THE EFFECT OF ACCESS TO AND USE OF AGRICULTURAL INFORMATION ON THE LIVELIHOOD OF COCOA FARMERS

BY

ISAAC AIKINS

(10162648)

THIS THESIS IS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF MPHIL AGRICULTURAL EXTENSION DEGREE

DEPARTMENT OF AGRICULTURAL EXTENSION, SCHOOL OF AGRICULTURE, COLLEGE OF BASIC AND APPLIED SCIENCES, UNIVERSITY OF GHANA

JULY, 2014

Declaration

I, Isaac Aikins, do hereby declare that with the exception of references to other people's work, other work herein submitted is entirely the product of my own research under supervision and has not been presented for any other degree elsewhere.

……..…… ……..……

ISAAC AIKINS DATE

(STUDENT)

……..…… ……..……

DR. PASCHAL B. ATENGDEM DATE

(SUPERVISOR)

……...……..… ……..……..…

DR. SETH D. BOATENG DATE

(CO-SUPERVISOR)

Abstract

Cocoa remains Ghana's most important crop, providing a means of livelihood to about two million people. As a result of the liberalization of the sector, there have been several providers of services to farmers particularly agricultural information. In agriculture, the role of information in enhancing the agricultural development cannot be over emphasized. Information is essential for increasing agricultural production and improving marketing & distribution strategies. Concerns still persist as to the differences in the access to and use of agricultural information leading to differences in livelihood outcomes of farmers. The study's main objective was to assess the effect of access to and use of agricultural information on the livelihood of cocoa farmers. The study used survey research methodology with a sample size of 260 cocoa farmers within the Sefwi Bekwai Cocoa District of Ghana. Primary data was collected using structured questionnaires. The data was analysed using descriptive and inferential statistics. The study showed that the cocoa farmers get information on cocoa farming mainly through radio (95.4%), Television (75.0%), Family/Friends (70.8%) and COCOBOD/MoFA (49.2%). The use of information from family/friends was the highest with a mean of (3.85) followed by information from agro - input dealers (3.64), COCOBOD/MoFA (3.47) and Farmer groups (3.33). The study also found that, there was a moderate level of access to agricultural information by the farmers as indicated by 62.3% of the respondents. Farmers' level of use of accessed agricultural information was low, indicated by 48.1% of the respondents. The farmers' characteristics and institutional factors significantly influenced access to agricultural information ($R^2 = 0.498$, $F(19, 240) = 12.515$, $p = 0.000$), additionally it significantly influenced the use of agricultural information ($R^2 = 0.514$, $F(19, 240) = 13.365$, $p = 0.000$). The significant predictor variables of farmers' access to agricultural

information were household size, labour availability, group membership, farmers' information seeking behaviour and farmers' attitude towards improved farming practices. The use of agricultural information was significantly influenced by household size, off – farm work, labour availability, group membership and farmers' information seeking behaviour. There was a significant relationship between level of access to information and level of use of information ($R^2 = 0.897$, $F(5,254) = 440.16$, $p = 0.000$). The significant variables were frequency of access to information, clarity of language used and the relevance of the information disseminated. A statistically significant relationship existed between level of farmers' use of agricultural information and the following variables: level of farmers' yield per hectare, level of average annual income, extent of satisfaction of basic needs and basic household assets possession at 5%. There was a statistically significant relationship between the level of access to agricultural information and its use. The study revealed that sources of information that have direct contact with the farmers were highly used. It is therefore recommended that face to face interaction with the farmers should be frequent, timely training of input dealers to equip them with more technical know-how and cocoa farmers should be encouraged to subscribe to the farmer groups that abound in their localities.

Dedication

This work is dedicated to my lovely Mother, Madam Ama Arkoh and my Grandmum Madam Sarah Aidoo.

Acknowledgements

I would like to express my utmost gratitude to my supervisors; Dr. Paschal B. Atengdem and Dr. Seth D. Boateng for their academic guidance and giving me the possibility to complete this thesis.

Special thanks to lecturers in the Department of Agricultural Extension, University of Ghana Dr. (Mrs) Comfort Freeman, Dr. Jonathan N. Anaglo and Ms. Jemima Yakah for academically shaping my life. Also to my Academic Mentor Prof. Samuel Adjei – Nsiah, you have been such an inspiration and of great help to me.

God bless you all and increase you.

Table of Contents

List of Figures

List of Tables

List of Abbreviations

ANOVA	–	Analysis of Variance
COCOBOD	–	Ghana Cocoa Board
CODAPEC	–	Cocoa Disease and Pest Control
CSD	–	Cocoa Service Division
CSSVD-CU	–	Cocoa Swollen Shoot Virus Disease Control Unit
ERP	–	Economic Recovery Program
FAO	–	Food and Agriculture Organization
GDP	–	Gross Domestic Product
GSS	–	Ghana Statistical Service
ICTs	–	Information Communication Technologies
ISSER	–	Institute for Statistical Social and Economic Research
JHS	–	Junior High School
MoFA	–	Ministry of Food and Agriculture
MT	–	Metric Tonnes
NAADS	–	National Agricultural Advisory Services
NGOs	–	Non Governmental Organizations
PBC	–	Perceived Behavioural Control

SHED	–	Cocoa Health and Extension Division
SHG	–	Self Help Group
SN	–	Subjective Norm
SPSS	–	Statistical Package for Social Sciences
TORA	–	Theory of Reasoned Action
TPB	–	Theory of Planned Behaviour

CHAPTER ONE: INTRODUCTION

1.1 Background of the study

Agriculture is a key sector of Ghana's economy. It used to be the sector dominating in terms of contribution to Gross Domestic Product (GDP) and employment until the rebasing of the economy when its share has continued to decline (ISSER, 2013). Nevertheless, the decline can be said to be minimal since the sector still continues to play a key role in the promotion of food security and poverty reduction. It currently gives employment to about 50% of the working population and accounted for 22.7% of Ghana's GDP as at the end of 2012, it earned the nation US$3,225 million in foreign exchange in 2012 (ISSER, 2013). The sector itself is composed of five subsectors, namely cocoa, crops, livestock, fisheries and forestry.

Cocoa continues to be a crop of great importance because of its contribution to the economy of Ghana (MoFA, 2011). Cocoa has remained one of the most important commodities in the world as its products are consumed in both producing and non-producing countries because of its numerous health benefits. Over 90% of global cocoa production is cultivated by an estimated 5.5 million smallholders with more than 20 million family members directly dependent on cocoa for their livelihoods (Weiligmann, Verbraak & Van, 2010). Essegbey & Ofori-Gyamfi (2012), states that the crop is a major income earner and gives employment to many smallholder households with varying farm sizes of up to 5 hectares.

Greater emphasis has been placed on the prominence of cocoa to the socio-economic development of Ghana because it contributes substantially to the foreign exchange earnings of the agricultural sector of Ghana. In 2012 for example, the cocoa sector contributed 20.47% of the total foreign exchange earnings of the country (ISSER,

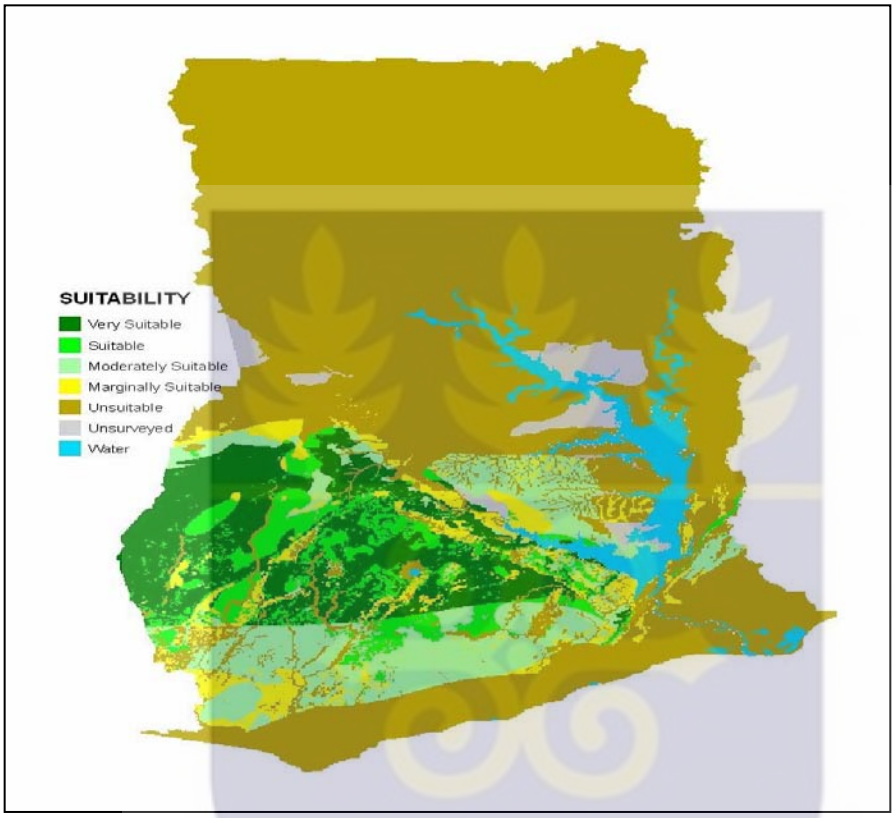
2013). Cocoa will remain the most important crop in the agricultural export sector, accounting for about 44% of agricultural exports by 2015 and contributing about 20 percent of foreign-exchange earnings (Breisinger, Diao, Kolavalli & Thurlow, 2008).

Lundstedt & Pärssinen (2009), put it in simple terms that "*Cocoa is Ghana, Ghana is Cocoa"*, in the sense that it contributes significantly to the economy of Ghana in terms of employment creation and the second highest foreign exchange earner to the country. The crop has been the main source of livelihood to many farmers in the country after its successful introduction in 1876 by Tetteh Quarshie from Fernando Po (Leiter & Harding, 2004). Eight hundred and sixty five thousand (865,000) people are estimated to be cocoa farmers in Ghana and an estimated 2 million people livelihoods hinges on cocoa (Gakpo, 2012).

According to Gockowski, Weise, Sonwa, Tchtat & Ngobo (2004), cocoa contributes about 70-100 percent of the annual household income of smallholder cocoa farmers and has supported Ghana's socio-economic growth for decades which includes employment creation, roads, schools, water systems among others. There has been a reduction in poverty among cocoa-producing households from 60.1% in the early 1990s to 23.9% in 2005 (World Bank, 2007). Ghana is the world's second largest producer of cocoa after Cote d'Ivoire (ICCO, 2012). An estimated total area of about 1.6 million Hectares of cocoa is under cultivation in Ghana as at 2012 (MoFA, 2013). Ghana in 2012/13 produced 835,410 MT of cocoa beans (COCOBOD, 2013). Six major regions in Ghana produce cocoa which all found south of the country (Vigneri, 2007). The regions and their contribution to total cocoa production in Ghana are Ashanti (16.59%), Brong Ahafo (9.97%), Eastern (7.78%), Western (North and

South) (57.71%), Central (7.63%) and Volta (0.32%) for the 2010/2011 cocoa season (COCOBOD, 2012). Figure 1.1 is a map showing cocoa growing areas in Ghana.

Figure 1. 1: Map of Cocoa Growing Areas in Ghana and their suitability for cultivation



Source: Breisinger et al. (2008)

Cocoa production in Ghana rose from 36.3 MT in 1891 to about 557,000 MT in 1964/65 making the country the leading producer with a market share of 33%. This later dropped to an all-time low of 158,956MT in the 1983/84 cocoa season with a world market share of 9% making it loose its number one position (Adjinah & Opoku, 2010). The decline in production in the 1980s was attributed to the 1983 drought and bushfires, pest and diseases (Anang, Mensah & Asamoah, 2013).

There was a recovery in 1983 when the then government initiated an economic recovery programme (ERP) which included rehabilitation of old farms, increase in farm gate prices of cocoa and compensation for the rehabilitation of farms infected with cocoa swollen shoot virus. This triggered most farms to be rehabilitated raising the production figure to 400,000 MT by 1995/6 (Kolavalli & Vigneri, n.d). Vigneri & Santos (2008), reports of high growth from 400,000 MT in 2001 to an all-time high of 1 million MT in 2010/11 cocoa season due to an amalgamation of higher world market prices and intervention rolled out by COCOBOD including CODAPEC and High- Tech to promote the use of fertilizer. It is also attributed to the intensification of extension activities and other cocoa sector policies implemented by government and private sector players which led to adoption and improvements in farming practices (Dzene, 2010)

The unparalleled increases in the 2010/11 cocoa season did not see Ghana capture its former glory of the number one producer of cocoa producing 24% as compared to 32% of Cote d'Ivoire of the total world production in the 2010 / 2011 season (CTA, 2011). This has even decreased to 22.3% in the 2011/12 cocoa season compared to 35.3% of Cote d'Ivoire (ICCO, 2012). The decline is attributed to drier weather and fall in prices on the world market (CTA, 2012). Figure 1.2 below displays Ghana's yearly cocoa production figures from 2000/01 to 2012/13 cocoa season.

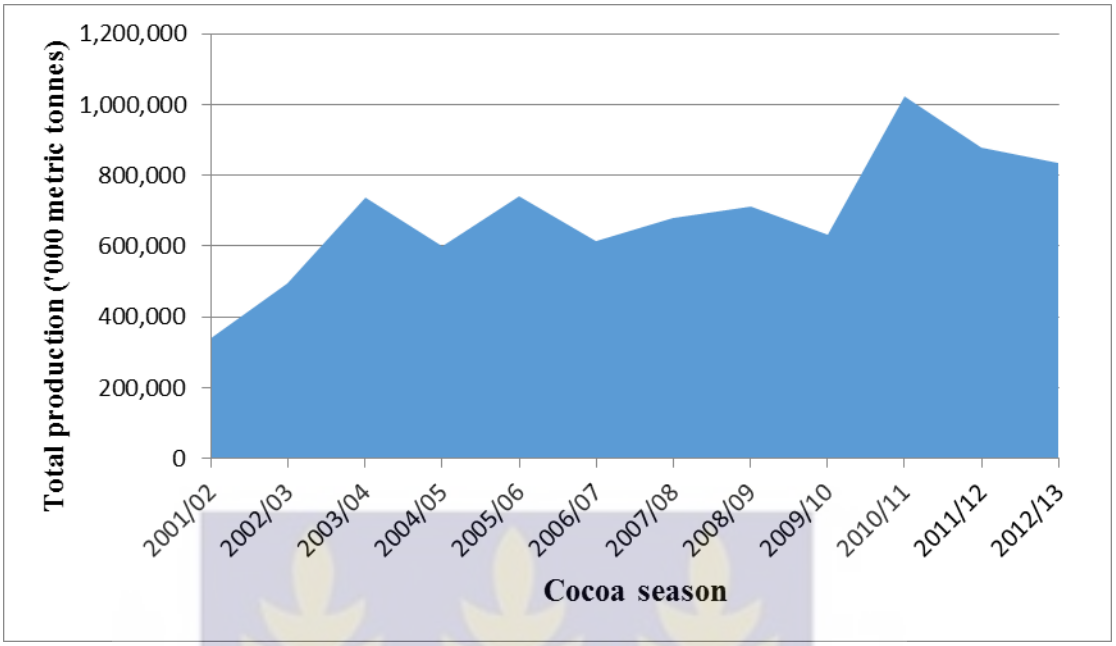


Figure 1. 2: Yearly cocoa Production in Ghana from 2000/01 to 2012/13 cocoa season (Source: COCOBOD 2013)

Ghana has a high prospect for cocoa production. However, According to Dormon, Van Huis, Leeuwis, Obeng-Ofori & Sakyi-Dawson (2004) production is constrained by low yield due to socio-economic, technical and biological factors. These include access to extension and inputs and the ability of farmers to purchase recommended agro-inputs as well as diseases and pest. Ghana's cocoa sector's growth has been achieved mainly through increase in cultivated area rather than intensification of the already cultivated area (MOFA, 2006; COCOBOD, 2007). The average yields of cocoa farms in Ghana are very poor compared to other producing countries, suggesting potential for productivity driven growth (FAO, 2005; ICCO, 2007). Whilst the average cocoa yield in Malaysia is 1800 kg per hectare and 800 kg per hectare in Cote d'voire, it is only 400 kg per hectare in Ghana (Barrietos et al., 2008). Kolavalli & Vigneri (n.d), state that the difference between observed yields and achievable yields in Ghana lies between 50 to 80 % depending on practices adopted

by the farmers such as fertilizer application. Factors such as pests, diseases, ageing trees, poor farm maintenance, inadequate and quality extension services are attributed to the low productivity and have the capacity to diminish the incomes of farmers putting off young potential cocoa farmers' (IPEC, 2013).

Binam, Gockowski & Nkamleu (2008) asserts that Ghana appears to be the least efficient in cocoa production compared to other cocoa producing countries in West Africa like Nigeria, Cote d'voire and Cameroon; Which (Nkamleu, Nyemeck & Gockowski, 2010) suggested could be enhanced through the improvement of the technical efficiency or improving technological applications. Central to the quest to increase on-farm productivity rests on the knowledge state of farmers and adequate use of agro-inputs to fight pest and diseases. It is estimated that in sub-Saharan African, fertilizer use is averagely 8 kg/ha per annum compared to 100–200 kg/ha in developed agricultural economies which is a serious constraint to agricultural productivity (IFDC, 2006). In Ghana, IFDC (2012) reports of the use of fertilizer on only 20% of cultivated area in the 2010/11 cocoa season with an application rate of 496kg/Ha.

Key to enhancing high fertilizer usage is affordable fertilizer prices, good returns from farm produce, improved knowledge of fertilizer use, rural input credit schemes and efficient distribution system (Dayo, Nkonya, Pender & Oni, 2009). In achieving agricultural advancement, reduction in poverty and food security, agricultural extension and rural education is tipped to be very important by experts (Swanson & Rajalahti, 2010). In addition, dissemination of information on new technologies, more effective management options, and better farming practices to farmers is done through Agricultural extension (Owens, Hoddinott & Kinsey, 2003).

In Ghana, the Cocoa Services Division (CSD) was the sole unit for the procurement and distribution of inputs before 1996. In addition, the CSD was also responsible for cocoa extension services, advising farmers in cocoa and coffee production, the production and distribution of planting materials, and the control of pests and diseases (Amezah, 2004). The cocoa sector experienced a restructuring starting 1983 and according to Shepherd & Onumah (1997), one important change introduced during the reforms was the internal liberalization of the marketing system to private competition in 1992/93 which had been monopolized for over almost 15 years by the government's internal purchasing agent, the Produce Buying Company. Input supply to farmers was solely done by the CSD of COCOBOD and was later privatized in 1995 as a result of failure to reach the remote areas of cocoa production (Shepherd & Farolfi, 1999; Laven, 2007). This was to increase competition in the inputs industry and also to make available the inputs on the market at the right time and quantities at a much lower price (Ton, Hagelaar, Laven, & Vellema, 2008).

Cocoa extension in Ghana which was a responsibility of Cocoa Services Division became the responsibility of the Agricultural Extension Services of the Ministry of Food and Agriculture (MOFA) in 2000. The merger was to offer more cost-effective agricultural extension services to farmers. Since most cocoa farmers also cultivate other crops and keep livestock, it was thought best to consider them as general farmers and therefore to provide services under a unified extension services system (Ministry of Finance, 1999; Dormon, 2006). In 2010, the CSD was re-structured into Cocoa Swollen Shoot Virus Disease Control Unit (CSSVD-CU) now Cocoa Health and Extension Division (CHED) to rehabilitate moribund farms above 30 years and also to take back the provision of extension services to cocoa farmers on a PPP

platform with some License Buying Companies and other international NGOs (Personal communication, L. Fiakeye, CHED, October, 2013).

1.2 Problem Statement

Agricultural extension agencies in the developing countries are very important entities in rural development policy because they provide information and other support services to farmers which help improve farm and non-farm incomes (Adebayo, 2004). The irregular provision of extension services to cocoa farmers (Osei-Bonsu, Baah & Afrifa, 2001) as a result of Ghana's Cocoa Extension's merger with MoFA in 2000 (Amezah & Hesse, 2002) called for the involvement of private agencies such as the licensed buying companies (LBCs), farmer organisations, NGOs and other Non-State service providers to provide advisory services to cocoa farmers (Baah, 2002).

