents agree that communication gap between COCOBOD and LBCs was challenge to cocoa production, respondents agree that low collaboration of cocoa supply chain partners challenges cocoa production, respondents agree that smuggling was perceived by COCOBOD as challenge to cocoa production.

Conclusions

This research has provided valuable insights into the impact of the cocoa rehabilitation program on the economic status of cocoa farmers. Findings from the study reveal that while the rogram has been useful, there are still a significant number of farmers that do not have frequent access to agricultural extension officers. 88.7 percent of the farmers make contact with agricultural extension officers for their services regarding their farms, 27.6 percent of cocoa farmers make contact with the agricultural extension officers for their services regarding their farms 3 times in a month, 74.10 percent of the cocoa farmers received other agricultural related training, 76.4 percent of the farmers were prepared to cut cocoa trees for complete rehabilitation and 72.80 percent of the farmers were willing to pay off investment with proceeds from their farms.

Also the findings demonstate that the rogram has layed a significant role in increasing the outut of cocoa farmers. The study concluded that undertake shaded agroforestry system, undertake no-shaded mono-cropping, Cocoa Agronomists helped to develop protocols and techniques on rehabilitate, Rehabilitation program helps to

cultivate large scale, undertaking early intercropping, Shade regulation, Replanting in stages and Selective replanting of trees to regulate cocoa crown's shape and size accounted for more than 43.3% of the Level of output of cocoa production. However, undertaken shaded agroforestry system, (-0.023, p = 0.701) was negative and statistically insignificant.

The study concluded that cocoa rehabilitation as cost effective, profit margin is increased through the rehabilitation programme, Price strategy enhances competitive position, Farm experienced improvement in sales and market share, Record decrease in the sales cost, Record decrease in the cost for pesticides and disinfectants accounted for more than 28.4% of the economic status of cocoa farmers (ESCF). Farm experienced improvement in sales and market share (FEISM) (0.233, p = 0.003) and Record decrease in the cost for pesticides and disinfectants (RDCPD) (0.234, p = 0.000) was positive and statistically significant.

This highlights the importance of targeted interventions and by extension contributing to the sustainable growth of the cocoa sector. The positive outcomes observed in this research underscore the potential for similar initiatives to promote economic development and poverty alleviation in cocoa growing regions in Ghana.

Recommendations

Based on the findings the study gives the following suggestions for stakeholders to consider;

1. Findings from the study indicate that financial constraints are one of the major challenges farmer face. Thus, government should introduce more avenues for cocoa farmers to adequately access credit facilities to support their cocoa farming activities.

2. Also, policies should be implemented to ensure that financial institution and other none financial institutions that lend money to cocoa farmers should make sure that their loan agreement and conditions are favorable for their clients.
3. Findings also indicated that farmers are discouraged because of the rice of cocoa in Ghana, thus an increase in increase cocoa prices is recommended to motivate the cocoa farmers to increase their land size for more production of cocoa beans.
4. A significant proportion of farmers stated that they rarely have extension officers vising their farms. Hence, it is recommended that district agricultural extension offices should pay more visit to the cocoa farms to reduce the rate of pests and diseases attacked on the cocoa trees.
5. Government and the district assemblies should always distribute the farm inputs on time to enable the famers use it at the right for effective results and output.
6. Deliberate effort should be taken by government to add more storage facilities and increase the number of cocoa road construction to solve the problem of poor road network and lack of adequate storage facilities.

Recommendations for Further Studies

This study mainly focused on the economic importance of the rehabilitation programme on cocoa farmers. Further studies should look at the environmental impact of the programme and how that contributes to cocoa production.

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APPENDICES

APPENDIX I

CHRISTIAN SERVICE UNIVERSITY COLLEGE

DEPARTMENT OF PLANNING AND DEVELOPMENT

Dear Sir/Madam,

This questionnaire is designed purely for academic purposes to solicit for data on the study. This questionnaire is meant to collect information on the impact on cocoa rehabilitation programme on the cocoa famers. Your contribution towards the completion of this questionnaire will be highly appreciated and the information collected through this questionnaire will be treated with confidentiality and used for academic purpose only. Kindly take a moment to answer all the questions as accurately as possible.