The License Cocoa Buying Companies in order to attract more farmers as a result of the competition from the liberalization of the internal cocoa marketing has gone into the provision of advisory services to cocoa farmers. Additionally, pressure from the media and Consumer Organizations on the international cocoa buyers have compelled the License Buying Companies to go into the development of certification schemes which is much concerned with the provision of information on labour practices and sustainable cocoa production (Ton et al., 2008). Several companies are operating certification schemes such as UTZ, Rainforest Alliance, Fairtrade and Organic through the provision of services to farmers such as the provision of agricultural information and the provision of agro-inputs to cocoa farmers (Hütz-Adams & Fountain, 2012)

There are also several Non-Governmental Organizations who are also offering extension services to cocoa farmers in Ghana. Ton et al. (2008) report of the active

participation of the private sector and NGOs in Ghana's cocoa sector beside public interventions in the provision of services in the areas of extension and inputs provision. The privatization of cocoa inputs supply in 1995 (Shepherd & Farolfi, 1999; Laven, 2007) introduced several local level agro-inputs dealers in the supply chain. With the foregoing literature, it is evident that there are several actors in the provision of agricultural services to cocoa farmers in Ghana with agricultural information a core component of their services.

The importance of cocoa farming is very enormous as it touches the lives of about 2 million people in Ghana (Gakpo, 2012), thus any resource that will improve it will directly affect the lives of the majority of the dependents. Information has been identified as one of the resources required for the improvement of cocoa production. Mgbada (2006) stated that access to information by farmers at the right time is very essential to increased agricultural productivity therefore for farmers to function very well, they need information. Constant information is needed on agronomic practices, disease and pest control, postharvest practices, credit facilities, diversification of livelihoods etc. All these information when acquired and effectively utilized by the farmers will bring an improvement in agricultural productivity and bring about increase improvement in livelihood outcomes. This is explained by DFID (2001) as the aspirations of households which is made up of increased income, improved food security, reduced vulnerability and more sustainable use of the natural resources.

A study by Dercon, Gilligan, Hoddinott & Woldehanna (2007) stated that one extension visit to farmers decreases farmers' likelihood of being poor by 10%. The analysis by Owen, Hoddinott & Kinsey (2003) on the impact of extension services on agricultural production in Zimbabwe also concluded that farmers' access to extension services increases the value of output by 15%. Benin et al. (2007) found out that there

was an increase in income, assets, food and food security in a section of farmers as a result of the use of national agricultural advisory services in Uganda. Additionally, in investigating the influence of conservation agriculture on farmers' livelihood, Nkala, Mango and Zikhali (2011) found out that there was an improvement in crop yield which translated into more income for the household, increase in household and farming assets and improvement in the social capital of the farmers.

The literature shows clearly that the use of agricultural information results in the improvement of farmers' livelihoods. However, there have been observed differences in production outcomes resulting in differences in livelihood outcomes depending on the farmers' level of access to and use of information. Ojo, Bila & Iheanacho (2013), observed differential access to technologies and support services leading to differences in productivity. Furthermore, Agbebi (2012) observed different levels of yield and profits among fish farmers in Nigeria due to differences in the application of improved practices and different levels of access to and use of extension services respectively.

The differences in the production outcomes which to some extent determines farmers' livelihood outcomes has been noted to be as a result of differences in access to and use of agricultural information. Empirical evidence from literature points to the fact that, access to and use of agricultural information are likely to be influenced by factors such as socio-economic characteristics of the farmer, institutional factors and the farmer's orientation towards improved farming. Rehman (2010), Koskei, Langat, Koskei & Oyugi (2013) argued that access to agricultural information by farmers is influenced by their socio-economic variables. In addition, Ojo, Bila, & Iheanacho (2012) found socio-economic and institutional factors such as years of schooling,

family size, and age, farming experience, farm size, extension contact, other occupations and group membership as factors which influenced access to production resources by women farmers. Jayawardana & Sherief (2010), Martínez-García, Dorward, & Rehman (2012a; 2012b) report of uptake of improved practices by farmers largely influenced by institutional factors and farmers' orientation towards improved farming such as; access to credit, extension service, attitudes, social pressures, farmer innovativeness and information seeking behaviour.

Therefore, the focus of this study is to find out the effect of access to and use of agricultural information on the livelihood of cocoa farmers. Based on the above, the study seeks to ask the following research questions;

1.3 Research Questions

The study sought to answer these questions;

1. What relationships exist between farmer characteristics, institutional factors and access to agricultural information?
2. Is there any relationship between farmer characteristics, institutional factors and the use of agricultural information?
3. Do relationships exist between the level of use of agricultural information and the livelihood outcomes of cocoa farmers?
4. Is there any relationship between the level of access to agricultural information and the level of its use?

1.4 Objectives of the study

The overall objective of this study is to assess the influence of the level of access to and use of agricultural information on the livelihood outcomes of cocoa farmers' in the Sefwi Bekwai Cocoa District of Ghana.

The specific objectives are to;

1. Ascertain the relationship between the characteristics of farmers, institutional factors and access to agricultural information.
2. Determine the relationship between farmers' characteristics, institutional factors and the use of agricultural information.
3. Establish the relationship between the level of access to agricultural information and the level of the use.
4. Determine the relationship between the level of use of agricultural information and the livelihood outcomes of cocoa farmers.

1.5 Relevance of the study

All development actors like extension services, NGOs, inputs providers and other development agencies involved in agricultural development, especially with smallholder farmers, must be aware of the factors influencing cocoa farmers access to and use of agricultural information. It is important for policy makers to understand whether the existing agricultural information services provision assures the smallholder cocoa farmers of sustained support and to make useful policy changes to facilitate meaningful interventions in periods of need.

This would recommend policy strategies that must be pursued in order to ensure that farmers have access to agricultural information in the area and the country at large.

This would engender the growth, sustainability of the crop and diversification in livelihoods of cocoa farmers which will invariably aid in the achievement of the first millennium development goal of eradicating poverty and hunger in the growing areas. The study would also contribute to knowledge on factors that affect cocoa farmers' access to and use of agricultural information and the influence of the level of use on the livelihood outcomes of cocoa farmers.

1.6 Operationalization of Terminologies

Operationalization is the description of a variable so that it can be measured which helps in the removal of vagueness (Williamson, 2008).

1.6.1 Access

The study defines access as the availability of agricultural information from different sources and extension methods such as mass media and the opportunity of cocoa farmers to make use of this information. According to March, Smyth & Mukhopadhyay (1999), access is defined as the opportunity to make use of a resource. Access according to this study is the frequency at which farmers receive information, time of receiving it, clarity of the information received, the clarity of the language used in the dissemination and the relevance of the information disseminated.

1.6.2 Use

Use in this study relates to the application of agricultural information by the households in their agricultural production activities. The study measures it by using the frequency of use of the information received from the various sources.

1.6.3 Orientation towards improved farming

Farmers Orientation towards improved farming for this study is operationally defined as the basic attitudes of farmers towards improved farming. It was constituted by farmers' attitude towards improved farming practices, innovation proneness, achievement motivation and information seeking behaviour.

1.6.4 Institutional Factors

Institutional factors in this study are the factors that facilitate and enhance access to and use of agricultural information. They are factors such as access to credit, frequency of agro-input market visits, distance to the nearest agro-input market and group membership.

1.6.5 Livelihood Outcomes

This explains the results or product of cocoa farmers' use of agricultural information and other assets. It was made up of farm yield, income, satisfaction of basic household needs and possession of basic household assets and farm tools. Yield is the quantity of harvest per hectare, average annual income is the total of all on- farm and off – farm income annually and basic household satisfaction is how well household heads are able to provide food, health care, education, shelter, clothing and water for their households. Household assets possession on the other hand is the number of basic household assets and farm tools possessed by a farmer.

1.7 Study Area

The research was undertaken in the Sefwi Bekwai Cocoa District of Ghana. The District politically, is located in the Western Region of Ghana but COCOBOD classifies it as Western North Cocoa Region of Ghana. It shares boundaries with

other Cocoa Districts such as Akontombra, Boako, Nkawie, Sankore and Dunkwa. The Western Region is noted for high cocoa production producing about 591,232 MT of Ghana's total cocoa production of 1,024,553MT in the 2011/2012 cocoa season (COCOBOD, 2012).

The District is located in the Equatorial Climate with annual rainfall average between 1200mm and 1500mm. The pattern is bimodal, falling between March – August and September- October. The dry season is noticeable between November- January and the peak periods are June and October. The average temperature throughout the year is about 26°c. There is a high relative humidity averaging between 75% in the afternoon and 95% in the night and early morning. The implication here is that the climate of the area is suitable and can facilitate the growing of most traditional and non- traditional crops for exports. The district falls within the Equatorial Rain Forest Zone. The natural vegetation is a moist-deciduous forest (Bibiani Anhwiaso Bekwai District, 2006)

1.8 Organization of the thesis

The organization of this thesis is as follows: Chapter one gives a general introduction to the study. This includes the background, problem statement, objectives of the study, research questions, hypothesis and justification for the study as well as structure of the thesis. Chapter two covers a review of the literature and the theoretical perspectives providing insight into concepts and issues relevant to the study of access to and use of agricultural information. Chapter three gives a vivid description of the methodology of this research. It describes the research design, study population, sample size, sampling procedure, research instruments, sources of data, method of data collection, the analysis of data and the analytical methods.

The chapter four presents a detailed outcome discussion of the research results (that is findings and interpretations). This is done in line with the specific objectives of the study. Chapter five, which is the last chapter, gives a summary of findings, conclusion and recommendations based on the findings of the study.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The literature review is divided into three main sections and sub-sections. In the first section, the conceptual framework of the study is presented, the theoretical perspective follows in the second section and review of literature on agricultural information, factors influencing its access and use and livelihood outcomes follow in the third section

2.2 Conceptual Framework

To enhance the livelihood outcomes of cocoa farmers in developing countries, access to and effective use of agricultural information by farmers play crucial roles. This study assumes that cocoa farmers in Ghana are embedded with a lot of complex roles and constraints in the agricultural production sector. In this study, efforts are made to identify factors affecting access to and use of agricultural information from literature, practical experiences and field observations of the research.

The conceptual framework of this study is based on the assumption that access to and use of agricultural information is influenced by a number of characteristics of the farmer and some institutional factors. The conceptual framework presented in Figure 2.1 presents the most important variables hypothesized to influence the access to and use of agricultural information by cocoa farmers and its consequent livelihood outcomes

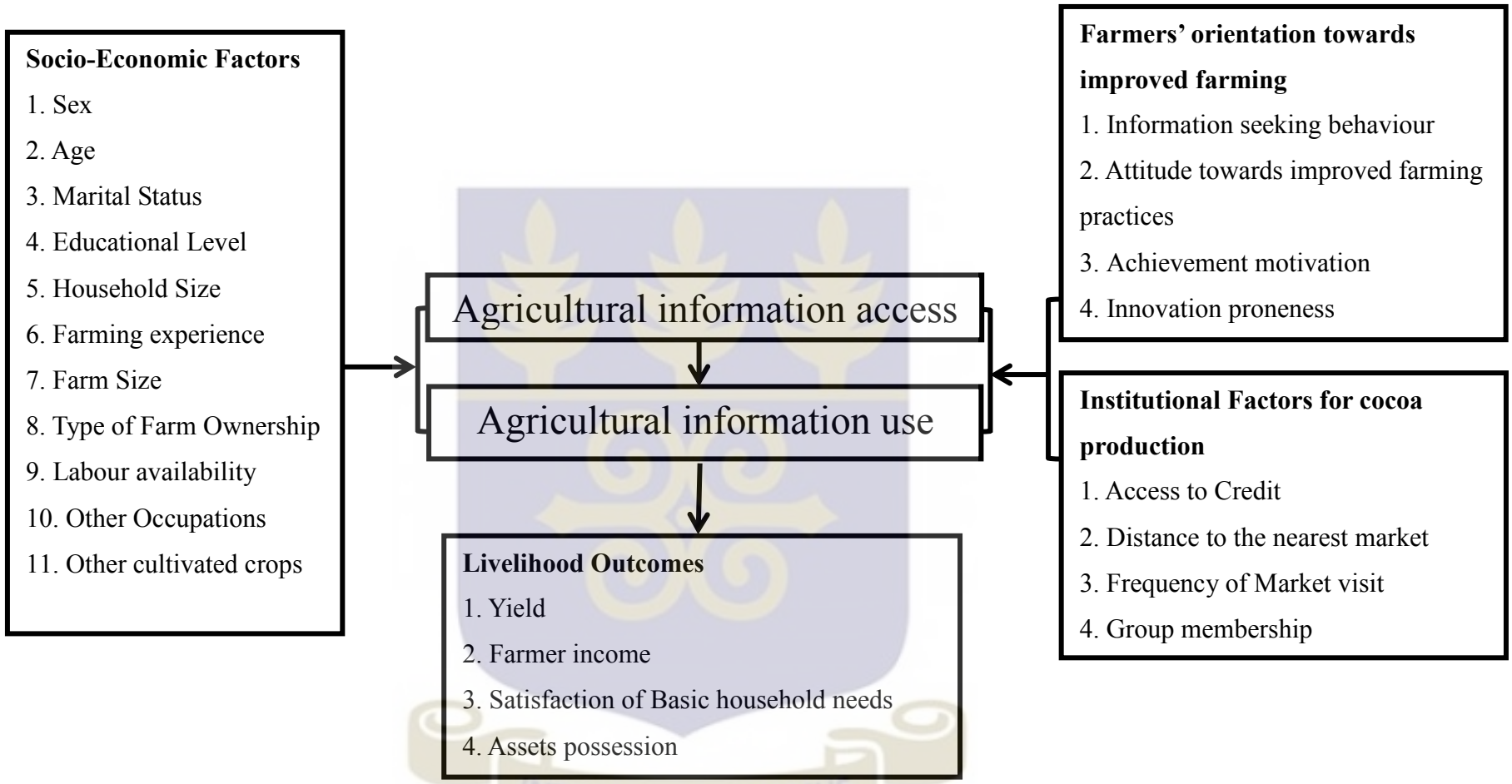


Figure 2. 1: Conceptual framework

Source: Author's conceptualization

2.3 Theoretical Background

This section of the chapter focuses on the theoretical reflections of the problem under investigation.

2.3.1 The theory of Diffusion of Innovation

The study of the diffusion of innovations emerged as a prominent research field after the publication of a seminal work by Ryan & Gross (1943), who analysed the adoption of hybrid corn seeds among farmers in two communities in Iowa, highlighting the importance of communication processes. The term *innovation*, which scholars from different fields of thought (e.g., Rogers 2003; Damanpour & Schneider, 2006) refer to it as different concepts, such as ideas, practices, products, services, processes, technologies, policies, structures, and administrative systems that the adopting unit perceives as new. For example a new innovation is a new type of insecticide for adoption which can reduce the devastating effects of insects, some innovations also manifest themselves in behavioural forms such as improved cultural practices. Heemskerk (2005) termed agricultural innovation as the result of a social negotiation between farmers.

Roger's diffusion of innovation theory published in 1962 describes the factors that may motivate people to adopt new technologies over time. The theory explains the behaviour of the adoption of new technology. For example, those individuals who are most likely to adopt a new technology first are called early adopters. Early adopters are made up of opinion leaders, who are respected by their peers in a local setting. They are the first individuals within a local setting to adopt a new innovation and then provide an evaluation of the innovation to peers. On the other hand, "laggards are the last in a social system to adopt an innovation (Rogers, 1995, p. 265).

Diffusion of innovations is referred to by (Brown 1981; Stoneman 2002) as the spread of innovations across social groups over time, that could be individuals, companies or governments. From the definition, innovation, communication channels, time, and social groups are the four key components of the diffusion of innovations.

Rogers (2003), defines communication as "a process in which participants create and share information with one another in order to reach a mutual understanding" (p.5) which occurs through channels between sources. "A *source* is an individual or an institution that originates a message and the channel is the means by which a message gets from the source to the receiver" (Rogers, 2003, p.204). Diffusion is a specific kind of communication which includes: an innovation, two individuals or other units of adoption, and a communication channel. Mass media and interpersonal communication are two communication channels. The mass media channels include TV, radio, or newspaper and interpersonal channels consist of a two-way communication between two or more individuals.

On the other hand, "diffusion is a very social process that involves interpersonal communication relationships" (Rogers, 2003, p. 19). Thus, interpersonal channels are more powerful to create or change strong attitudes held by an individual. Finally, a social system is considered as interactions among individuals to solve a joint goal (Rogers, 2003). Four major factors interact to influence the diffusion of an innovation (Rogers, 2003); the innovation-decision process theory, the individual innovativeness theory, the rate of adoption theory, and the theory of perceived attributes.

(i) Innovation-decision process theory

Nutley, Davies & Walter (2002) explains that the innovation-decision process theory is based on time and five distinct stages. The stages are knowledge, persuasion, adoption, implementation, and confirmation. Potential adopters must first be made aware of the innovation followed with persuasion from the source as the product being good for the user. A decision is then taken by the adopter to adopt or not to adopt, and once adopted, implementation follows and confirmation and once these processes take place diffusion is said to have resulted (Rogers, 2003).

(ii) Individual innovativeness theory

Innovativeness theory is based on the adopter and the innovation which is represented by a bell-shaped to illustrate the percentage of individuals that adopt an innovation (Nutley et al., 2002). Rogers (1995) states that the diffusion is influenced by the following factors: whether the decision is made collectively, by individuals, or by a central authority; the communication channel used to disseminate the innovation, whether mass media or interpersonal; the nature of the social system in which the potential adopters are embedded, its norms, and the degree of interconnectedness and the extent of change agents' promotion efforts. Prominent amongst them is the communication, or rather the process where information is both created and shared in order to reach a mutual level of understanding between individuals. This provides the means by which information is transmitted between individuals and social systems creating the communication channel (Rogers & Scott, 1997).

(iii) Theory of rate of adoption

The theory of rate of adoption is represented by an s-curve shape graph (Nutley et al., 2002). The theory states that innovation adoption grows slowly and gradually in the

beginning. It then assumes a period of rapid growth that will taper off and become stable and eventually decline (Rogers, 1995). Another aspect of importance is time. Innovations are seen to be communicated across space and through time.

(iv) Theory of perceived attributes

The theory of perceived attributes is based on the view that individuals adopt an innovation with the following perceived attributes (Nutley et al., 2002). The innovation must first have some relative advantage over an existing innovation or the status quo. Secondly, there must be compatibility with existing values and practices. Thirdly, the innovation should not be too complex. Fourthly, the innovation must be trial-able which means the innovation can be tested for a limited time without adoption and finally, there must be observable results in the adoption of the innovation (Rogers, 2003).

Several studies have been conducted using this theory to examine factors that influence farmers' adoption of new farm technologies. Some include conservation practices, precision technologies and conventional agricultural practices (Floyd, et al., 2003; Weir, & Knight, 2004). The results are inconclusive in either fully supporting or rejecting the theory's effectiveness in explaining adoption behaviour. However, there appear to be a consistent association between this theory, economic and social psychology theories. The innovation diffusion theory explains farmer behaviour more effectively when used in combination with the economic and social psychology theories (Floyd, 2003). This research explores the sources (channels) cocoa farmers rely on as sources of information for their activities.

2.3.2 The Theory of Planned Behaviour

The Theory of Planned Behaviour (TPB) (Ajzen, 1985) builds upon the Theory of Reasoned Action (TORA) which states that, a person's intention is a function of two basic determinants; the first one is a personal factor (an individual's positive or negative evaluation of performing the behaviour) and the second one reflects social influence (the person's perception of the social pressures put on him to perform or not to perform the behaviour in question) (Azjen, 1985). For example, if people evaluate the suggested behaviour as positive (attitude), and if they think their significant others want them to perform the behaviour (subjective norm), this results in a higher intention (motivation) and they are more likely to do so. Burton (2004) asserts that, the theory of planned behaviour (TPB) was created in order to include socioeconomic, socio-cultural, psychological and economic approaches into the behavioural analysis.

According to Ajzen (1991), behavioural intentions are a function of three components: attitude toward a behaviour, subjective norms (social pressure), and perceived behavioural control (self-confidence) which is a measure of a person's perceived ability to perform a behaviour and ability is intended to incorporate a person's consideration of resources and opportunities that are recognised as conditional for the performance of some behaviour. The TPB proposes that behaviour is predicted by the strength of an individual's intention to behave the way they do. Attitudes, subjective norms and perceived behavioural control are assumed to be predictable from an individual's beliefs about the behaviour. Behavioural intentions have been defined as the subjective probability that an individual will engage in a specified behaviour (Fishbein & Ajzen, 1975).

Intentions comprise all the motivation factors that affect behaviour and indicate how much effort an individual will exert to perform behaviour. According to (Ajzen,

1991), intentions are considerably accurate in predicting behaviour. Consequently, the theory predicts that the stronger an individual's intent to perform behaviour, the more likely the individual will engage in that behaviour. Attitude towards the behaviour refers to the individual's positive or negative assessment of engaging in the behaviour. An individual's attitude is a multiplicative component consisting of the individual's strength of belief associated with the behaviour and the individual's subjective evaluation or weighted importance of the beliefs attribute. The theory predicts that as the individual perceives the behaviour as favourable, he or she will more likely intend to perform the behaviour (Fishbein & Ajzen, 1975).

A subjective norm (SN) refers to the individual's perception of the social pressures to engage or not to engage in the behaviour. In particular, it encompasses an individual's perception of whether or not to engage in the behaviour as seen from his or her significant others.

Perceived behavioural control (PBC) refers to the individual's perceptions of the ease or difficulty of performing the behaviour. It predicts that the greater an individual perceives that he or she has control, the more likely the individual will intend to engage in the behaviour (Fishbein & Ajzen, 1975). An assumption underlying TPB is that most human behaviour is rational. TPB help us to explore the rationality that underlies the individual's decision to engage, or not engage, in behaviour (Zubair & Garforth, 2006).

Attitudes, subjective norms, and perceived behavioural control are shown to be related to a set of salient behavioural, normative, and control beliefs about the behaviour (Azjen 1985; 1991). The behavioural belief refers to an individual's positive or negative evaluation of self-performance of the particular behaviour. That is

the degree to which performance of the behaviour is positively or negatively valued (perceived benefits or consequences of taking the desired action). The normative belief refers to an individual's perception about the particular behaviour, which is influenced by the judgment of significant others e.g., other farmers', input dealers, friends, family members, etc (perceived opinions of others regarding one's performance of the behaviour).

Control belief refers to an individual's beliefs about the presence of factors that may facilitate or impede performance of the behaviour (Ajzen, 2001). The behavioural, normative, and control beliefs are influenced by a variety of socio-demographic factors, such as social, cultural, personal and situational factors which Burton (2004) states is the main reason for the introduction of TPB. The theory of planned behaviour would be more relevant to this study in the sense that there could be other external factors that may prevent a person from using agricultural information even though he/she may have intention to do so.

2.3.3 Theory of Motivation

Motivation has been measured to be consisting of three psychological variables. First, energizing or triggering behaviour, which is a cognitive process that gets individuals engaged in or turned off toward doing something; secondly, guiding behaviour, which defines why one course of action is chosen over another; thirdly, regulating persistence of behaviour, which describes why individuals persist towards goals (Alderman, 2004). Armstrong (2006) likewise discussed three constituents of motivation that are direction, effort and persistence.

Vrooms VIE (Valence, Instrumentality, Expectancy) looks at the role of motivation in the overall work environment (Vrooms, 1964). The theory, argues that people are

motivated to work when they believe that their efforts in the workplace will result in a desired outcome which was assumed by Vrooms in three folds (Robbins & Judge, 2008).

Expectancy: Expectancy can be described as the belief that higher or increased effort will yield better performance. This can be explained by the thinking of "If I work harder by doing things that will help boost my yield, I will make something better". Conditions that enhance expectancy include having the correct resources available, having the required skill set for the job at hand, and having the necessary support to get the job done correctly.

Instrumentality: Instrumentality can be described as the thought that if an individual performs well, then a valued outcome will come to that individual. Some things that help instrumentality are having a clear understanding of the relationship between performance and the outcomes

Valence means "value" and refers to beliefs about outcome desirability. There are individual differences in the level of value associated with any specific outcome. For instance, the yield from a farm will not be what will motivate a farmer but rather what other farmers will say about his farm when they see it doing well. Valence can be thought of as the pressure or importance that a person puts on an expected outcome.

The VIE theory stipulates that causal relationships exist between motivational process, levels of expended efforts, achieved performances and allocated awards.

2.4 The concept of agricultural information

Information is defined by Adereti, Fapojuwo, & Onasanya (2006) as data that have been put into a meaningful and useful context which is communicated to a recipient

who uses it to make decisions. Agricultural information was classified into two broad groups by Umali (1994). He classified it into pure agricultural information and agricultural information inherently tied to new physical inventions. Pure agricultural information can be used without the compliment of any specific physical technology. It includes practices such as production techniques, farm management, marketing and processing and community development. On the other hand agricultural inventions or technologies are those that come in the form of agricultural inputs, management technologies facilitating farm management, and marketing and processing equipment.

2.4.1 Sources of agricultural information

Statrasts (2004) defines information source as an institution or individual that creates or brings about a message. Muhammad (2005) divides the sources of information into two main categories interpersonal and impersonal. Face-to-face exchange of information between individuals is regarded as interpersonal, whereas mass media sources are known as impersonal methods enabling one or a few persons to reach many addressees at a time. According to Fekadu (1997), though knowledge is produced through agricultural research, it is not the only avenue for knowledge generation. Learning from experience, interaction and farmers' experimentation are other sources. Salomon & Engel (1997) indicated that farmers have been innovators for centuries, based on their own on-farm experimentation.

A study by Boz & Ozcatalbas (2010) revealed that family members, neighbour farmer, extension services, input providers and mass media were key sources of information for Turkish farmers. According to Farooq, Muhammad, Chaudhary & Ashraf (2007) the most commonly used sources of information were fellow farmers, printed material, television, and private sector.

Furthermore, Benard, Dulle & Ngalapa (2014) identified interpersonal sources such as Family/parents, personal experience, neighbours or friends and agricultural extension officers' as the major sources of information probably because of their readily availability and accessibility. The print media, fellow farmers and television were identified by Rehman et al. (2013) as the most common sources of information while sources, like extension field staff, private sector, radio, and NGOs were the least common.

2.4.2 Information sharing and communication network

Communication can be defined as "the exchange of messages" between two or more partners, or establishing "commonness" between two or more parties through a particular medium, or an active, dynamic process in which ideas and information are exchanged leading to modification of people's knowledge, attitudes and practices (Burnett, 2003). To boost the productivity of farmers there is the need for information exchange, however gaps exist between the knowledge of the people in a system and not all people will have the kind of knowledge and information to produce efficiently. To close this gap Suhermanto (2002), suggested the sharing of information facilitated by the Government such as; training, media publications, leaflets, and the opening of educational institutions; and secondary the sharing of the information among individuals. To strengthen these information exchanges, extension can serve as information source and information exchange facilitator. The learning opportunities among farmers are the main (informal) means for information dissemination across a community. Therefore, agricultural extension service is expected to contribute to the well-functioning of the existing local information exchange, taking into account the diverse sources of information.

2.4.3 Role of Agricultural Extension Services in agricultural information dissemination

Christoplos (2010) defines extension as "all the different activities that provide the information and advisory services that are needed and demanded by farmers and other actors in agri-food systems and rural development." (p.2). Agricultural extension, or agricultural advisory services, comprises the entire set of organizations that support people engaged in agricultural production and facilitate their efforts to solve problems; link to markets and other players in the agricultural value chain; and obtain information, skills, and technologies to improve their livelihoods (Birner et al., 2009; Davis, 2008).

Christoplos (2010) further states that agricultural extension services has gone beyond agriculture and also include issues in rural areas such as the dissemination of information about new innovations, farmer training along the market chain, on-farm testing of new technologies and equipping farmers with business management and entrepreneurship skills. It also include facilitation of linkages among actors in the value chain, linking farmers to training institutions, support and implementation of Government policies, home economics, conflict mediation among others.

2.4.4 Determinants of farmers' level of access to agricultural information

The dissemination and use of information by farmers is influenced by the search for and sharing of information with farmers by extension personnel, the reliability, relevance, usability, timeliness of the information and the information dissemination process (Glendenning, Babu & Asenso-Okyere, 2010). Statrasts (2004) also mentioned timelessness, accuracy, relevance, cost effectiveness, trustworthiness, usability, exhaustiveness and aggregation level been characteristics of a good information source. Adereti et al. (2006) concur with the view that accuracy,

timeliness and relevance of information are important determinants of quality of the information accessed. Accuracy implies that information is free from bias; timeliness means information is received at the needed time whiles relevance implies information answers the user's question.

It is apparent that farmers' level of access to agricultural information is best determined by the frequency of access to the information, time of accessing the information with regards to the problem to be solved and the relevance of the accessed information to the farmers' problem. Other determinants include, usability of the accessed information, distance to the source of information, clarity of language used and information been disseminated. Several researchers have postulated on diverse factors determining the level of access to agricultural information.

Naveed & Anwar (2013) in their study of Agricultural information needs of Pakistani farmers found out that time of access, language barrier and frequency of access were major hindrances to agricultural information. Similarly, Ofuoku, Emah & Itedjere (2008), Agbebi (2012), Asogwa & Okwoche (2012) in their studies also mentioned inadequate extension contact, timeliness of access, language barrier, ineffective communication and distance to sources as hindrances in accessing extension services by farmers.

2.4.5 Factors influencing farmers' access to and use of Agricultural information

A number of empirical studies have been conducted by Sintayehu, Fekadu, Azage & Berhanu (2008), Haji (2003), Habtemariam (2004), Nambiro, Omiti & Mugunieri, (2006), Ayele & Bosire (2011) on access to and use of different improved agricultural practices. The review in this section is mainly based on different researches on access to and use of information on different crops and animals such as dairy, cereals,

horticultural crops and many more. Conceptually, the variables are categorized as socio-economic, institutional and orientation towards improved farming.

2.4.5.1 Socio-economic variables influencing access to and use of agricultural information

Variables reviewed under this category include; sex, age, marital status, educational level, household size, farming experience, farm size. The rest are type of farm ownership, labour availability, engagement in off – farm work, and the cultivation of additional crops.

(i) Gender

Gender of the household head is a factor that limits access to agricultural information and it use. Women are traditionally occupied by household chores whiles the man has the liberty of mobility, participate in different meetings and trainings consequently have greater access to extension services. Male-headed households tend to build and maintain larger network ties with relatives and friends than female-headed households (Katungi, 2006). Nambiro, Omiti & Mugunieri (2006) in assessing access to agricultural extension in SSA found out that sex is an important determinant in the seeking of agricultural information. Male farmers sought for agricultural information than their female counterpart. A positively significant relationship was established between sex of household head and adoption of improved agricultural technologies in the cultivation of Irish potatoes (Namwata, Lwelamira & Mzirai, 2010). On the other hand, Doss & Morris (2001) found out that there was no significant relationship between sex and access to agricultural information.

(ii). Age

Age is also one of demographic characteristics which describe how long a person has been in existence. Young farmers are ardent to get knowledge and information than older farmers. It might also be that older farmers want to avoid risk and are not likely to be flexible than younger farmers and thus have a lesser likelihood of information utilization. But several studies report different results; Nkamleu, Coulibaly, Tamo & Ngeve (1998) reports of older farmers being more experience and have accumulated more capital as a result they are more likely to invest in innovation. Similarly, Yenealem (2006) reported positive relationship between age and adoption behaviour of farmers.

However, Haba (2004) suggest that older people were unwilling to pay for agricultural information delivery technologies such as print, radio, farmer-to-farmer, expert visit, and television. He revealed that, as age increased, the willingness to pay for these agricultural information delivery technologies decreased, meaning that older farmers were less willing to get information than younger ones. Old age also increases with conservativeness and negatively impact on adoption while young farmers tend to be more innovative and risk adverse (Zhang, Li, Xiong & Xia, 2012; Adesina, Mbila, Nkamleu & Endamana, 2000).

A study conducted by Deribe (2007) on diary women farmers proved that age has a negative influence on agricultural information network of farm women. The study is that older women do not seek many new ideas, since they try to conform to practices they have followed for a long time in their life. Ayele & Bosire (2011) also found out that both younger and old tried new things introduced to them thus there was no significant relationship between age and the use of improved inputs and practices.

(iii) Marital Status

Marriage is considered as an important social institution in the Ghanaian society. Marriage is an institution which can be found in every human culture. Nambiro, Omiti & Mugunieri (2006) working on the topic "Decentralization and access to Agricultural Extension services in Kenya" established that the marital status of farmers significantly influenced their access to extension services. Opara (2008, 2010) also noted that there was a positive association between marital status and agricultural information access and use.

However, marital status of the farmer was found by Koskei, Langat, Koskei & Oyugi (2013) to negatively affects the probability of access to information, signifying that the single farmers had access to agricultural information more than married farmers which could be attributed to the fact that un-married farmers take part in more social activities due to limited responsibilities, while married farmers stay in house to attend to family issues.

(iv) Educational level

Education generally is associated with receiving and absorbing of agricultural information and use of the information. Because education is believed to increase farmers' ability to obtain, process and analyze information disseminated by different sources and helps him/her to make appropriate decision to utilize agricultural information through reading and analyzing in a better way. The ability to read and understand sophisticated information that may be contained in a technological package is an important aspect of access to agricultural information (Zuta, 2009).

Rehman et al. (2013) found out that education of respondent had a significant relationship with their access to agricultural information; an increase in the educational level of the respondents increased their access to agricultural information.

Better education according to Okoye et al. (2008) would lead to improved access to knowledge and tools that enhance productivity. However, Julius, (2013) established that irrespective of farmers educational level it had no influence on their access to agricultural extension services.

With regard to the use of agricultural information, Ofuoku et al. (2008) posit a positive significant relationship between level of formal education of fish farmers and information use. According to Waller, Hoy & Henderson (1998), education is expected to create a favourable mental attitude for the acceptance of new practices especially of information-intensive and management intensive practices.

(v). Household Size

The household is the number of individuals eating from the same pot of the family. It is generally agreed that increase in household size comes with extra hands to work on the farm thus more use of agricultural innovations. On the other hand increase in household size also put extra burden on the family as not being able to invest in the farm. Koskei et al. (2013) asserts that an increase in size of household increases the probability of access to information. The increases in household size put pressure on the demand for household needs and hence the need to produce more for family and earn more to cater for the household which could lead to agricultural information seeking and use. Techane (2002) has also found family labour as positively related to adoption and intensity of fertilizer use which is determined by the family size. However, Christiaensen & Demery (2007) established no significant between household size and agricultural extension services access.

(vi) Farming experience

Farming experience is the number of years the household has spent with that particular crop. The number of years spent in farming is a very important household related variable that has relationship with the production process. Longer farming years comes with accumulated farming knowledge and skill which contributes to the use of agricultural information. Several studies support this argument. Longer farming experience implies accumulated farming knowledge and skill which contributes to utilization of agricultural technologies (Namwata, Lwelamira & Mzirai, 2010).

Rahman (2007) also argues that experience in a particular activity equips the individual and makes the person more matured to take right decision. Oslen (2009) also asserts that "number of years the farmer has owned his farm is assumed to influence the investment behaviour". However Chen & Ravallion (2008) posit that farming experience has no relationship with access to extension services. Rehman et al. (2013) also establish a non- significant relationship between agricultural information access and farmers years in farming in Pakistan.

(vii) Farm Size

Farm Size is the measure of the total land area under cocoa cultivation and the size in bearing will determines the yield. Rehman et al. (2013) in studying effects of farmers' socio – economic characteristics found of a highly significant relationship between respondent size of land holding and their access to agricultural information. Similarly, Saadi, Mahdei & Movahedi (2008) who also found a highly significant relationship between land holdings of the respondents and their access to information.

Cocoa farmers with large farm sizes are usually wealthy and there is more likelihood that they would readily adopt any high inputs innovation. Large farm size facilitates easy realization of the benefits due to economy of scale (Zhang et al., 2012).

Akudugu, Guo & Dadzie (2012) found farm size a significant positive relationship farm size and farmers' adoption of modern agricultural production technologies, the bigger the size of a farm, the higher the probability for adoption of current ideas by farmers.

(viii) Off – farm work engagement

Off-farm activities, defined as the participation of individuals in remunerative work away from a "home plot" of land, is seen as an important tool in sustainable development and poverty reduction, especially in rural areas (FAO, 1998).

Since farming is a seasonal activity, off-farm occupation comes in with extra income to support the household needs and investment on the farm. Davis (2003) states that off-farm employment is alternative source of income for farmers thus a way to boost rural economic activity and employment in many developing countries. Off-farm income was noted to have a positive relationship with access to agricultural information by Koskei et al. (2013) in their study Determinants of Agricultural Information Access by Small Holder Tea Farmers in Bureti District in Kenya. This implies that the more a farmer earned from off-farm work they are likely to look for information to invest in their tea farms. Income from non-farm activities has been found to increase the farmers' probability to invest in new technologies (Habtemariam, 2004). However, Akudugu et al. (2012) found out that off-farm activities had a negative relationship with adoption of technologies; this is because they are likely to interfere in the other activities that the farmer is carrying out.

(ix) Farm ownership type

Ownership of one's own farm normally comes with an enthusiasm to invest in it since all the benefits would accrue to you than doing a shared cropping. In agreement with

this assertion, Tenaw, Zahidul, & Parviainen (2009) states that, farmers naturally do not feel sound emotionally when they are not cultivating on their own land and as such do not invest in land development and will not use inputs efficiently. Kyomugisha (2008) also found land ownership as a major factor influencing investment into land to boost productivity. He states that in Uganda, land owners invest in soil management practices than tenant farmers and other occupants. Akinola & Adeyemo (2013) also revealed that land use and ownership affected yam output implying that farmers that owned land are able to adopt technologies that will enhance their yields than sharecroppers.

(x) Labour availability

The use of new agricultural innovations usually is labour intensive so therefore availability of labour in the locality will aid farmers to practice new innovations. Studies such as Hailu (2008) states that improved practices require lots of labour and hence the household with relatively high labour force uses the technologies on their farm plots more than those with low labour force. Nandi, Haruna & Abudu (2012) inferred from the positively significant relationship between labour availability and adoption of Agricultural innovation and concluded that labour availability is a requirement for technology adoption which increases the yield of farmers. Beshir (2014) also found a positive relationship between labour availability and intensity of use of improved forages as improved practices are labour intensive.

(xi) Additional crops cultivation

Crop diversification is one of the coping mechanisms of food security, production and market risks. Growing of other crops such as maize, cassava, vegetables among others helps farmers feed their families thus the little income from the major crop on the farm. Crop diversification also serves as additional source of income apart from the

main crop cocoa. For example, diversification was the single most important source of poverty reduction for small farmers in South and Southeast Asia (FAO and World Bank, 2001). Aneani, Anchirinah, Owusu-Ansah, & Asamoah (2011) mention of diversified cocoa cultivation into growing other crops to earn additional income apart from cocoa and also ensure food security and income stability (MASDAR, 1998)

2.4.5.2 Institutional factors influencing access to and use of agricultural information

The factors considered to enhancing access to and use of agricultural information in this study is access to credit, frequency of market visit, distance to the nearest agro-input market and group membership

(i) Group membership

A farmer's association with other farmers is a means of sharing knowledge, information and other resources. Farmers who belong to a group are exposed to the resources of their colleague farmers such as their experience in farming, successful practices on their farms and many more. Belonging to a group serves as a contact for services provided for groups such as extension services, loans and agro – inputs. Rogers (1995) concludes that: "The heart of the diffusion process consists of interpersonal network exchanges between those individuals who have already adopted an innovation and those who have not are then influenced to do so".

In conformity with this view, Conley & Udry (2010); Caviglia & Khan (2001); Bandiera & Rasul (2003) state that group membership increases the capacity of an individual to access information about current innovation and its benefit from other members. It also increases individual farmer's awareness and as a result increases the likelihood for adoption of new technology. Group participation was found to

stimulate information exchange among members as a result of each other's experience and knowledge (Katungi, 2006).

Oyinbo, Saleh & Rekwot (n.d) in their study of determinants of Herbicide Utilization in *Striga Hermonthica* control among maize farming households identified group membership as a factor influencing use of herbicides in maize farming. Ofuoku, Uzokwe, & Ideh (2006) mention of access to credit, inputs and aids from government and extension services as benefits by farmers in groups which aid in the use of agricultural information. Ofuoku et al. (2008), Fadiji, Adeeogun & Kehinde (2006) identified group membership as significantly related to information usage because farmers influence each other in a group as a result of experience shared.

(ii) Frequency of agro-input market visit and distance

Distance to market and frequency of market visiting is a factor in the access and use of agricultural information and inputs, longer distances to inputs shops tend to make prices high thus constraining poor farmers from purchase. Regular visits to the market make farmers aware of new technologies; it also serves as a platform to share information with other farmers from other localities. The closeness of the market to farmers' is a great catalyst for farmers to receive information (Negash, 2007). Distance to market was found by Bulale (2000) to have had a significant effect on the adoption of crossbred dairy. Yenealem (2006) also show that market distance is negatively and significantly related to adoption decision which is also confirmed by Ayele & bosire (2011) that, distance to nearby markets negatively influenced farmers' access and use of inputs as it adds cost to purchasing inputs implying that longer distances comes with higher prices of inputs hence reducing the use of agricultural information by farmers.