Section A: Background Information of Respondents

1. Gender of respondent

a. Male [ ] b. Female [ ]

2. Age bracket

a. 20 – 30 years [ ]
b. 31 - 40 years [ ]
c. 41-50 years [ ]
d. 51-60 years [ ]
e. Above 60 [ ]

3. What is your education level?

a. No formal education [ ]
b. Primary [ ]
c. JHS [ ]
d. SHS/Technical/Vocational [ ]
e. First degree [ ]
f. Masters [ ]
g. PhD [ ]

4. Years of working experience

a. 2- 4 years [ ]
b. 5 – 7 years [ ]
c. 9 – 11 years [ ]
d. 12+ year [ ]

Section B: **Characteristics of cocoa farms**

1. What is the age of your cocoa farm?

a. Less than 10 years [ ]
b. 10-20 years [ ]
c. 21-30 years [ ]
d. 31-40 years [ ]

e. 41+ years [ ]

2. How many years have you worked on your cocoa farm?

a. Less than 10 years [ ]
b. 10-20 years [ ]
c. 21-30 years [ ]
d. 31-40 years [ ]
e. 41+ years [ ]

3. Do you make contact with agricultural extension officers for their services regarding your farm?

a. Yes [ ]
b. No [ ]

4. If yes in 2 above, how many times do you make contact with the extension officers within a month?

a. once [ ]
b. 2 times [ ]
c. 3 times [ ]
d. 4 times [ ]
e. More than 4 times [ ]

5. Did you receive other agricultural related training?

a. Yes [ ]
b. No [ ]

6. What is the distance to your farm plot?

a. Less than a kilometer [ ]
b. 1- 3 kilometers [ ]
c. 4-6 kilometers [ ]
d. 7-10 kilometers [ ]
e. 11+ kilometers [ ]

5. Are you prepared to cut cocoa trees for complete rehabilitation?

a. Yes [ ]
b. No [ ]

6. Are you willing to pay off investment with proceeds from the farm?

a. Yes [ ]
b. No [ ]

7. Is your plot/site in the middle of a forest or closer to a natural reserve?

a. Yes [ ]
b. No [ ]

8. Do you have the right to cut and replant cocoa farm?

a. Yes [ ]
b. No [ ]

Section B: Output and Productivity through the Rehabilitation Programme

Indicate the extent to which you agree or disagree with the following statements on increased in production of the farmers through the rehabilitation programme. Please circle the number that best represents your opinion: *(1) = Strongly Disagree, (2) = Disagree, (3) = Not Sure, (4) = Agree, (5) = Strongly Agree*

S/N	Statement	1	2	3	4	5
1	I undertake shaded agroforestry system					
2	I undertake no-shaded monocropping					
3	I have an action plan for my cocoa rehabilitation					
4	Cocoa Agronomists have helped to develop protocols and techniques on how and when to rehabilitate my cocoa program					
5	My cocoa trees are productive and yields between 50 to 125 kg ha^{-1} per year					
6	The rehabilitation program helps me to cultivate on large scale					
7	The rehabilitation program increase Revenue					
8	The rehabilitation program ensures high yield					
9	It increase production					
10	The rehabilitation program is more efficient					
11	Membership of FBO positively affects production					
12	I Receive incentives from NGOs					
13	I will recommend cocoa rehabilitation to any other farmer any day					
14	Generally, I undertake most of these rehabilitation process: early intercropping, shade regulation, stumping, replanting, complete replanting of the orchard, replanting in stages, selective replanting of trees, reconstructing cocoa tree crowns using basal suckers, planting new cacao under old cacao used as temporary shade, with or without grafting them, propagating elite trees, various types of pruning and pollarding to regulate cocoa crown's shape and size					

Section C: Improvement in Farmers Economic Status through the Rehabilitation Programme