(iii) Access to credit

Smallholder farmers are most often financially constrained thus access to credit in the form of money or agro – inputs will go a long way in the search and use of agricultural information by farmers. Availability of credit is important if improved technology in the form of purchased inputs is to be available to farmers, especially small-scale producers. Inputs such as improved seed, agrochemicals and fertiliser require capital in the form of short-term production credit. Access to credit can relax the financial constraints of cocoa farmers'. There are different reports of significant positive influence on the adoption behaviour of farmers regarding improved technologies (Lelissa, 1998; Tesfaye, Tadesse & Tesfaye, 2001). Ayele & Bosire (2011) found out that access to credit had a positive impact on the use of improved agricultural inputs as it helped farmers' to access seeds, fertilizers and other inputs on credit.

Akudugu et al. (2012) established a significant relationship between adoption and credit. They say credit help farmers to purchase most modern technologies which are expensive thus difficult for many rural farmers, who are normally poor to acquire and utilise them without assistance in the form of supply of affordable credit and other financial services (Benin, Mogues, Cudjoe & Randriamamonjy, 2009). For instance, it has been reported that most small scale farmers in the country are unable to afford basic production technologies such as fertilisers and other agrochemicals resulting in low crop yields due to poverty and limited access to credit (MoFA, 2010).

2.4.5.3 Orientation towards improved farming and access to agricultural information and it use.

Access to agricultural information and its use could be highly influenced by farmers' orientation towards improved farming. It included farmers' attitude towards

improved farming practices, farmers' innovation proneness, farmers' achievement motivation and their information seeking behaviour.

(i). Information seeking behaviour

This variable reflects the degree at which the respondent was eager to get information from various sources on different agricultural activities. Owolade (2008) explains information-seeking behaviour as the "totality of human behaviour in relation to sources and channels of information sought," p.3. Ali-Olubandwa, Odero-Wanga, Kathuri & Shivoga (2010) advocates for the need for farmers to possess good information search behaviour to enable them to adopt improved production technology. Owolade (2008) mentions of vast information available for use by snail farmers who are interested in increasing their productivity, but they exhibit diverse information seeking behaviour, some having a high seeking behaviour whiles others do not and the difference in their attitude thus affect the information sought after and their productivity. Sharing problems, asking and weighing options exposed people to a variety of hygiene and sanitation information than people with no such behaviour (Regassa, Sundaraa & Ketsela, 2011). Asres (2005) established that as information seeking behaviour of farmers increases, their utilization of accessed information also increases.

(ii) Achievement motivation

Achievement motivation is the value associated with an individual, which drives him to excel or do well in an assignment he undertakes. Achievement motivation helps an individual to decide and complete the tasks in certain direction, which in turn helps in achieving the desired results. According to Slavin (2006), "Achievement motivation is what gets you going, keeps you going and determines where you are trying to go". Achievement motivation among cocoa farmers for the search and use of agricultural

information could be increase in yield of cocoa, improvement in their standard of living as a result of increase income, self-recognition etc. Obaniyi, Akangbe, Matanmi, & Adesiji (2014) found out that farmers motivation for engaging in rice training programmes were ambition to make friends, self-recognition, market availability, profitability, loan, personal needs, improve standard of living, increase yield etc. which is in agreement with Olatidoye (2008) who reports improving the standard of living as a motivational factor for participating in a programme. In achieving farmers' motivation for entering into farming, access and use of agricultural would play a pivotal role. Several studies have emphasised the relationship between achievement motivation and access to and use of agricultural information. Tadesse (2008) asserts a significant relationship between achievement motivation and agricultural information access and use in his studies access and utilization of agricultural information by resettler farming households.

(iii) Attitude towards improved farming practices

Kearsley (2008) defines attitude as a "disposition or tendency to respond positively or negatively towards a certain thing (idea, object, person, and situation). They are closely related to our opinions, beliefs and are based upon our experiences". Attitude simply refers to "a person's evaluation of any psychological object". These evaluations are represented as items of knowledge, which are based on three general classes of information: cognitive information, emotional information, and information about past behaviours (Allen, Machleit, Kleine & Notani, 2003).

This study looks at attitude towards improved farming as the degree of positive or negative opinion of respondent farmers towards improved farming practices. Attitude is a prerequisite for behavioural change to occur. Positive attitude towards improved farming practice is supposed to enhance the use of such practices and

recommendation to other farmers. Attitude towards improved farming was found by Tadesse (2008) to have a significant relationship with agricultural information access and use as farmers seek for information exposes them to new information for their activities and influences it use. Ebrahim (2006) in his study of adoption of dairy innovations, its income and gender implications in the Adami Tulu District reported that attitude towards change had a statistically significant relationship with dairy adoption. Farmers' had an unfavourable attitude towards the use of fertilizer as they complained of fertilizer promoting weed growth and decreasing the shelf life of produce (Okoedo-Okojie & Aphunu, 2011).

(iv) Innovation proneness

Innovation proneness was operationally defined as the rate of acceptance of an innovation by an individual for his/her agricultural activities. Studies conducted to assess it influence on access to and use of agricultural information include; Asres (2005) report of a statistically significant relationship between innovation proneness and access to productive role information and utilization of women. Singha & Baruah (2011) in studying farmers' adoption behaviour in rice technology found out that innovation proneness of respondents significantly affected adoption of selected rice cultivation practices. Similarly, Singha & Baruah (2012) in their study of adoption behaviour of dairy innovations by small farmers under different farming systems established that innovation proneness was very significant in the adoption of dairy farming practices.

2.5 Agricultural information use and Livelihood outcomes.

This section of the review looks at the importance of agricultural information and its relationship with livelihood outcomes.

2.5.1 The role of agricultural information in agricultural development

In the development of human societies, information had played an important role and had been a facilitating factor in the shaping of the way we think and act (Meyer, 2005). Information is vital in the improvement of agricultural production, marketing and distribution strategies (Oladele, 2006). It is a central issue in farming and it is the basis for extension service delivery (Ofuoko et al., 2008). Kalusopa (2005) asserts that in the practise of agricultural extension, the agent is only a source of new information, effectively disseminating research results or necessary information for small scale farmers survival thus there exists a direct relationship between provision of effective information and agricultural development.

Information plays a role in sharing experiences, best practices, sources of financial aids and new markets among farmers. This enables farmers to make informed decisions regarding production and marketing and managing their lives successfully to cope with everyday problems and to realize their opportunities (Matovelo, 2008; Idiegbeyan-ose Jerome & Theresa, 2009). Ferris (2005) indicates that accurate, timely and appropriate information access aids farmers in their decision making process as to what to produce, when to produce and where to sell it than those who do not have such information. Additionally, Byamugisha, Ikoja-Odongo, Nasinyama, & Lwasa (2008) mention the following as the likely benefits of using current agricultural information; improvement in farming techniques and knowledge of when to use manure or fertilizer, how to treat diseases and what crops to plant.

2.5.2 Livelihood outcomes

Livelihoods are set of capabilities, assets, and activities that are required to make a living (Chambers & Conway, 1992). The strategies that make living comprise the range and combination of activities and choices that people undertake in order to achieve their livelihood goals (Kollmair & Gamper, 2002). Livelihood outcomes are achievements and benefits that households anticipate to obtain through the implementation of specific activities and strategies. These outcomes can also be interpreted as the aspirations of the household. Potential outcomes include conventional indicators such as more income, improved food security, reduced vulnerability and more sustainable use of the natural resources (DFID, 2001).

However, for the purpose of this study, the following were employed from DFID (2001): assets possession, income and household basic needs such daily food needs, clothing, water, shelter, education and health care.

2.5.3 Relationship between agricultural information use and farmers' livelihood outcomes.

Farmers' exposure to agricultural information plays an important role in agricultural development and contribute to improving the welfare of farmers and other rural dwellers (Anderson, 2007), which can manifest in many ways including increase in yield, income, improved standard of living and many more.

Several studies have reported on the impact of agricultural information on farmers' livelihood which include: Farm radio messages in Malawi were found to have impacted positively on farmers' behavioural changes in diversification of crops to reduce overdependence on maize. The study suggest that practices such as engaging in soil improvement, use of compost manure, tree planting, rotation systems, micro-

enterprises, small-scale irrigation, better environmental conservation, nutrition, and home economics are more effective when linked to new information and information communication technologies (ICTs) (FRI, 2008).

The change in the attitude, behaviour and practices of farmers in the above literature resulted in the increase of yield and income of farmers as reported by Rizvi (2011) in India who found that information to farmers via the mobile phone led to an increase in productivity and incomes of farmers. Raj, Poo Murugesan, Aditya, Olaganathan & Sasikumar (2011) also established an improvement in the livelihoods of farmers who benefitted from agricultural information on crop cultivation and nutrient management. The intervention led to changes in the practices of farmers, reduction in cost of production and increase in net farm income.

In a study of the impact of village information centre in China on the livelihoods of farmers, it was found out that there had been an improvement in the quality of life of farmers and an improvement in the local economy and society. It also brought improvement in the rural farmers' livelihood by the strengthening their human capital to increase financial capital through improved access to information on better agricultural practices and market information (Fengying, Jieying, Fujiang & Xiaochao, 2011).

Anderson & Feder (2004), Laurent, Cert & Labarthe (2006) posit that higher profits aid in minimization of problems of vulnerability, food insecurity, and limited access to resources, information and knowledge as well as shocks of the rural people . Working on the topic "impact of microfinance on the efficiency of micro – enterprises in Cape Coast (in Ghana) Bhasin & Akpaulu (2001) established that not only did their meals and clothing improved but also their savings and children's education as a results of

higher incomes from the farm. Mapila, Kirsten & Meyer (2011) in their study of agricultural rural innovation realized that the use of the rural innovations had a significant impact on the total assets holding of farmers, livestock ownership and an increase in the household income.

2.6 Summary

The chapter reviewed literature on the famer characteristics and institutional factors influencing access to and use of agricultural information, and the use of agricultural information on cocoa farmers' livelihoods outcomes. The chapter has described the various components of the conceptual frame work. It highlighted on famer characteristics and institutional factors, and their influence on agricultural information access and use and how agricultural information use influences the livelihoods of cocoa farmers.

The review reveals that access to and use of agricultural information by cocoa farmers is influenced by farmer characteristics and institutional factors of the environment. The characteristics includes age, educational level, household size, farming experience and farm size. The others were information seeking behaviour, achievement motivation, attitude towards improved farming practices and innovation proneness. The institutional factors that influence farmers' access to and use of agricultural information like group membership, access to credit, frequency of visit and distances to the nearest agro-input market were also discussed.

These factors either give opportunities or hinder farmers' access to and use of agricultural information. The relationship between information use and livelihood outcomes was also reviewed. The next chapter is about the methodology and methods used for the study.

CHAPTER THREE: METHODOLOGY

3.1 Introduction

Methodology can be described as the outline associated with a particular set of model assumptions that can be used to conduct research (Creswell, 2003). The information contained in this thesis is the result of data collected both from the field and secondary sources. This chapter provides a summary of the whole process from the research design, study area, selection of population, data collection tools, data analysis and procedures.

3.2 Research Design

A research design is a "plan or recipe for investigation". It represents a structure that guides the carrying out of a research method and the analysis of the subsequent data, with a view to reaching conclusions about the research problem (Kruger & Mitchell 2005). It gives a clear description of how a research study is to be carried out and provides a suggestion of the processes to be followed in the sampling, data collection, data analysis, and in the presentation of findings in answering the research questions. The research design that was employed for the study uses both quantitative and qualitative research methodology, thus the mixed method was used.

3.3 Study Population

According to Selesho & Monyane (2012), a population is the total set from which the individual or units of study are chosen. Therefore, the population of respondents used for this study was primarily made up of cocoa farmers in the Sefwi Bekwai cocoa district of Ghana in the Western North Region of Ghana.

3.4 Sample size

There are several approaches to determine the sample size. These include using a census for small populations, imitating a sample size of similar studies, using published tables, and applying formulas to calculate a sample size. For this study a published table was used. Table 3.1 is a detailed table for determining minimum returned sample size for a given population size for continuous and categorical data (Bartlett, Kotrlik & Higgins, 2001).

Table 3.1: Table for Determining Minimum Returned Sample Size for a given Population Size for Continuous and Categorical Data

Population size	Sample size					
	Continuous Data (Margin of error=0.03)			Categorical Data (Margin of error=0.05)		
	Alpha=0.10 t=1.65	Alpha=0.05 t=1.96	Alpha=0.01 t=2.58	p=0.50 t=1.65	p=0.50 t=1.96	p=0.50 t=2.58
100	46	55	68	74	80	87
200	59	75	102	116	132	154
300	65	85	123	143	169	207
400	69	92	137	162	196	250
500	72	96	147	176	218	286
600	73	100	155	187	235	316
700	75	102	161	196	249	341
800	76	104	166	203	260	363
900	76	105	170	209	270	382
1,000	77	106	173	213	278	399
1,500	79	110	183	230	306	461
2,000	83	112	189	239	323	499
4,000	83	119	198	254	351	570
6,000	83	119	209	259	362	598
8,000	83	119	209	262	367	613
10,000	83	119	209	264	370	623

Source: Bartlett et al., 2001

For the survey, a total sample size of 280 was used for this research. With a margin of error of 0.05, using a categorical data and a study population of over 8,000, the minimum sample size according to Table 3.1 was 262 but was rounded up to 280.

There was a pretesting using 20 questionnaire while 260 were used for the main administration.

3.5 Sampling Procedure

The choice of an appropriate sampling technique is very critical for any research as it gives an assurance that a good sample has been chosen (Barreiro & Albandoz, 2001).

The study therefore adopted the multi-stage sampling technique: Purposive, cluster and simple random sampling technique.

3.5.1 Multistage sampling

Multistage sampling was the method used in this study. The District was purposively selected because of its found in the region with the highest cocoa production. It was followed by a cluster sampling based on geographical location and simple random sampling of the villages and the respondents.

Multistage sampling occurs when a researcher divides the population into stages, samples the stages and then resample, repeating the process until the final selection of sampling units is done beneath the hierarchical levels (Goldstein, 1995; Thompson, 1992). The primary sample is the first portion taken from the population available for sampling with the subsequent secondary, tertiary, etc being the sets of sub-samples, units, items, individuals or increments taken from the preceding step. The units may be different steps of multistage sampling (Maxwell & Loomis, 2003).

Table 3. 2: Sampling frame

Region (Purposive)	Cocoa District (purposive sampling)	Operational area (Simple random sampling)	Communities (simple random)	Respondents (simple random)
Western Region	Sefwi Bekwai	Ahwiaa	1. Ntrentrenso 2. Appeakrom 3. Larwehkrom 4. Aboanidua 5. Ahwiaa 6. Atiakrom	1 = 8 2 = 17 3 = 12 4 =12 5 = 4 6 = 4
		Bekwai	1. Akaasu 2. Humjibre 3. Muohu 4. Ampenkrom 5. Bankromisa 6. Dansokrom	1 = 6 2 = 17 3 = 12 4 = 6 5 = 8 6 = 8
		Ashiam	1. Kyeikrom 2. Nyentina 3. Alata 4. Asarekrom 5.Adobewura 2 6. Ashiam 7. Nkyensim	1 =12 2 = 11 3 = 9 4 = 11 5 = 11 6 = 5 7 = 9
		Asawinso	1. Nkatieso 2. Beposo 3.. Anyinasie 4. Akaaso 5. Sorano B 6. Subri	1 = 18 2 = 12 3 = 4 4 = 10 5 = 3 6 = 19
		Tanoso	1. Ahwiaso 2. Pataboso	1 = 10 2 = 6
		Total sample size = 260		

3.5.2 Purposive sampling

The purposive sampling technique was used to select the region and the district Sefwi Bekwai for the study. The Region and the District Sefwi Bekwai are noted for high cocoa production in Ghana and with numerous sources of agricultural information. Purposive sampling involves the selection of a sample "on the basis of your own knowledge of the population, its elements, and the nature of your research aims" (Tashakkori & Teddlie, 2003, p. 713).

3.5.3 Cluster and simple random sampling

Cluster sampling occurs when each sampling unit is not an individual but a group that occurs naturally in the population such as neighbourhood (Teddlie & Yu, 2007). This sampling method is used when no master list of the population exists but "cluster" lists are obtainable (Frey, Botan & Kreps, 2000). The simple random sample on the other hand is a type of sampling where each unit in the accessible population has an equal chance of being selected and the likelihood of selecting a unit is not affected by the selection of other units from the accessible population (Teddlie & Yu, 2007).

The District was divided into clusters (geographical areas). Already there exist in the district operational areas namely Ajakamanso, Kwekuboa, Asawinso, Juabo, Ashiam, Bibiani, Bekwai and Tanoso. The names of the operational areas were written on pieces of papers and folded. Five of the operational areas were simple randomly selected from the lots without replacement namely; Ahwiaa, Bekwai, Ashiam, Asawinso and Tanoso. Names of communities under the operational areas were also written on papers and randomly picked without replacement from a basket. Two (2) to seven (7) Communities were selected from each operational area making a total of twenty six (26). The farmers were then randomly selected from the communities.

3.6 Type of Data

The study made use of both primary and secondary data. Secondary data collection approach is done by extracting information required which is already available whereas the primary data collection approach is where information is collected directly from the target population (Kumar, 2005). The primary data collected included socio-economic characteristics, institutional factors, farmers' orientation towards improved farming, access to and use of agricultural information as well as

farmers' livelihood outcomes while secondary data were collected from published and unpublished documents, reports, maps, statistical data, refereed journals, books, articles and bulletins.

3.7 Research Instrument Development

The research instrument used was a questionnaire. It was made up of both-closed ended and open-ended questions. According to Bulmer (2004), a questionnaire is a well-established tool within social science research for obtaining information on participants' social characteristics, present and past behaviour, standards of behaviour or attitudes and their beliefs and reasons for action with respect to the topic under investigation. The prime reason is to translate the researcher's information needs into a set of specific questions that respondents are willing and able to answer. The use of questionnaire in data collection is an objective way of gathering standardized information. It is also a very quick way of collecting information and can be used to collect information from a large population (Malhotra, 2004).

The questionnaire consisted of both closed-ended questions and few open-ended questions. The first part of the questionnaire dealt with the socio-economic characteristics of the cocoa farmer. The second part was used to collect information from farmers on their level of access to and use of agricultural information. The third section solicited information on the farmers' orientation towards improved farming. The fourth part dealt with questions on the institutional factors in the study area and the final part dealt with information on the livelihood outcomes of the cocoa farmers'. Table 3.3 depicts the operational framework for the data collection of the study. It is made up of the study concepts, variables, information required, information sources and the method used in the data collection.

3.8 Data Collection procedure

The data collection procedure involved pre-testing of the questionnaire and the main data collection exercise.

3.8.1 Pretesting

The actual data collection from the respondent farmers was preceded by a pre-test. According to Alina-Mihaela & Mirela-Cristina (n.d), pretesting is the test of a set of questions or a questionnaire on subjects from the target population. It is an activity that helps to determine the strengths and flaws in a questionnaire. Questionnaire pretesting aids in identifying inapt terms in question wording, an inappropriate order, mistakes in questionnaires related to their arrangement and instructions and seeks answers to the following;

- Is every question measuring what it should measure?
- Are all terms used understood by respondent?
- Are questions interpreted in the same manner by all the respondents?
- Did closed questions provide at least one answer choice that would apply to every respondent?
- Are all the possible responses to be selected correct?
- Does any aspect of the questionnaire suggest any biasing attempt from the researcher?

The pretesting was done on farmers in the Osino Cocoa District, a district with similar conditions and characteristics to that of the study area. Twenty of the questionnaires of the study sample size were pretested. After the pretesting exercise, the questionnaires were edited and changes made according to the evidence from the field. The pre-testing exercise took three days.

3.8.2. Data collection

The data collection process was done between February 8th and March 2nd, 2014. It was mainly by interviewing the respondents in their farms and homes. The Twi language was the main language because it is one of the main languages spoken in the study area. At least forty (40) minutes was spent on each respondent to collect all the needed information to satisfy the study. The data collection exercise was done with the help of two research assistants who are extension agents with the Cocoa Health and Extension Division (CHED) of the Ghana COCOBOD. They were taken through the research problem, research questions, relevance of the study, the questionnaire and the expected outcome of the study.

3.9 Data Analysis

Coding was first done for data collected from the field. The Microsoft Excel 2010 and the Statistical Package for Social Sciences (SPSS) version 16.1 were the two computer software programmes used in the analysis of data that was collected from the field. Both descriptive and inferential statistics were conducted for the analysis of the data. The important statistical measures that were used to summarize and categorize the research data were means, percentages, frequencies, and standard deviations. The qualitative data were partly analysed on the spot during data collection to avoid forgetting and to be able to fill the gaps in the quantitative data. The inferential statistics included chi square test of independence, and multiple linear regression analysis.

The following equations were developed for the regression analysis:

Objective 1: $INFACC = a+B_1SX + B_2AG + B_3MS + B_4EL + B_5HS + B_6FO + B_7OW + B_8FS + B_9LT + B_{10}OC + B_{11}YF + B_{12}CA + B_{13}FM + B_{14}DM + B_{15}GM + B_{16}INPR + B_{17}INSK + B_{18}ATTO + B_{19}ACMT + Ɛ$

Objective 2: $INFUSE = a+B_1SX + B_2AG + B_3MS + B_4EL + B_5HS + B_6FO + B_7OW + B_8FS + B_9LT + B_{10}OC + B_{11}YF + B_{12}CA + B_{13}FM + B_{14}DM + B_{15}GM + B_{16}INPR + B_{17}INSK + B_{18}ATTO + B_{19}ACMT + Ɛ$

Objective 3: $INFUSE = a+B_1FRQINF + B_2TMSINF + B_3CLANINF + B_4CINF + B_5RVINF + Ɛ$

Where
a = y intercept,
Ɛ = error,
B = slope of the relationship,
INFACC = Access to agricultural information,
INFUSE = Use of agricultural information.
SX = Sex,
AG = Age,
ML = Marital status,
EL = Educational,
FM = Farm size,
FO = Farm ownership type,
LT = labour availability,
HS = Household size,
YF = Years in farming,
OW = other work,
OC = Cultivation of other crops,
AC = Access to credit,
FM = Frequency of market visit,
DM = Distance to market,
GM = Group membership,
INNPRO = Innovation Proneness,
INFSK = information seeking behaviour,
ATTTO = attitude towards improved farming practices,
ACHMO = achievement motivation,
FRQINF = Frequency of information access,
TMSINF = Timeliness of information access,
CLANINF = Clarity of language used for dissemination,
CINFO = Clarity of language disseminated and
RVINF = Relevance of information disseminated

Gamma co – efficient was used to measure the strength of association between dependent and independent variables in the Chi square analysis. The value of the

coefficient ranges from -1 to +1 with the sign telling the direction of the relationship. A negative sign means that as one increase the other decreases and a positive sign means as one goes up so does the other, the closer the value to +1 or -1, the stronger the relationship (Göktaş & İşçi, 2011). Cohen's (1988) categories for interpreting the strength of correlation coefficients were used to explain the strength of the associations. 0.1 to 0.29 means small, 0.3 to 0.49 means medium and 0.5 to 1.0 means large.

3.10 Analytical Methods

Five main concepts were used as the basis of analysis for the study. They were the socio-economic characteristics of the farmers, the institutional factors and the farmers' orientation towards improved farming. The rest were access to agricultural information, use of agricultural information and farmers' livelihood outcomes. The variables that were used for socio-economic characteristics were gender, age, marital status, educational level, labour availability, off-farm work and additional crops cultivated. The institutional factors included; access to credit, frequency of market visit, distance to market and group membership. The following variables were used to explain farmers' orientation towards improved farming; information seeking behaviour, attitude towards improved farming practices, achievement motivation and innovation proneness.

The variables that were used for access to agricultural information included frequency of access, timeliness of access to information, clarity of language for dissemination clarity of information disseminated and the relevance of the information. The use of information was arrived at using the frequencies of use of information. Finally, the variables that were used to explain 'livelihood outcomes' included; cocoa yield per

hectare, farmers' average annual income, satisfaction of basic needs and assets possessed by respondents.

3.10.1 Level of access to agricultural information

In the determination of the level of access to agricultural information, the number of sources that a respondent have access to were taken into consideration. There is a higher level of access if the numbers of sources are more and vice versa (Rehman et al., 2013). The indicators considered in the determination were; frequency of access to the information, timeliness of access of the information, clarity of language used in the dissemination, clarity of information disseminated and relevance of information disseminated. Farmers were first asked to state their sources of agricultural information out of nine possible sources. A Likert scale of 1 – 5 was used for the administration as in Table 3.4.

Table 3. 3: Table of indicators measuring level of access to agricultural information.

Parameter	Likert Scale				
	1	2	3	4	5
Frequency of access	Yearly	Every six months	Quarterly	Monthly	Weekly
Timeliness of access	Never on time	Rarely on time	Sometimes on time	Often on time	Always on time
Clarity of language	Never clear	Rarely clear	Sometimes clear	Often clear	Always clear
Clarity of information	Never clear	Rarely clear	Sometimes clear	Often clear	Always clear
Relevance of information	Never relevant	Rarely relevant	Sometimes relevant	often relevant	Always relevant

In analysing the likert scale, the items were combined into a single composite score (Boone & Boone, 2012). With a minimum score of 5 and maximum 175, the

composite scores were then trichotomized into Low (5 – 61), moderate (62 – 119) and High (120 – 175) as used by Rehman et al. (2013).

3.10.2 Level of use of agricultural information.

The level of use of agricultural information was based on the frequency of use of the sources indicated by the farmers based on a scale of 1 to 4 namely; 1 = never, 2 = rarely, 3 = sometimes and 4= always. The sources were COCOBOD/MoFA, Input dealers, NGOs/private extension and TV. The rest were Radio, Farmer groups and Friends.

A summation of the frequency of usage of the information from these sources was done and based on a total score of 28, three levels were arrived at. The respondents who did not use the information accessed often were termed low level users (1 – 10), moderate (11 – 18) users are the farmers who used accessed information adequately and high level users (19 – 28) used information frequently. Baah (n.d) termed these classes of farmers as low, medium and high class respectively.

3.10.3 Level of farmers' attitude towards improved farming practices

The attitude of the farmers towards improved farming practices were evaluated by their degree of agreement (Jha, 2009). A set of statements were presented to respondents and asked to express their agreement or disagreement according to a five point scale. Each degree of agreement was given a numerical value from one to five, thus a total numerical value was calculated from all responses. Table 3.5 presents the likert scale for the measurement of farmers' attitude towards improved farming practices.

Table 3. 4: Scale for measuring farmers' attitude towards improved farming practices

Statement	Likert Scale				
	1	2	3	4	5
Positive	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Negative	Strongly agree	Agree	Neutral	Disagree	Strongly disagree

A total of 8 statements were presented for the attitude analysis, four positive statements and four negative statements. The maximum and minimum scores were 40 and 8, respectively. For the description of responses to each question, the scale was further trichotomized as High (30 - 40 points), Moderate (19 - 29) and low (8 - 18).

3.10.4 Level of Innovation Proneness

In the determination of innovation proneness, farmers were presented with ten agricultural innovations that were familiar to them and asked which ones they use on their farms and how quickly they accepted these technologies based on a measurement scale. For every innovation, respondents were required to rank their responses on a scale of 1 to 4 (Table 3.6). With a total score of 40 and a minimum of 10 three levels were arrived at as in Table 3.5.

Table 3. 5: Scale for the measurement of innovation proneness

Likert scale	1 = not accepted 2 = accepted after most people have accepted, 3 = accepted after consulting others and 4 = accepted whenever exposed to it
Categories	low (10 – 20), moderate (21 – 30) and High (31 – 40)

3.10.5 Level of Farmers' Information Seeking Behaviour

Eight different practices were used to assess farmers' information seeking behaviour. Farmers were asked their frequency of seeking new information on these practices on

the farm which increases production levels using a scale of 1 – 5 (Table 3.7). The responses were added into a single score and with a minimum score of 8 and a maximum score of 40, farmers were categorized into low, moderate and high (Table 3.6).

Table 3. 6: Scale for the measurement of information seeking behaviour

Likert scale	1 = never, 2 = rarely, 3 = sometimes, 4 = often and 5 = always
Categories	low (8 – 18), moderate (19 – 29) and High(30 – 40)

3.10.6 Level of farmers' Achievement Motivation

Achievement motivation was operationally defined as the desire of the farmer to produce more and more in the production process. Respondents were presented with eight (8) statements on practices on the farm that increase and protect cocoa yield and were asked for their response on a five scale category (Table 3.8). The responses were then added and out of a total score of 40 and a minimum of 8, a categorization of low, moderate and high levels of achievement motivation were determined.

Table 3. 7: Scale for the measurement of farmers' achievement motivation.

Likert scale	1 = never, 2 = rarely, 3 = sometimes, 4 = often and 5 = always
Categories	low (8 – 19), moderate (20 – 30) and High(31 – 40)

3.10.7 Level of Farm Yield

Cocoa yield was measured by considering the cocoa yield per hectare of farm size. The yield was put into three different categories based on Baah (n.d). He classified cocoa farmers' into three according to their yield levels and technology used; low technology users with an average yield of (350kg/ha), medium technology users with

an average yield of (650/Ha) and high technology users with an average yield of (1400kg/ha).

3.10.8 Level of farmers' average annual Income

Farmers' income was computed by summing all the income they receive for the year from the following: Sale of cocoa, Income from animal sales, Income from sales of other crops, Food crops and animals consumed, Food crops given as gift, Income from wages and salaries, income from remittances and Income from personal services on the farm. A summation of the amount stated for the various income sources was used as the farmers' average annual income. The incomes were put into two categories; low and high. Farmers whose income was less than the mean income were considered as low and those whose incomes were above the mean were classified as high.

3.10.9 Level of farmers' wellbeing

In order to measure the wellbeing of the farmers, the following items were stated and farmers were asked to rank on a three-point scale their level of satisfaction. The items were daily food needs, clothing, water, shelter, education and health. A summation of the scores for each item was used as a grade for wellbeing. The satisfaction score for each farmer were put into three different categories (Table 3.8)

Table 3. 8: Scale for the measurement of wellbeing

Category	Range
Low	< 9
Moderate	10 – 15
High	16 – 18

3.10.10 Level of Basic household assets possession

In measuring the level of household assets possession, farmers were asked to mention the assets they possessed from a possible list of ten. Value for assets possessed was determined by summing all the assets possessed based on a scale of 1 to 5 according to the value of the product on the market. The assets were valued according to a scale of 1 – 5. Out of a total score of 23, the farmers were categorized into three; low, medium and high (Table 3.9).

Table 3. 9: Scale for the measurement of household assets possession.

Scale for assets measurement					Categories of farmers	
1	2	3	4	5	Category	Scale
Radio	TV	Mist Blower	Motor	Car	Low	0 - 9
Phone	Mattress				Moderate	10 - 16
Knapsack sprayer	Bed				High	17 - 23
	Bicycle					

3.11 Summary

This chapter provided a summary of the whole process from the research design, study area and selection of population. It also described data collection tools and process and how the data analysis processes and procedures. Operationalization of concepts used in the work was also explained.

CHAPTER FOUR: RESULTS AND DISCUSSION

4.1 Introduction

This chapter deals in depth with the presentation of the results of this work and a further discussion of the findings. The chapter looks also at a description of farmers' characteristics and the institutional factors influencing cocoa production. It considers cocoa farmers' level of access to and use of agricultural information. The next section takes a look at the livelihood outcomes of the cocoa farmers under study. It also looks at the relationship between farmers' characteristics, institutional factors and access to and use of agricultural information. It also considers the relationship between the level of access to agricultural information and its use. The next section discusses in detail the relationship between the level of use of agricultural information by the respondents and their livelihood outcomes.

4.2 Farmer Characteristics

Farmer characteristics comprising farmers' social, economic and orientation towards improved farming are discussed in the section.

4.2.1 Social characteristics of respondents

The social characteristics include variables such as gender, age, marital status, and educational status, household size and type of farm ownership. Table 4.1 displays the summary of the farmers' social characteristics.

Gender Distribution of Respondents

Table 4.1 show that majority (75%) of the respondents were males indicating that males are the dominant sex of household heads in cocoa farming in the Sefwi-Bekwai Cocoa District. The majority of the respondents being males is as a result of the target population (heads of households) who are mostly males provided there is marriage and even if a wife has a land from her family, it is usually cultivated with the male being the leader thus part of the family's farm. In the District the females are usually owners of the annual crops which they sell to take care of the daily needs of the households. This result is collaborated by Danso-Abbeam, Aidoo, Osei-Agyemang & Ohene Yankyera (2012) who found majority (91%) of cocoa farmers to be males. This finding is also similar to other countries in the West African sub-region where about 72.5% male cocoa farmers population is reported (Ogunleye & Oladeji, 2007).

Age of respondents

Majority of the farmers (72.7%) were between the ages of 35 and 60 years. This was followed by (14.6%) of the respondents who were above 60 years (Table 4.1). The results obtained shows that majority of the farmers (72.7%) are quite strong to undertake most of the difficult activities of farming. The mean age of the farmers who were interviewed was found to be 48.2 years. The minimum age of the farmers was 21 years and the maximum age was 80 years.

This shows a relatively ageing population of cocoa farmers and with only 12.7% of the youth engaged in cocoa farming indicating that they are not interested in cocoa farming. The low participation of the youth in cocoa farming is as a result of scarcity of land in the area which could only be inherited by children or bought from the chiefs at a very exorbitant price. With respect to age, 61.5% of the sample size was less than

50 years. This is a good news given that most studies (for example MASDAR, 1998; MMYE, 2008; Baah et al, 2010) have stated that most of the cocoa farmers have become old.

Table 4. 1: Social Characteristics of Farmers

Variable	Category	Frequency	Percentage
Sex	Male Female	195 65	75 25
Age	Up to 34 35 – 60 >60 (Old)	33 189 38	12.7 72.7 14.6
Marital status	Married Single	192 67	73.8 26.2
Educational Level	Low(≤JHS) High(>JHS)	224 36	86.2 13.8
Household Size	1 – 5 >5	104 156	40.0 60.0
Farm ownership	Solely owned Others	217 43	83.5 16.5

Source: Field Data, 2014

Marital Status Distribution of Respondents

The data presented in Table 4.1 depicts that majority of the respondents representing 73.8% were married, 26.2% of them were also single. According to Hainmueller, Hiscox & Tampe (2011), 76% of all cocoa farmers in Ghana fall within the married bracket. This agrees with the findings of this study where greater majority of 73.8% are married. Danso-Abbeam et al. (2012) also reports of 87% of cocoa farmers being married. The results also agree with findings from other cocoa producing West African countries where marriage percentages of cocoa farmers are high (Lawal, Torimiro, Banjo, & Joda, 2005; Adeogun, Olawoye, & Akinbile, 2010).

Educational Level of Respondents

Empirical data presented in Table 4.1 indicates that 86.2% of respondents had education up to the Basic level and below whiles 13.6% had education above the Basic level. This finding is not different from what has been reported in Ghana as Baah (2008) states that about 76.2% of cocoa farmers in Ghana had received education up to the basic level. The cocoa farmers survey also reveals about 73% of cocoa farmers in Ghana ending their formal education at Junior High / Middle school and below (Hainmueller et al., 2011). The results are also similar to the situation in the West African sub-region where farmer education levels are generally described as low (Ogunleye & Oladeji, 2007).

Household Size Distribution of Respondents

The data in Table 4.1 revealed that 60% of the respondents had a family size of above five (5) whiles 40% had a family size of five (5) and below. The average household size of the study was 6 which is similar to that reported by Hainmueller et al (2011) who found an average size of 5 in their cocoa farmers' survey in Ghana. Adebiyi & Okunlola (2013) report of 76.7% of cocoa farmers in Oyo State in Nigeria having a household size of 6 and above which generally is in conformity with this finding.

Farm ownership type

The data in Table 4.1 shows that majority (83.5%) of the farmers owned their farms and the remaining 16.5% were either share croppers or farmers who operated both sole proprietorship and sharecropping. Baah, Anchirinah, Badger & Badu-Yeboah (2012) also report of 80% of cocoa farmers operating their own farms.

4.2.2 Economic characteristics of farmers

This section summarizes the economic characteristics of farmers. It includes labour availability, engagement in off-farm work, additional crops cultivation, farm size and farming experience.

Engagement in off-farm work

The data presented in Table 4.2 depicts that more than half of the respondents representing 55.4% were not engaged in any off – farm work, while 44.6% engaged in off – farm work. This is in conformity with the report by Hainmueller et al (2011) who report of 40% Ghanaian cocoa farmers engaging in other jobs. The data also revealed that out of the 116 respondents who were engaged in off-farm work, 42.2% of them were engaged in trading, 36.2% in artisanal work, 6% in teaching and 15.5% in other activities (Appendix III). It is important to note that some of the farmers were involved in secondary occupations to help boost their household income. The seasonality of farming activities is such that farmers are not assured of regular income throughout the year; therefore a secondary occupation will help the farmers to cope with uncertainties in farming and household activities.

Farm Size

A mean farm size of 2.82 hectares was recorded indicating that farmers generally cultivated smaller piece of land. The majority of farmers, 60.8 % owned farms between 0 and 3 hectares and 39.2% cultivated farm size of above 3 hectares (Table 4.2). This finding is consistent with Danso-Abbeam et al. (2012) who states that, majority of cocoa farmers operate farms of between 1 – 5 Hectares. It also agrees with studies carried out in other countries in the sub-region (Oluyole and Sanusi,

2009; Agbongiarhuoyi et al., 2013). However, Hainmueller et al. (2011) in their survey report of 41% over estimation of cocoa farm sizes by farmers in Ghana.

Table 4. 2: Economic Characteristics of Farmers

Variable	Category	Frequency	Percentage
Off-farm Work	Yes No	116 144	44.6 55.4
Farm Size (Ha)	0 - 3 >3	158 102	60.8 39.2
Years in Farming	>10 <10	67 193	25.8 74.2
cultivation of other crops	Yes No	256 4	98.5 1.5
Availability of labour	Family only Two sources Family + hired + Self Help Group	34 111 115	13.1 42.7 44.2

Source: Field Data, 2014

Farming experience

The data in Table 4.2 shows that 25.8% of farmers had farmed between 1-10 years, whiles 74.2% had been in cocoa farming for more than 10 years. Longer years in farming come with experience thus familiar with most practices on the farm. This is confirmed by Danso-Abbeam et al. (2012) who report that majority of cocoa farmers (79%) have an experience of greater than 10 years. Ogunleye & Oladeji (2007) are of the view that engaging in cocoa farming for a period above five years is long enough to gather all the experience needed. Thus conclusion can be drawn that most farmers interviewed had great experience.

Cultivation of additional crops

The majority (98.5%) of the respondents cultivated additional crops apart from cocoa with only 1.5% cultivating only cocoa (Table 4.2). The data also revealed that 90.4%

of farmers cultivated more than four (4) crops aside cocoa and 9.6% cultivated four (4) or less additional crops (Appendix III). Aneani et al. (2011) report of farmers cultivating food crops such as plantain, cassava, maize, banana and tree crops such as oil palm, citrus and coconut which confirms the finding of this study. Farmers in the District depends on the crops usually annual crops for their daily meals and sell the surplus to cater for their protein needs such as fish, meat and many more.

Labour availability

The data in Table 4.2 depicts that, 13.1% of the respondents used only one type of labour either family or hired. 42.7 % used a combination of two labour sources and 44.2% used a combination of all three sources; family, hired and self-help group (SHG) with the SHG been an occasional option. Cocoa farming is a labour intensive activity and farmers' incomes are generally low as such the main labour source is the family (Baah, 2006; Abenyaga & Gockowski, 2001). They occasionally rely on other sources like the hired and SHG since some of the operations are technical and very laborious hence, the high percentage of use of all three sources. This is also in conformity with Idris, Rasaki & Folake, Hakeem, 2013; Adebiyi & Okunlola, 2013 who revealed that most of the farmers used both family and hired labour in their farming operations.

4.3 Description of respondents' orientation towards improved farming

Orientation towards improved farming include the variables of social and psychological dimension of individual respondent such as attitude towards improved farming practices, innovation proneness, achievement motivation and information seeking behaviour which are addressed in this section.

4.3.1 Attitude of farmers towards improved farming practices

From Table 4.3 it could be inferred that farmers attitude were unfavourable towards "Empty bottles of agro-chemicals can be used in the homes", with a mean of 4.70. This was followed by "Fermenting cocoa for 5 days is the best" with a mean value of 3.42, "Planting haphazardly increases yield" with a mean value of 3.29 and the then "Pods from my farm are very good for planting" with a mean value of 2.32 for the negative statements. From the same table, attitude of farmers was favourable towards "Over application of herbicides is harmful to the environment" with a mean value of 4.58. This was followed by "Pruning helps prevent cocoa black pod" with a mean value of 4.58, followed by "Row planting will increase my yield" with a mean value of 3.78 and "Spacing of 3m*3m is the best" being the least with a mean value of 3.60 for the positive statements.

A summary the results in Table 4.3 show 50.4% of the respondents had a high level whiles 12.3% had a low level (Appendix iiib). Therefore, most (50.4%) of interviewed farmers in the study area showed a relatively favourable attitude towards improved farming practices. The high percentage of farmers in the high level category might be as a result of the high level of awareness of farmers on modern improved practices of farming as a result of the numerous sources of agricultural information. In agreement with this finding is Goswami (2012) who found out that majority of fish farmers in West Bengal had a more favourable attitude towards scientific fish culture.