Indicate the extent to which you agree or disagree with the following statements on the improvement in farmers' economic status through the rehabilitation programme. Please circle the number that best represents your opinion: *(1) = Strongly Disagree, (2) = Disagree, (3) = Not Sure, (4) = Agree, (5) = Strongly Agree*

S/N	Statement	1	2	3	4	5
1	Cocoa rehabilitation is cost effective					
2	Cocoa rehabilitation saves time					
3	Cocoa rehabilitation retains original knowledge					
4	Cocoa rehabilitation provides a competitive advantage					
5	Systematic risk management helps in the quantification of uncertainty during rehabilitation					
6	Cocoa rehabilitation provides a useful insight into the program					
7	Cocoa rehabilitation leads to inefficient and poor performance of farmers					
8	The continuous changes and interference during rehabilitation by COCOABOD STAFF is a factor that undermine the performance of cocoa farmers					
9	The rehabilitation programme increase my income level					
10	It increases the price level of our beans					
11	My profit margin is increased through the rehabilitation programme					
12	The rehabilitation programme poverty					
13	The rehabilitation programme encourages the use of child labour					
14	The price strategy enhances our competitive position					
15	I am committed to efficient input or farm utilization					
16	I am committed to enhancing quality products/services to my customers					
17	My farm has experienced improvement in sales and market share in the last two years					
18	I am able to meet tax obligations					
19	I record decrease in the sales cost					
20	I record decrease in the cost for pesticides and disinfectants					
21	I record decrease in the cost for fertilizer					
22	I record decrease in the cost for general input usage					
23	I record an improvement in income on sales of cocoa beans.					
24	I record an improvement in the overall farm's profit.					

Section D: Challenges Farmers Encounter in Their Rehabilitation

Indicate the extent to which you agree or disagree with the following statements on the problems farmers encounter in their rehabilitation. Please circle the number that best represents your opinion: *(1) = Strongly Disagree, (2) = Disagree, (3) = Not Sure, (4) = Agree, (5) = Strongly Agree*

Problem	**1**	**2**	**3**	**4**	**5**
Challenges of cocoa production as perceived by farmers					
Difficulty in obtaining farm inputs					
Lack of Adequate Credit Facilities					
Unsatisfactory loan agreement conditions by creditors					
Low cocoa prices					
Pests and Diseases					
Unfamiliarity of modern methods of farming					
Late distribution of farm inputs by government					
Poor Land Tenure systems and conditions					
Bush Fires					
Land degradation by 'galamsey' operators					
Flooding					
Irregular rainfall pattern					
Poor Standard of Living					
Poverty					
Poor road network					
Lack of adequate storage facilities					
Challenges of cocoa production as perceived by licensed buying companies					
High Level of Illiteracy of farmers					
Aged Cocoa farmers					
Insufficient Agricultural Extension Officer					
Poor road network					
Warehousing and Storage Challenges					
Lack of cordial relationship with COCOBOD					
Aging cocoa trees					
High Cost of Financing Farmers					
Inadequate government support					
Difficulty in meeting set target by COCOBOD					
Cheating on the part of Purchasing Clerks					
Smuggling					
Challenges of cocoa production as perceived by COCOBOD					
Lack of enough motivation for the youth to enter into farming					
Inadequate funds to buy and distribute farm inputs					
High Illiteracy level of farmers					
Insufficient support from government					
Inadequate agricultural extension officers					
Insufficient storage facilities					
Poor road network					
Inadequate motivation for farmers					
Land degradation from the activities of 'galamsey'					

operators					
Irregular rainfall pattern					
Communication gap between Cocobod and LBCs					
Low collaboration of cocoa supply chain partners					
Smuggling					

Thank you.

Secondary Data Schedule

Year	Output/kg	Price	Annual income (GH₵)
2022			
2021			
2020			
2019			
2018			
2017			
2016			
2015			
2014			
2013			
2012			
2011			
2010			
2009			
2008			
2007			
2006			
2005			
2004			
2003			
2002			
2001			
2000			

APPENDIX II