Table 4. 3: Frequency Scores of farmers' attitude towards improved farming practices.

Statement	1	2	3	4	5	Mean
Fermenting cocoa for 5 days is the best	40	47	7	96	70	3.42
Agro-chemicals bottles can be used again in the homes	0	2	12	49	197	4.70
Pods from my farm are very good for planting	131	40	5	44	10	2.32
Planting haphazardly increases yield	44	34	49	69	64	3.29
Spacing of 3m*3m is the best	10	14	91	99	46	3.60
Pruning helps prevent cocoa black pod	1	4	13	66	176	4.58
Row planting will increase my yield	13	10	77	83	77	3.78
Over application of herbicides is harmful to the environment.	0	15	6	52	187	4.58

Source: Field Data, 2014

Key: 1=strongly disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree for negative statement and 5 = strongly agree, 4 = agree, 3 = neutral, 2 = disagree and 1 = strongly disagree for positive statement.

4.3.2 Information Seeking Behaviour of Farmers

Farmers were asked how often they seek information on major practices in cocoa production and other farming activities. The mean values for farmers' information seeking behaviour were calculated. Table 4.4 shows the Mean values of farmers' information seeking behaviour. Table 4.4 indicates that information seeking on disease control on cocoa was high. This was attested to by a mean of 3.39 out of a total of 5. This was followed by information seeking on pest control on cocoa with a mean value of 3.38; information seeking on recommended agro – chemicals for cocoa followed with a mean value of 3.35. Shade management in cocoa cultivation followed with mean value of 2.28 then information seeking on farm sanitation was next with a value 2.26, information seeking on raising nurseries (2.16), information

seeking on cultivation of other crops (2.08) with information seeking on raising of animals being the least with a mean of (1.80).

A summary of farmers information seeking behaviour (Appendix iiib) revealed that the number of respondent who were in the moderate level were in the majority (51.2%) and 13.5% of the respondents were in the high level of information seeking. Therefore, the majority (64.7%) of interviewed farmers in the study area were in the moderate level and above of information seeking behaviour. The plausible reason for the high level of information seeking among cocoa farmers is that cocoa farming has numerous challenges thus the seeking for remedies. Additionally there are a number of sources of information available to farmers as such farmers are able to report any problem they encounter on their farms for restoration.

Table 4. 4: Frequency Scores of farmers' Information Seeking Behaviour

Activity	1	2	3	4	5	Mean
Farm sanitation	77	58	110	10	5	2.26
Pest control on cocoa	6	8	168	38	40	3.38
Disease control on cocoa	4	7	156	70	23	3.39
Recommended agro-chemicals	11	23	124	68	34	3.35
Cultivation of other crops	93	71	80	15	1	2.08
Raising of animals	124	70	60	5	1	1.80
Nursery management	80	71	98	9	2	2.16
Shade management in cocoa cultivation	73	62	104	20	1	2.28

Source: Field Data, 2014. Key = 1= never, 2 = rarely, 3= sometimes, 4 = very often, 5=always.

4.3.3 Farmers' innovation proneness

Innovation proneness was operationally defined as how quickly farmers accepted some agricultural innovations. Using the means, it could be deduced that "mistletoe removal" was easily accepted with an adoption rate mean of 3.36. It was followed by "pruning" with a mean of 3.35, "periodic removal of black pod" with a mean of 3.19 and "chemical fertilizer" with a mean of 2.75. "Chemical weed control" followed with a mean of 2.62, "hybrid seedlings" with a mean of 2.26, "regular harvesting" with a mean of 2.03, "Drying healthy and unhealthy beans separately" with a mean of (1.51) with "row planting" being the least with an adoption rate mean of 1.33. Table 4.5 displays the mean values of farmers' innovation proneness.

Majority of the respondents (61.5%) were within the moderate level of innovation proneness whiles 17.3% were within the high level of innovation proneness (Appendix iiib). The results show that farmers in the District normally sought further explanations from colleague farmers' who have used innovation before they put them into practice themselves. The high percentage of farmers in the moderate level could be as a result of the wait and see attitude of farmers. Some farmers often wait to see results on people's farms before they also adopt. This present finding is in conformity with Singha & Baruah (2012) who found out that most dairy farmers had moderate level dairy innovation adoption under different farming system.

Table 4. 5: Frequency Scores of Farmers' Innovation Proneness

Activity	1	2	3	4	Mean
Row planting	219	10	16	15	1.33
Pruning	9	23	95	133	3.35
Use of hybrid seedlings	95	42	83	40	2.26
Raising of nurseries	113	60	59	28	2.01
Chemical fertilizer	47	35	113	56	2.75
Mistletoe removal	3	17	45	195	3.66
Chemical weed control	28	89	98	45	2.62
Regular harvesting	115	55	55	35	2.03
Periodic removal of black pod	2	47	110	101	3.19
Drying healthy and unhealthy beans separately	194	25	16	25	1.51

Source: Field Data, 2014

Key: 1 = innovation not adopted, 2 = after most of the people have accepted/adopted it, 3 = after consulting others who are more knowledgeable and using it and 4 = whenever i become exposed to it.

4.3.4 Farmers' achievement motivation

The respondents were asked eight (8) agricultural practices which help increase and protect the yields of cocoa. From the results obtained in Table 4.6, "regular weed control" had the highest mean of 4.62 followed by regular mistletoe removal (4.52), regular removal of black pods (4.47) and regular pruning with a mean of 4.34. Yearly application of the recommended number of insecticides followed with a mean of 3.78, followed by yearly application of the recommended number of fungicides (2.77), regular fertilizer application (2.53) with regular harvesting not when all pods are ripped being the least observed with a mean of 2.18.

A summary of the results in Table 4.6 shows that majority of the respondents (47.3%) had a moderate level of achievement motivation whiles 17.3% had a low level of achievement motivation (Appendix iiid). It could be seen from the result that over 70% of the respondents were at the moderate level and beyond. This could mean that farmers' level of achievement motivation is relatively high by carrying out activities

that enhances the yields from their farms but inference from Table 4.8 is that critical activities such as fertilizer application which promotes fruiting is highly low (2.53) and fungicides (2.77) and insecticides (3.78) application which protects the fruits from insects and diseases damage are also relatively low.

Table 4. 6: Frequency scores with regard to achievement motivation

Activity	1	2	3	4	5	Mean
Regular pruning	9	11	2	98	140	4.34
Regular mistletoe removal	3	3	7	91	156	4.52
Regular weed control	0	1	7	81	171	4.62
Regular fertilizer application	47	98	79	1	35	2.53
Application ≥ two times fungicides yearly	0	103	115	42	0	2.77
≥ three times application of insecticides	0	5	84	133	38	3.78
Regular harvesting not all pods are ripped?	115	38	56	47	4	2.18
Regular removal of black pod?	2	2	20	85	151	4.47

Source: Field Data, 2014

Key: 1 = never, 2 = rarely, 3 = sometimes, 4 = often 5= always

4.5 Description of institutional factors of the respondents

The institutional factors considered include access to credit, frequency of market visit, distance to the market, and group membership (Table 4.8).

Frequency of agro-input market visit and distance to agro-input market

The data presented in Table 4.8 depicts that majority of the respondents (75.4%) resided in areas less than 10km to the nearest markets, 24.6% resided above 10 km to the nearest market. The majority of respondent (85.4%) only went to the market when the need arose, with 14.6% going every market day.

Access to credit

The results in Table 4.8 show that a slimmer majority of respondents (51.2%) had access to credit with 48.8% not having access to credit. Sources of credit in the District for farmers include the banks, NGOs, input dealers and the license cocoa buying companies. 77.4% had credit from informal sources, 16.5% had credit from the banks whiles 6.1% had it from combination of two or more sources (Appendix III). The high level of access to credit by the farmers plausibly is a result of the high liberalization which has brought a number of providers and intense competition into the sector. Some of the service providers usually provide farmers with the credit in the form of agro-inputs in exchange for the sales of cocoa beans to them.

Table 4. 7: Institutional factors of respondents

Variable	Category	Frequency	Percentage
Access to credit	Yes No	133 127	51.2 48.8
Group membership	Yes No	117 143	45.0 55.0
Distance to market	<10km >10km	196 64	75.4 24.6
Frequency of market visit	Every market day. When there is the need.	38 222	14.6 85.4

Source: Field Data, 2014

Group membership

From the data in Table 4.8, 45.0% of respondents were members of a group with 55.0% not belonging to any group. It was realized during the study that, before farmers are reached with information or any other service such as inputs, financial assistance, it was perfectly done through the formation of groups. These groups served as a conduit through which agricultural information are channelled before subsequent delivery of agro – inputs. Belonging to a group in the District also served

as a platform for the exchange of ideas, knowledge and experiences among farmers in the groups. The greater majority (97.4%) of those in a group belonged to agricultural group whiles only 2.6% belonged to social groups. Additionally, majority 49.6% of those who belonged to group did that to have access to credit and to learn, 48.7% joined only to learn and only 1.7% joined only to have access to credit (Appendix III).

4.6 Access to and use of agricultural information

This section of the results and discussion is concerned with information on farmers' access to agricultural information and their frequency of use of the information.

4.6.1 Sources of agricultural information

Table 4.9 shows farmers source of agricultural information. From the results obtained, it can be deduced that radio is the most accessible with a percentage of 94.5% followed by Television with 75.0%. Family/Friends (70.8%) was the next followed by extension sevices (49.2%), input dealers (39.2%), farmer groups (21.9%), NGOs/Private extension providers (20.0%), Newspapers (12.3%) and LBCs (10.4%). This finding is consistent with that of Owolade & Kayode (2012) in their study on information-seeking behaviour and utilization among snail farmers in Oyo state in Nigeria. They report of about 65% and 76% of farmers receiving information from radio and television respectively. This could be as a result of radio and TV being the cheapest means of passing information to farmers (Ayandiji, 2003) and it being the effective medium of reaching farmers with information (Kock, Harder & Saisi, 2010). A small standard deviation of 0.21 for the access to radio means the responses were not varied whiles a relatively higher value of 0.50 for access to COCOBOD/MoFA means the responses were varied.

Table 4. 8: Rank order, mean and standard deviation of agricultural information sources based on their access

Source	Frequency	% (N = 260)	Rank	Mean	Std Dev.
Radio	248	95.4	1	0.95	0.21
TV	195	75.0	2	0.75	0.43
Family/Family	184	70.8	3	0.71	0.45
COCOBOD/MoFA	127	49.2	4	0.49	0.50
Input Dealers	102	39.2	5	0.39	0.48
Farmer groups	57	21.9	6	0.21	0.41
NGOs/Private ext.	52	20.0	7	0.20	0.40
Newspapers	32	12.3	8	0.12	0.32
LBCs	27	10.4	9	0.10	0.30

Source: Field Data, 2014

4.6.2 Level of access to agricultural information

Respondents with access to the first seven sources (Table 4.9) indicated their level of access to the information sources with the help of their frequency of access, timeliness of access, clarity of language, clarity of information and relevance of the information. Figure 4.2 displays respondents' level of access to the top seven sources. Figure 4.2 indicates that majority of the respondents (62.3%) had a moderate level of access to agricultural information followed by 25.4% of low level of access. The respondents in the high level of access were 12.3%. With over 70% of respondents above the low level of access, cocoa farmers in the district could be said to have a relatively a high level of access to agricultural information.

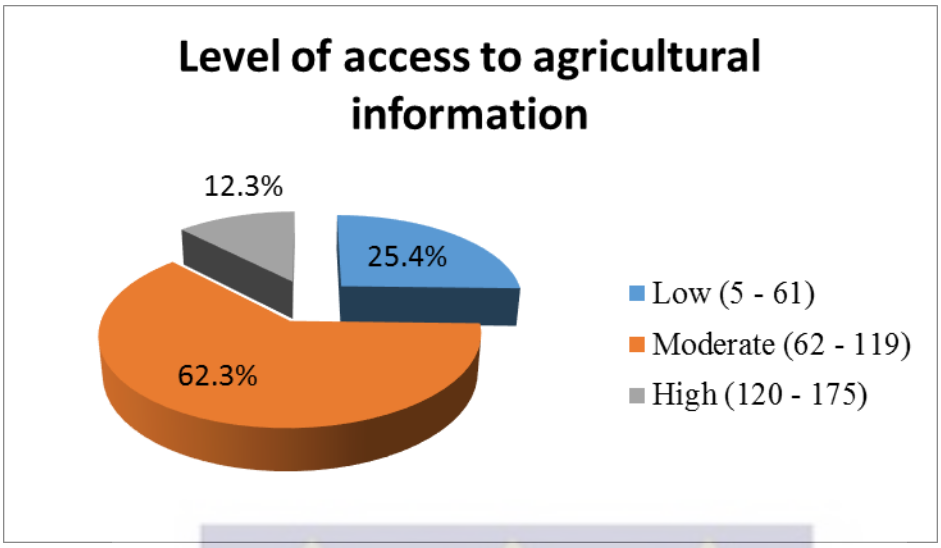


Figure 4. 1: Level of access to agricultural information

4.6.3 Use of agricultural information

Table 4.10 displays the means of use for the various sources of agricultural Majority of the respondents used the information received from their family/Friends with a mean of (3.85) followed by information from input dealers with a mean of (3.62). The use of information from COCOBOD/MoFA followed with a mean of (2.44). T.V placed 8th with a mean of (2.25) then Radio followed also with a mean of (2.19). The high use of information from family/friends, input dealers, COCOBOD/MoFA and farmer groups could be attributed to the face to face contact which allows for feedback whiles the less use of Radio and TV could be attributed to the one way communication most especially the television. It is also consistent with Ronald, Dulle, Honesta (2014) who found out that majority of rice farmers (93.8%, 80.0% and 66.2%) in Kilombero in Tanzania preferred farmers own personal experience, family/parents and Neighbours and or friends respectively for extension information. It is also confirmed by Daudu, Chado & Igbasha (2009) in their work on agricultural information sources utilized by farmers in Benue state in Nigeria. However, these

findings are in contrast with Baah (2008) who observed of family and other farmers as the main sources of information and rather radio was the most preferred information.

Table 4. 9: Rank order, mean and standard deviation of agricultural information sources based on their use

Source	Mean	Standard Deviation	Rank
Family/Friends	3.85	0.35	1
Input dealers	3.62	0.59	2
COCOBOD/MoFA	3.44	0.66	3
Farmer Groups	3.33	0.47	4
LBCs	3.30	0.45	5
NGOs/private extension	3.21	0.69	6
Newspapers	2.94	0.46	7
TV	2.25	0.80	8
Radio	2.19	0.82	9

Source: Field Data, 2014

Key: 1=never, 2= rarely, 3 = sometimes and 4 = always

4.6.4 Level of use of agricultural information

Farmers with access to the top seven sources (Table 4.9) indicated how often they use the information from the sources. Figure 4.3 shows a distribution of the level of use of agricultural information from the top seven sources. Results show that majority of the farmers (48.1%) used the accessed information on a low level (1 – 10), 44.2% of respondents were within the moderate level of use (11 – 18) and 7.7% of respondent were within the high level of use (20 – 28) of agricultural information. It could therefore be concluded that majority (94.3%) of the cocoa farmers in the District used agricultural information moderately and below.

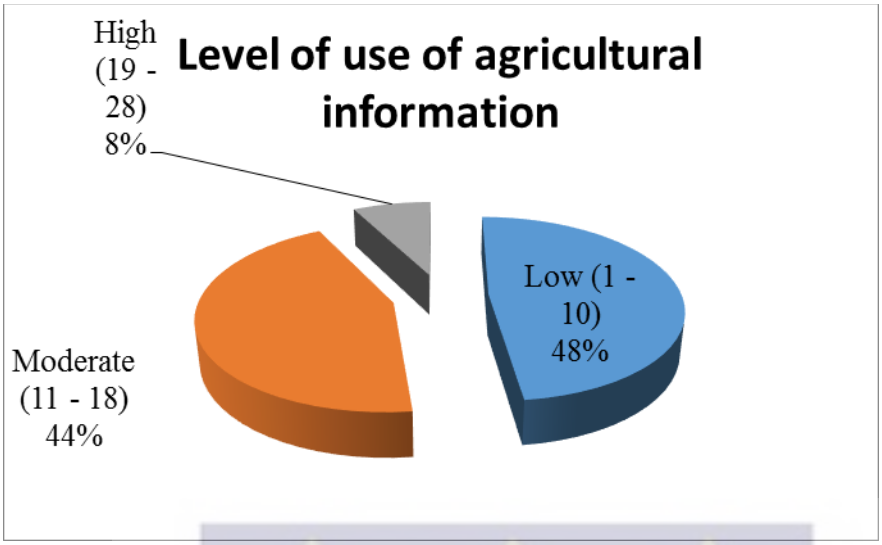


Figure 4. 2: Level of use of agricultural information

4.7 Livelihood Outcomes

This section of the study deals with farmers livelihood outcomes. Four main indicators were used in this study to measure livelihood outcomes; yield, farmers' average annual income, satisfaction of basic needs and farmers' assets possession.

4.7.1 Level of yield per hectare

The mean yield of cocoa per hectare for the period 2011/12 and 2012/13 cocoa season was 491.80 kg. The minimum yield was 2kg and the maximum was 1,280kg. The average yield of 491.80 is in conformity with LMC-WCF (2011) which estimates Ghana's average cocoa yield to be a little above 500kg/Ha after the production of over one million metric tonnes in 2010/2011 cocoa season. The LMC-WCF (2011) also estimates cocoa yields in West Africa to be under 500kg/Ha out of a possible 1000kg/Ha. Majority of the respondents (55.8%) were within the low level of cocoa yield, 39.2% were within the moderate level of cocoa yield and 5.0% were within the high level of cocoa yield. The summary is presented in Table 4.11. The majority of

farmers were with the low level of yield as a result of low level of use of agricultural information as in Figure 4.3.

Table 4. 10: Level of farmers' average yield per Hectare

Category	Frequency	Percentage
Low (2 – 350kg)	141	54.2
Moderate (351 – 650kg)	106	40.8
High (above 650)	13	5.0
Total	260	100

Note: Minimum = 2kg/Ha, Maximum = 1280kg/Ha, Mean = 491.80, N=260 and S.D = 234.301

Source: Field Data, 2014.

4.7.2 Farmers' average annual income

Farmers' average annual income consisted of all the income farmers received during the year. Table 4.12 shows a summary of farmers' average annual income. The mean average annual income of farmers was GH¢ 6,427.92 with a standard deviation of 4423.05. The minimum income level was GH¢ 1,046 per year and the maximum was GH¢ 29,133 per year. From the results most of the respondents (63.5%) were in the low level income category and 36.5% were in the high level income category. Table 4.12 shows a distribution of the farmers' average annual income.

Table 4. 11: Level of farmers' average annual income

Category	Frequency	Percentage
Low (< GH¢6428)	165	63.5
High (> GH¢6428)	95	36.5
Total	260	100

Note: Minimum = GH¢1,046, Maximum = GH¢29,133, Mean = GH¢6427.92, S.D = 4423.05 and N= 260
Source: Field Data, 2014.

4.7.3 Farmers wellbeing

Results from Figure 4.4 show that majority of the farmers (69.6%) had a high level of wellbeing (16 - 18). Also 30.4% of the farmers had a moderate level of satisfaction of basic needs while no farmer was in the low level of wellbeing. The high percentage of farmers within the high level of satisfaction could be attributed to the provision of free basic education, provision of boreholes and the existence of the national health insurance scheme in Ghana. Additionally, majority of farmers grow additional crops to feed their families and sell the surplus. The mean wellbeing level was 16.1; minimum wellbeing level was 12 while the maximum wellbeing level was 18. With no farmer in the low level category, a conclusion could be reached that farmers are able to satisfy the basic things that make life bearable.

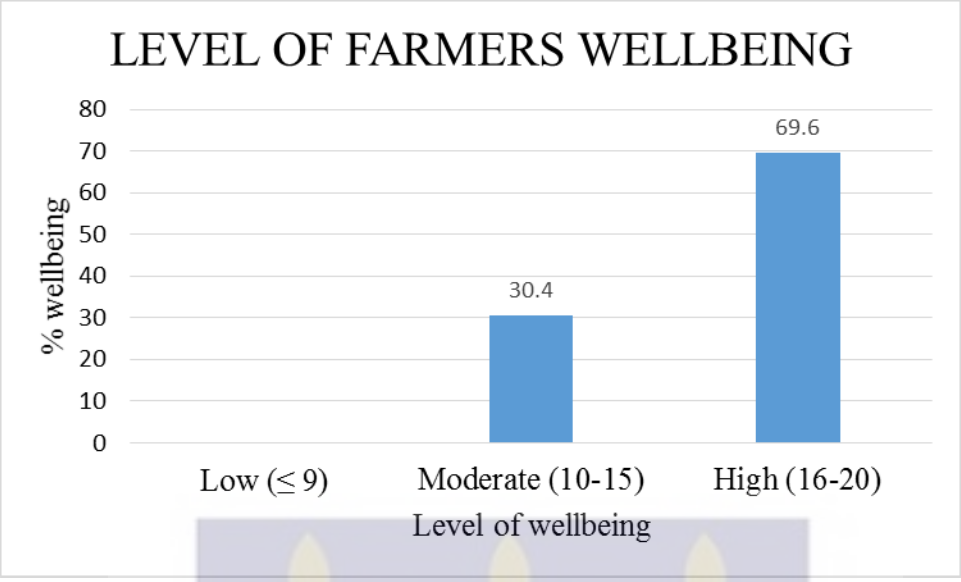


Figure 4. 3: Farmers' Level of wellbeing.

Note: Range 1 = never 2 = sometimes difficult, 3 = always
Minimum = 12, Max = 18, Mean = 16.1

4.7.4 Assets possession by farmers

From the results in Table 4.13, majority of the farmers' (96.9%) possessed beds and mattresses. This was followed by radio (93.5%), mobile phone (82.3%), knapsack sprayers (81.5%), television (69.2%), mist blower (26.9%), bicycle (23.1%), motor (8.1%) and Car (4.6%). Furthermore, the results show that majority of the farmers bought these items through their farming activities. The mean scores for sources of funds for purchase of these items were 79.42%, 9.1% and 27.3% respectively for farming, gift and other occupations.

Table 4. 12: Assets possession by farmers

Asset	Frequency	Percentage (%*)	Source of funds for purchase (%*)		
			Farming	Gift	Other
Bed	252	96.9	80.6	3.2	16.3
Mattress	252	96.9	80.6	3.6	15.9
Radio	238	93.5	81.5	6.3	12.2
Phone	214	82.3	65.4	14.0	20.6
Knapsack	212	81.5	91.0	2.8	6.1
Television	180	69.2	72.8	7.2	20.0
Mist blower	70	26.9	82.9	10.0	7.1
Bicycle	60	23.1	85.0	1.7	13.3
Motor	21	8.1	90.5	-	9.5
Car	12	4.6	63.9	9.1	27.3

Source: Field Data, 2014. Note: %* = Respondents who possessed the household assets and %** = sources of funding for the purchase.

4.7.5 Farmers level of assets possession

The results show that majority of the respondents representing 58.6% were in the low level category of assets possession followed by 36.9% in the moderate level whiles as low as 4.6% were in the high level category of assets possession (Figure 4.5).

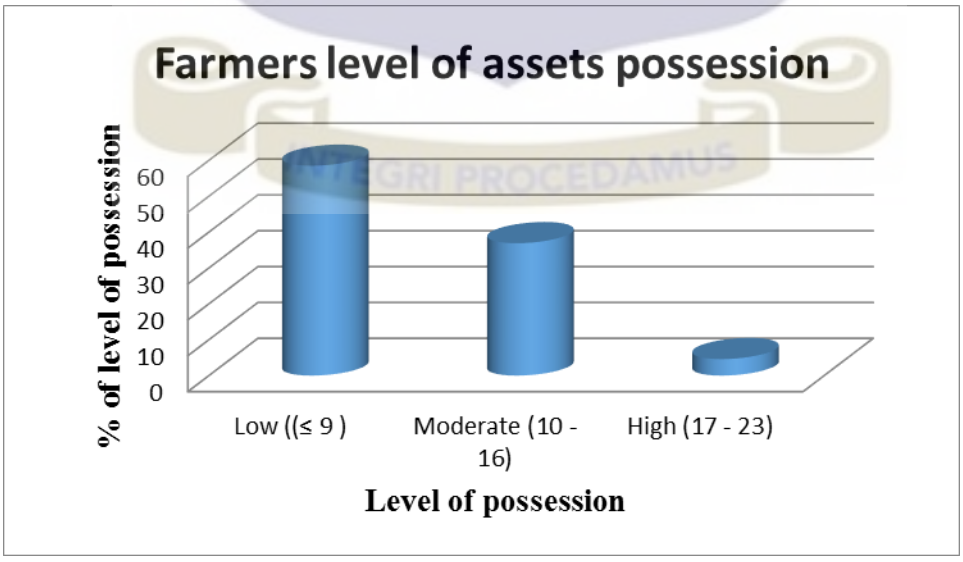


Figure 4. 4: Farmers' level of assets possession.

4.8 Relationship between farmer characteristics, institutional factors and access to agricultural information

This section discusses the relationship between farmer characteristics comprising social, economic and their orientation towards improved farming. It also looks at the relationship between the institutional factors of the farming environment and access to agricultural information.

4.8.1 Relationship between farmers' social characteristics and access to agricultural information.

The data in Table 4.14 show a significant relationship (χ_2 = 12.450; p = 0.002 education and access to agricultural information by farmers. Education is generally believed to increase farmers' ability to obtain, process and analyze information disseminated by different sources and helps them to make appropriate decision to utilize agricultural information through reading and analyzing in a better way. The educational level of a farmer usually affects individual's enthusiasm to learn about new things and to use them. The results show that educational level of farmers is a significant determinant of access to agricultural information.

This result is similar to Rehman et al. (2013) who found out that education of respondent had a significant relationship with their access to agricultural information.

Table 4. 13: Relationship between farmers' social characteristics and access to agricultural information.

Variable 1	Variable 2	$\chi 2$ ($\alpha = 0.05$)	df	p
Sex	Access	4.783	2	0.091
Age	Access	1.848	4	0764
Marital status	Access	3.086	2	0.214
Educational Level	Access	12.450	2	**0.002**
Household Size	Access	1.921 0.278	2 2	0.383 0.870
Farm ownership	Access	6.979	4	0.137

4.8.2 Relationship between farmers economic characteristics and access to agricultural information

Table 4.15 displays the economic characteristics and its relationship with access to and use of agricultural information. There was a significant relationship between farm size and their access to and use of agricultural information ($\chi 2$ =7.344, p = 0.025). This indicates that farm size has a significant relationship with access to agricultural information. Usually increasing farm size leads to an increase in farm yield if all the good practices are observed; increase in yield of cocoa also increases the incomes of farmers who are then able to look for information to use.

The Chi square value for growing of additional crops and agricultural information access ($\chi 2$ = 6.401, p = 0.041) was significant indicating that growing of additional crops affected farmers access to information. This could be due the search of extra information to cater for the additional crops cultivated by the farmers. The cultivation of additional crops also increase the incomes of farmers thus motivates them to look for information to boost their yields.

Table 4. 14: Relationship between farmers' economic characteristics and access to information

Variable 1	Variable 2	$\chi 2$ ($\alpha = 0.05$)	df	p
Off-farm work	Access	3.361	2	0.186
Farm Size (Ha)	Access	7.344	4	**0.025**
Farming experience	Access	2.376	2	0.305
Growth of other crops	Access	6.401	2	**0.041**
Availability of labour	Access	32.165	4	**0.000**

The relationship between availability of labour and access to agricultural information was highly significant ($\chi 2 = 32.165$, $p = 0.000$) (Table 4.15). This implies that availability of labour to farmers determines farmers' access to agricultural information. Cocoa farming is very labour intensive; activities such as weeding, pesticide application and many more require some sought of experience especially the application of pesticides thus availability of labour to the farmer leads to they seeking for more information for use on their farms to increase their yields. This result is collaborated by Haliu (2008) who found out that improved farming practices required lots of labour thus families with lots of labour force use technologies on their farms more than those without.

4.8.3 Relationship between farmers' orientation towards improved farming and agricultural information access

The relationship between information seeking and access to agricultural information was highly significant ($\chi 2 = 56.742$, $p = 0.000$) (Table 4.16). This implies that farmers' information seeking behaviour is a determinant of their access to agricultural information.

With a Chi square value of ($\chi 2 = 13.229$, $p = 0.000$) (Table 4.16), a conclusion could be reached that there exist between achievement motivation and farmers' access to agricultural information a highly significant relationship. This shows that farmers' achievement motivations significantly determined their access agricultural information.

Table 4. 15: Relationship between farmers' orientation towards improved farming and access to information

Variable 1	Variable 2	$\chi 2$ ($\alpha = 0.05$)	df	p
Information seeking behaviour	Access	56.742	4	**0.000**
Achievement motivation	Access	13.229	4	**0.000**
Innovation proneness	Access	30.429	4	**0.000**
Attitude towards improved farming practices	Access	38.276	4	**0.000**

The innovation proneness of farmers had a significant relationship ($\chi 2 = 30.429$, $p = 0.000$) with access to agricultural information (Table 4.19). This result is a confirmation of Asres (2005) who found a statistically significant relationship between innovation proneness and access to productive role information of women. Similarly, in studying adoption behaviour of dairy farmers.

The Chi square values of ($\chi 2 = 38.279$, $p = 0.000$) (Table 4.16) show a highly significant relationship between farmers' attitude towards improved farming practices and their access to agricultural information. This implies that attitude of farmers towards improved practices significantly determined their access to agricultural information. Farmers with favourable attitude towards improved practices seek for information from diverse sources.

4.8.4 Relationship between institutional factors and agricultural information access

Table 4.17 displays the institutional factors and their relationship with access to and use of agricultural information. Access to credit had a statistically significant relationship with access to agricultural information ($\chi 2 = 13.739$, $p = 0.001$) (Table 4.17). Farmers in the District receive credit from the banks, agro – inputs from the NGOs, input dealers and the license cocoa buying companies. The significance of the relationship implies that access to credit leads to farmers having more access to agricultural information. It was observed that before credit is given to the farmers, it is usually done in groups which included trainings on good agricultural practices.

The study looked at the relationship between group membership and access agricultural information. The findings additionally reveals a highly significant relationship ($\chi 2 = 59.623$) (Table 4.17) between group membership and access to agricultural information. It was realized during the study that, before farmers are reached with information or any other service such as inputs, financial assistance, it was perfectly done through the formation of groups. These groups served as a conduit through which agricultural information are channelled before subsequent delivery of agro-inputs. This finding is in agreement with Katungi (2006) who found group participation to have stimulated information exchange among members as a result of each other's experience and knowledge.

Table 4. 16: Relationship between institutional factors and access to information

Variable 1	Variable 2	$\chi 2$ ($\alpha = 0.05$)	df	p
Access to credit	Access	13.739	2	**0.001**
Group membership	Access	59.623	2 2	**0.000**
Distance to agro-input market	Access	12.266	2	**0.002**
Frequency of agro-input market visit	Access	2.890	2	0.236

The distances from farmers residence to the nearest agro-input market had a significant relationship with access to agricultural information ($\chi 2 = 12.266$, $p = 0.002$). This means that the distance from a farmer to the market affected their access to agricultural information either negatively or positively. Longer distances to the nearest market centres known to be a place for the exchange of ideas and information serves as a discouragement for farmers to visit and vice versa. The distance from a farmer's residence to the nearest market also did have a significant relationship with the use of agricultural information ($\chi 2 = 6.558$, $p = 0.038$).

4.8.5 Identification of significant predictor variables of access to agricultural information

Regression analysis was carried out to determine the direction and strength of the relationship between the independent and the dependent variables. Since the P value in the ANOVA table is less than 0.05, (P= 0.000), this means the relationship is significant at 1% significance level therefore the null hypothesis cannot be accepted. The variation in access to agricultural information has been explained by the independent variables by 49.8%.

There is a statistically significant relationship between the independent variables and farmers' access to agricultural information (R^2 = 0.498, F (19, 240) = 12.515, p = 0.000). According to the results in Table 4.18, the following variables were found to be positively significant; availability of labour, group membership, information seeking behaviour of farmers and attitude towards improved farming practices whiles household size was negatively related.

Household size

There exists a negative significant relationship between household size and access to agricultural information. This implies that increasing household size will lead to a decrease in the access to agricultural information. From the table a unit increase in the size of household of a farmer leads to a decrease in 1.664 unit of agricultural information access implying farmers with large family size do not make effort to get information due to their inability to use because they spend much of their resources in catering for the family needs. Contrary to this result, increased exposure to information was noted among women farmers with larger family sizes (Kacharo, 2007). However, Fuglie (2008) established no relationship between household size and access to agricultural information.

Labour availability

From the study a unit increase in labour availability leads to the possibility of accessing agricultural information by 4.662 units.

Group membership

Belonging to a group serves as a platform for information exchange among members, access to group credit, inputs and also aid extension agents to reach members with

new practices. From the result, belonging to a group leads to 14.594 increase in the possibility of accessing agricultural information. The high coefficient of 14.594 signifies the significant role group membership plays in information sharing. This result is collaborated by Conley & Udry, (2010); Caviglia & Khan, (2001); Bandiera & Rasul, 2003 who report of group membership increasing the capacity of an individual to access information about current innovation and its benefit from other members. It also increases individual farmer's awareness and as a result increases the likelihood of adoption of new technology.

Information seeking behaviour

Information seeking by farmers exposes them to new practices for their production activities. There are lots of challenges with farming thus solutions are needed to them. The results from the study show that a unit increase in information seeking will lead to an increase of 1.062 unit of access to agricultural information. From the results in Table 4.4, information seeking was high in recommended agro-chemicals, pest and diseases control which are pivotal in cocoa farming. This result is shared by Regassa et al. (2011) who state that sharing of problems, asking and weighing options exposed people to a variety of hygiene and sanitation information than people with no such behaviour.

Attitude towards improved farming practices

Attitude of farmers towards improved farming practices was significantly related to access to agricultural information. Farmers with a favourable attitude towards improved farming practices will always look for information from genuine sources which would subsequently be used. A unit improvement in the attitude of farmers

leads a 0.645 unit increase in access to agricultural information. Table 4.18 presents significant predictor variables of farmers' access to agricultural information.

Table 4. 17: Significant predictor variables of access to agricultural information

Predictor variables	B	t	p - value
Household size	-1.664	-2.557	0.011
Availability of labour	4.662	2.401	0.017
Group membership	14.594	4.853	0.000
Information seeking behaviour	1.062	3.373	0.001
Attitude towards improved farming practices	0.645	2.384	0.018
$R^2 = 0.498$			
p value = 0.000			
Standard error = 18.41			

Source: own construct, 2014

Note: All significant and non-significant variables presented in appendix IIa

4.8.6 Relationship between farmer characteristics, institutional factors and use of agricultural information

This section discusses the relationship between farmer characteristics comprising social, economic and their orientation towards improved farming. It also looks at the relationship between the institutional factors of the farming environment and use agricultural information.

The data in Table 4.14 show a significant relationship ($\chi 2 = 15.155$; $p = 0.001$) between education and use of agricultural information by farmers. Education is generally believed to increase farmers' ability to analyze information disseminated by different sources and helps them to make appropriate decision to utilize agricultural information through reading and analyzing in a better way. The results show that educational level of farmers is a significant determinant use of agricultural information.

Similarly, Muneer (2008), found that education level of farmers affected their adoption of agroforestry farming, also it was found to have significant relationship

with the adoption of integrated pest management practices (Uwagboe, Akinbile & Oduwole, 2012).

Table 4. 18: Relationship between farmers' social characteristics and use of information

Variable 1	Variable 2	$\chi 2$ ($\alpha = 0.05$)	df	p
Sex	Use	0.006	2	0.997
Age	Use	4.235	4	0.375
Marital status	Use	2.082	2	0.353
Educational level	Use	15.155	2	**0.001**
Household size	Use	0.278	2	0.870
Farm ownership	Use	2.697	4	0.610

4.8.7 Relationship between economic characteristics of farmers and of agricultural information

There was a significant relationship between farm size and their access to and use of agricultural information ($\chi 2 = 10.999$, $p = 0.004$). This indicates that farm size has a significant relationship with use of agricultural information. Implementation of agricultural information normally goes with the use of money thus farmers with smaller farm sizes with lower yields are not able to invest in their farms. Zhang et al. (2012) assert of farmers with large farm sizes usually being wealthy thus there being the likelihood of they adopting high inputs innovation.

Table 4. 19: Relationship between farmers' economic characteristics and access to and use of information

Variable 1	Variable 2	$\chi 2$ ($\alpha = 0.05$)	df	p
Off-farm work	Use	3.879	2	0.144
Farm Size (Ha)	Use	10.999	4	**0.004**
Farming experience	Use	4.116	2 2	0.128
Growth of other crops	Use	1.265	2	0.531
Labour availability	Use	38.154	4	**0.000**

The relationship between availability of labour and use of agricultural information was highly significant ($\chi 2 = 38.154$, $p = 0.000$) (Table 4.15). This implies that availability of labour to farmers determines farmers' use of agricultural information. Cocoa farming is very labour intensive; activities such as weeding, pesticide application and many more require some sought of experience especially the application of pesticides thus availability of labour to the farmer leads to the use of agricultural information their farms to increase their yields. This result is collaborated by Haliu (2008) who found improved farming practices requiring lots of labour thus families with lots of labour force use technologies on their farms more than those without.

4.8.8 Relationship between farmers' orientation towards improved farming practices and agricultural information use

The relationship between information seeking and use of agricultural information was highly significant ($\chi 2 = 85.961$ $p = 0.000$) (Table 4.16). This implies that farmers' information seeking behaviour is a determinant of their use of agricultural information. This outcome is in agreement with Jayawardana & Sherief (2010) who observed a significant relationship between information seeking behaviour and farmers' adoption of organic farming. They concur that the seeking for information by

farmers enables them to have access to practices which must be strictly obeyed in the practice of organic farming.

With a Chi square value of ($\chi 2 = 15.966$, $p = 0.000$) (Table 4.16), a conclusion could be reached that there exist between achievement motivation and farmers' use of agricultural information a highly significant relationship. This shows that farmers' achievement motivation significantly determined their use agricultural information.

Table 4. 20: Relationship between farmers' orientation towards improved farming and access to and use of information

Variable 1	Variable 2	$\chi 2$ ($\alpha = 0.05$)	df	p
Information seeking behaviour	Use	85.961	4	**0.000**
Achievement motivation	Use	15.966	4	**0.000**
Innovation proneness	Use	36.560	4	**0.000**
Attitude towards improved farming practices	Use	61.990	4	**0.000**

The innovation proneness of farmers had a significant relationship ($\chi 2 = 45.36.560$, $p = 0.000$) with use of agricultural information (Table 4.19). Similarly, in studying adoption behaviour of dairy farmers, Singha & Baruah (2012) established a significant relationship between innovation proneness and some dairy practices.

The Chi square values of ($\chi 2 = 61.990$, $p = 0.000$) (Table 4.16) show a highly significant relationship between farmers' attitude towards improved farming practices and their and use of agricultural information. This implies that attitude of farmers towards improved practices significantly determined their access use of agricultural information. Farmers with favourable attitude towards improved practices seek for information from diverse sources and genuine information from genuine sources leads

to its usage. Ebrahim (2006) asserts of a significant relationship between attitude towards change by farmers and dairy practices adoption

4.8.9 Relationship between institutional factors and agricultural information use

Table 4.17 displays the institutional factors and their relationship with access to and use of agricultural information. Access to credit had a statistically significant relationship with use of agricultural information ($\chi 2 = 15.302$, $p = 0.000$) (Table 4.17). Farmers in the District receive credit from the banks, agro – inputs from the NGOs, input dealers and the license cocoa buying companies. The significance of the relationship implies that access to credit leads to the use of agricultural information by farmers. Access to credit also lead to farmers accessing agro – inputs and labour which are requirements for carrying out improved agricultural practices. Credit help farmers to purchase modern technologies which are expensive for many rural farmers, who are normally poor to acquire and utilise them without assistance (Benin et al., 2009).

The study looked at the relationship between group membership and use of agricultural information. The findings additionally reveals a highly significant relationship ($\chi 2 = 64.187$, $p = 0.000$) (Table 4.17) between group membership and use of agricultural information. Belonging to a group in the District also served as a platform for the exchange of ideas, knowledge and experiences among farmers in the groups. Fadiji et al. (2006) also identified group membership as significantly related with information usage due to the influence farmers have on each other in a group as a result of experience shared

Table 4. 21: Relationship between institutional factors and access to and use of information

Variable 1	Variable 2	$\chi 2$ ($\alpha = 0.05$)	df	p
Access to credit	Use	15.302	2	**0.000**
Group membership	Use	64.187	2	**0.000**
Distance to agro-input market	Use	6.558	2	**0.038**
Frequency of agro-input market visit	Use	6.272	2	0.828

The distances from farmers residence to the nearest market had a significant relationship with access to agricultural information ($\chi 2 = 12.266$, $p = 0.002$). This means that the distance from a farmer to the market affected their use of agricultural information either negatively or positively. Longer distances to the nearest market center known to be a place for the exchange of ideas and information serves as a discouragement for farmers to visit and vice versa.

4.8.10 Identification of significant predictor variables of the use of agricultural information

The following variables were found to be statistically significant and positively related to the use of agricultural information; labour availability, off – farm work, group membership and information seeking behaviour of farmers whiles household size of respondents was negatively related to the use of agricultural information. The R^2 statistic value of 0.514 means the independent variables are able to explain the variance in the dependent variable (use of agricultural information) by 51.4%, the p–value of 0.000 means the test is highly significant at 1% significance level.

Household size

From the results (Table 4.19), there is a decrease in 0.279 unit in the use of agricultural information when household size increased by one unit. This means that increase in the size of a household put pressure on the resources of the house making it difficult for them to invest in their farms. Amao & Awoyemi (2007) observed an increase in the size of households decreasing the adoption of improved varieties of cassava which Kafle & Shah (2012) attribute it to families with larger sizes paying much attention to non-farm activities which gives quicker returns to meet the increased needs of the family than their farms but contradicts Koskei et al. (2013) who found an increase in the size of household putting pressure on the demand for household needs and hence the need to produce more for family and earn more to cater for the household which could lead to agricultural information search and use on the farm.

Labour availability

Labour was positively significant with the use of agricultural information. There is the possibility of farmers using agricultural information by 0.919 units when labour availability increased by one unit. Labour was found by Nandi et al. (2012) as positively affecting adoption of innovation as labour availability is a requirement for technology adoption. Additionally, this result is collaborated by Haliu (2008) who established that improved farming practices required lots of labour thus families with lots of labour force used technologies on their farms more than those without.

Off – farm work engagement

The results of this study also show that there is a positive significant relationship between the use of agricultural information and the engagement in off – farm work. There is a possibility of using information by 1.118 units when a farmer engages in

off – farm work. Engaging in off – farm work brings additional income to the house aside the farming activity which is highly seasonal (Davis, 2003). However, Akudugu et al. (2012) observed a negative relationship between off-farm work and adoption of technologies, this is because they are likely to interfere in the farm activities.

Group membership

The positively significant influence of group membership on the use of agricultural information could be due to the fact that farmers usually interact among themselves in a group thus share innovations they have tried and were helpful to them. It might also be as a result of the stimulation of information exchange among members as a result of each other's experience and knowledge. Majority of farmers (97.4%) belonged to agricultural groups which only do not teach farmers but link them to sources to credit, agro–inputs which Ofuoku et al. (2006) mention as some of the benefit of belonging to a group which helps them in their use of recommendations from information sources. Belonging to a group was also a means of having regular access to Government and private extension services. From the results farmers belonging to a group increased their probability of using agricultural information by 2.996 units.

Information seeking behaviour

The result also shows that a unit increase in farmers' information seeking behaviour leads to 0.255 unit increase in the use of agricultural information. Similarly Asres (2005) established that as information seeking behaviour of farmers increases their utilization of accessed information also increases. Table 4.19 presents significant predictor variables of farmers' use of agricultural information.

Table 4. 22: Significant Predictor Variables of the use of agricultural information

Predictor variables	B	t	p - value
Household size	-0.279	-2.212	0.028
Availability of labour	0.919	2.458	0.015
Off – farm work	1.118	2.265	0.024
Group membership	2.996	5.133	0.000
Information seeking behaviour	0.255	3.679	0.000
$R^2 = 0.514$			
p value = 0.000			
Standard error = 3.57			

Source Author's own construct 2014

Note: All significant and non-significant variables are presented in appendix I

4.9 Relationship between level of access to agricultural information and level of use of agricultural information.

This study has revealed that the level of access to agricultural information by cocoa farmers in the Sefwi Bekwai Cocoa District affects their level of use of the information ($R^2 = 0.894$, F (1, 258) = 2181, p = 0.000) (Appendix 11c). This implies that increasing level of access to agricultural information leads to an increase in the use of agricultural information. Table 4.19 presents the actual variables of level of information access that predict the level of use of the information by farmers. The results indicate that variables such as frequency of access to the information, clarity of language used in dissemination and relevance of information disseminated significantly influenced level of use positively ($R^2 = 0.897$, F (5,254) = 440.16, p = 0.000). The relationship is significance at 1% significance and the variation in the use of agricultural information is explained by the independent variables by 89.7%.

The result suggests that a unit improvement in the frequency of access to agricultural information will lead to a 0.284 units increase in the level of use of information. This

means that when the source of information is always available, there is a high probability of use of the information by farmers. Their availability could lead to the seeking of further clarifications by the farmers thus clearing their doubt about the information. It also serves as a follow up check if the right things are being done the farmers. Similar to this result, Asiabaka & Owens (2002) established a significant positive relationship between the availability of information source and adoption by farmers. Furthermore, Adebiyi & Okunlola (2013) found a positive relationship between frequency of access to information by farmers and adoption of coca rehabilitation techniques which means regular access to agricultural information, they adopt the techniques available to them

From the results in Table 4.19, a unit improvement in the clarity of the language used in the dissemination of information leads to a 0.208 unit use of agricultural information. The clarity of language used in the dissemination plays an important role in the understanding and use of the information by the farmers, clarity of the language removes all vagueness about the information disseminated. Sani, Boadi, Oladokun & Kalusopa (2014) found language used in the dissemination of information as a barrier to its use in Nigeria. Additionally, language barrier or understanding of the language used in the dissemination of agricultural information was found by Daudu et al. (2009) as a barrier to the use of information in Benue state in Nigeria. The above literature implies that for information to be used there must be clarity which would be achieved if the language used in the dissemination is very common in the locality. In research to find out the influence of education on the dissemination of soil fertility information, Kimaru-Muchai, Mugwe, Mucheru-Muna, Mairura & Mugendi (2012) found out that about 99.6% of the farmers preferred the use of vernacular language in the dissemination.

Dissemination of relevant information leads to a 0.133 unit use of the information, implying dissemination to needed information to farmers at the right time is very necessary. From the results there is an increase in use of information if the information is relevant for a particular period. Poor relevance and usefulness of information led to the non-utilization of agricultural information by farmers in India (Babu, Claire, Asenso-Okyere, & Govindarajan, 2011). Table 4.20 present the significant variables for the level of use of information.

Table 4. 23: Relationship between level of agricultural information access and use.

Variable of access level	B	t	p - value
Constant	-0.802	-2.698	0.008
Frequency of access	0.284	3.805	**0.000**
Timeliness of access	0.079	1.307	0.193
Clarity of language used	0.208	2.450	**0.015**
Clarity of disseminated information	0.043	0.479	0.632
Relevance of information	0.133	2.026	**0.044**
R^2 = 0.897, p value = 0.000			
Standard error = 1.602			

4.10 Effect of the level of use of agricultural information on the livelihood outcomes of cocoa farmers

In order to obtain the relationship between farmers' level of use of agricultural information and their livelihood outcomes, the chi-square test of independence was used.

4.10.1 Effect of level of agricultural information use on yield of cocoa

The Contingency Table 4.21 below shows a Chi-square test of independence for farmers' level of use of agricultural information and their level of yield.

The table shows the results of a hypothesis test run to determine whether or not to reject the idea that the row and column classifications are independent. Since the p value in the table is less than 0.05, the null hypothesis cannot be accepted. It could therefore be deduced that there is a statistically significant relationship between level of use of agricultural information and level of yield of farmers at the 95.0% confidence level (χ^2= 39.863, df = 4, p = 0.000). This means increasing use of agricultural information in cocoa production comes with a corresponding increase in yield.

Table 4. 24: Effect of Level of agricultural information use on yield of cocoa

Level of farmers yield (Kg)	Level of use of Agricultural Information			Total
	Low (1– 10)	Moderate (11 – 19)	High (20 – 20)	
Low (≤350kg)	92(63.4)	47(32.4)	6(4.1)	145(100)
Mod (356 – 650kg)	29(28.4)	63(61.8)	10(9.8)	102(100)
High(>650kg)	4(30.8)	5(38.5)	4(30.8)	13(100)
Total	125(48.1)	115(44.2)	20(7.7)	260

χ^2= 39.863, df = 4, p = 0.000, < 0.05 (S), Gamma = 0.554.

Agricultural information transfer is a means of reaching farmers with new and improved ways of doing farming such as agro – chemicals to use, when and how to apply them, agronomic practices to undertake on the farm, where to obtain certain inputs among others. From the results, increasing use of these information helps increase the yields of farmers. This finding is supported by Ojo et al. (2013) who report of differential access to agricultural technologies and support services leading to differences in productivity of farmers. Furthermore, Agbebi (2012) observed

different levels of yield among fish farmers in Nigeria as a result of differences in the application of improved practices they received from extension officers. Ahmad, Jamal, Ikramullah & Himayathullah (2007) reports of tomato and onion farmers who utilize agricultural information recording higher yields than those without access to and use of agricultural information. The positive Gamma co - efficient of 0.554 implies a moderate effect of the agricultural information use on farmers' yield and the relationship is positive meaning as information use increased, there was a corresponding increase in the yield of cocoa.

4.10.2 Effect of level of agricultural information use on farmers' annual income

The Contingency Table 4.22 shows a Chi-square test of independence for farmers' level of use of agricultural information and their average annual income.

From the table there is a significant relationship between the level of use of agricultural information and the average annual income of farmers (χ^2= 15.825, df: 2, p = 0.000). This means that an increase in the use of agricultural information is likely to increase the incomes of farmers. The use of agricultural information is not only for cocoa production but for other cultivated crops and animals leading to the increase in production levels of all these crops and animals which have a direct bearing on the incomes of farmers. There is a report of a significant increase in the income of farmers who had access and utilized information from NAADS than those who did not utilize it (Benin et al., 2007). Also in agreement with this finding, Agbebi (2012) in his study of the assessment of the impact of extension services on fish farming in Ekiti state found out that the higher the access to and use of agricultural information in fish farming practices by the farmers, the higher their profit. Okwoche & Asogwa (2012) also arrived at the same result of that of the fish farmers for cassava farmers in Benue state in Nigeria. Rizvi (2011) in India also had similar results that information

use by farmers sent via the mobile phone resulted in an increase in productivity and incomes of farmers. There is a moderate effect of the level of use of information on farmers' level of annual income as indicated by a Gamma co – efficient of 0.433. The positive Gamma value implies that as information use increased, farmers' income also increased.

Table 4. 25: Effect of Level of agricultural information use on farmers' income

Level of farmers average annual income (GH¢)	Level of use Of Agricultural Information			Total
	Low (1 – 10)	Mod (11 – 18)	High (19 – 28)	
< GH¢ 6428	93 (56.4)	65 (39.4)	7 (4.2)	165 (100)
> GH¢ 6428	32 (33.7)	50 (52.6)	13 (13.3)	95(100)
Total	125(48.1)	115(44.2)	20 (7.7)	260(100)

χ^2= 15.825, df: 2, p = 0.000, < 0.05 (S), Gamma = 0.433

4.10.3 Effect of Level of agricultural information use on farmers' wellbeing

The Contingency Table 4.23 shows a Chi-square test of independence for farmers' level of use of agricultural information and their wellbeing.

Since the p value in the table is less than 0.05, the null hypothesis cannot be accepted and that the rows and columns are independent at the 95.0% confidence level. Therefore, there is a statistically significant relationship between the level of farmers' use of agricultural information and their level of wellbeing (χ2= 13.538, df: 2, p = 0.001).

This means that an increase in the level of use of agricultural information by a farmer is likely to produce an increase in the level of wellbeing of the farmer. This could be linked to most of the farmers cultivating crops aside the cocoa production which serves as source of food and additional income especially when cocoa is not in season which also make use of agricultural information. Some also raised animals which provided them with their protein needs. There is a report of an improvement in the

food security and nutrition of farmers who had access and utilized information from NAADS than those who did not utilize it (Benin et al., 2007)

Table 4. 26: Effect of Level of agricultural information use on farmers' wellbeing

Level of Satisfaction of basic household needs	Level of use Of Agricultural Information			Total
	Low (1 – 10)	Mod (11 – 18)	High (19 – 28)	
Moderate (10 -15)	50(63.3)	28(35.4)	1(1.3)	79
High (16 – 18)	75(41.4)	87(48.1)	19(10.5)	181
Total	125(48.1)	115(44.2)	20(7.7)	260

$\chi 2$= 13.538, df: 2, p = 0.001, < 0.05 (S), Gamma value = 0.441.

Certification schemes which provide the platform for the dissemination of agricultural information is mentioned by KPMG (2013) of providing training for farmers on agronomic practices such as good pesticides application, protecting farmers from diseases, linking of farmers to credit, and training of farmers on extra income generating activities with it resultant effect on increase in yields and income leading to satisfaction of basic needs in theirs home. Similarly, Fengying et al. (2011) report of improvement in the quality of life of farmers', the improvement in the local economy and society as a result of utilization of information received from the village information centre. There is a moderate effect of the level of use of information on the level of assets possession as depicted by Gamma co - efficient of 0.441. There is also a positive relationship implying that as information became high, farmers' wellbeing also improves.

4.10.4 Effect of Level of agricultural information use on farmer's assets possession

The Contingency Table 4.24 below presents a chi-square test of independence showing the farmers' level of use of Agricultural information and their level of assets possession.

Since the P value is less than 0.05, the null hypothesis is not accepted. It could therefore be deduced that there is statistically significant relationship between the two variables (level of use of agricultural information and farmers' level of possession of household assets) ($\chi 2$= 12.014, df: 4, p = 0.017). The significant relationship could be attributed to the increase in farm yield as a result of the use of agricultural information. This leads to increase in income of farmers enabling farmers to own basic household assets. Similar to this finding, Mapila et al. (2011) observed that the use of rural agricultural innovations resulted in the positive impact on the total assets holdings of farmers. The Gamma co – efficient of 0.305 shows a weak effect of the information use on farmers' possession of assets. The positive Gamma value depicts a positive relationship, as information use increased farmers' assets possession also increased.

Table 4. 27: Effect of level of agricultural information use on farmers' possession of basic assets.

Level of possession of Basic household assets	Level of use Of Agricultural Information			Total
	Low (1 – 10)	Mod (11 – 18)	High (19 – 28)	
Low (<9)	83(54.6)	60(39.5)	9(5.9)	152(100)
Moderate (10 – 16)	40(41.7)	48(50.0)	8(8.3)	96(100)
High (17 – 23)	2(16.7)	7(58.3)	3(25)	12(100)
Total	125(48.1)	115(44.2)	20(7.7)	260(100)

$\chi 2$= 12.014, df: 4, p = 0.017, > 0.05 (S), Gamma = 0.305

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a summary of the study, presents the very important findings and succinctly presents the conclusions that were made as a result of the study. Key recommendations are then proffered.

5.2 Summary

The central objective of this study was to assess the effect of use of agricultural information on the livelihood of cocoa in the Sefwi Bekwai Cocoa District. The study therefore addressed the following issues:

(1) To ascertain the relationship between the farmers' characteristics, institutional factors and their level of access to agricultural information

(2) To determine the relationship between the farmers' characteristics, institutional factors and their level of use of agricultural information,

(3) To determine the influence of the level of use of agricultural information on the livelihood of cocoa farmers and

(4) To determine the relationship between the level of access to agricultural information and information use.

To address the above objectives, a largely quantitative research design was adopted for the study with survey as the main method. The sample size was made up of 260 cocoa farmers within the Sefwi Bekwai cocoa District in the Western Region. The study adopted the multi-stage sampling technique: Purposive, cluster and the simple random sampling technique. Primary data was largely used for the study. Data was

collected by the use of questionnaires and it was analysed using two computer software; Microsoft Excel 2010 and Statistical Package for Social Sciences (SPSS). Both descriptive and inferential statistics were conducted for the analysis of the data.

Objective 1

For objective one, a Chi square analysis proved that a significant relationship exists between educational level, farm size, growth of additional crops, labour availability, access to credit, group membership and access to agricultural information. There is also a significant relationship between distance to agro-input market, farmers' information seeking behaviour, achievement motivation, innovation proneness and farmers attitude towards improved farming practices at 5% significance level.

A multiple linear regression yielded an R^2 value 0.0.498 implying together the predictor variables have been able to explain 49.8 percent of the variability in the dependent variable (access to agricultural information). The analysis have shown that, three farmer characteristics namely: household size, farmers' information seeking behaviour and attitude towards improved farming practices all have significant influence on the level of farmers' access to agricultural information. Two institutional factors namely: labour availability, group membership influenced the level of farmers' access to agricultural information. A unit increase in household size will lead to 1.664 units decrease in access to agricultural information, an increase in labour availability by 1 unit will result in 4.662 unit increase in level of farmers' access to agricultural information, farmers belonging to group lead 14.594 units increase in level of farmers access

to agricultural information and a unit increase in farmers' information seeking behaviour will yield 1.062 units increase in level of access to agricultural information. Farmers with favourable attitude towards improved farming practices increase their access to agricultural information by 0.645 units.

Objective 2

For objective two, a Chi square analysis proved that a significant relationship exists between educational level, farm size, labour availability, access to credit, group membership and access to agricultural information. There is also a significant relationship between distance to agro-input market, farmers' information seeking behaviour, achievement motivation, innovation proneness and farmers attitude towards improved farming practices at 5% significance level.

A multiple linear regression yielded an R^2 value 0.514 implying together the predictor variables have been able to explain 51.4 percent of the variability in the dependent variable (use of agricultural information). The analysis have shown that two farmer characteristics namely: household size and farmers' information seeking behaviour all have significant influence on the level of farmers' use of agricultural information. Two institutional factors namely: labour availability and group membership influence the level of farmers' use to agricultural information. A unit increase in household size will lead to 0.279 units decrease in the use of agricultural information, an increase in labour availability by 1 unit will result in 0.919 unit increase in level of farmers' use of agricultural information, farmers belonging to a group lead 2.996 units increase in level of farmers use of agricultural information and a unit increase in farmers' information seeking behaviour will yield 1.062 units increase in level of access

to agricultural information. Farmers level of use of agricultural in increases by 0.255 when they seek for information.

Objective 3

The study also revealed that increase in the level of access to agricultural information leads to an increase in the use of agricultural information. A multiple linear regression yielded an R^2 value of 0.894 implying that the predictor variables have been able to explain 89.4 percent variability in the level of farmers' use of agricultural information. The analysis shows that frequency of access to the information, clarity of language used in dissemination and relevance of information disseminated significantly influenced level of use positively. The results suggests that a unit improvement in the frequency of access to agricultural information will lead to a 0.284 units increase in the level of use of information, a unit improvement in the clarity of the language used in the dissemination of information leads to a 0.208 unit use of agricultural information and the dissemination of relevant agricultural information leads to a 0.133 unit use of the information.

Objective 4

There is a statistically significant relationship between the level of use of agricultural information and the level of yield of cocoa, level of average annual income of farmers and level of farmers' wellbeing at 5%. There is also a statistically significant relationship between level of use of agricultural information and the level of possession of basic household assets at 5%.

5.3 Conclusion

The study established that three farmer characteristics namely; household size, information seeking behaviour and attitude towards improved farming practices all have significant influence on level of farmers' access to agricultural information. Two institutional factors namely; labour availability and group membership by farmers were also found to have significant influence on access to agricultural information.

Household size and information seeking behaviour of farmers all have significant influence on level of farmers' use of agricultural information. Two institutional factors namely; labour availability and group membership by farmers were also found to have significant influence on use of agricultural information.

The study revealed that farmers' level of use of agricultural information is likely to be influenced by their level of access to agricultural information with the significant determinant been frequency of access, clarity of language used and the relevance of the information.

Finally, the study found that the level of farmers' average yield per hectare, average annual income, level of farmers' wellbeing and possession of basic assets are likely to be influenced by their level of use of agricultural information. It can therefore be concluded that increasing farmer's level of use of agricultural information leads a positive improvement in their livelihood outcomes.

5.4 Recommendations

Based on the findings and conclusions of this study, the following recommendations are made:

It is observed that access to and use of agricultural information brought improvement in the livelihood of cocoa farmers. Thus actions that enhance farmers' access to and use are recommended.

From the results it is observed that the use of information where farmers are able to have a face to face interaction with the source is high thus the following are recommended:

- Service providers should have a frequent face to face interaction with the farmers which could be done through farmer field schools, rallies, farm demonstrations among others.
- Government agencies responsible for extension services and other non-state organizations that are into the provision of agricultural information should offer training programs for lead farmers in the communities. These people will then serve as contact farmers in their various communities. Additionally, routine training of input dealers in the various communities should be undertaken to improve upon their knowledge levels since they are a regular source of agricultural information.
- Cocoa farmers should be sensitized to subscribe to the various farmer groups that abound in their communities. In communities that do not have groups, it is recommended that groups even if not agricultural in nature should be formed through the facilitation of the extension agents in the area. This will make information easily accessible and enhance it use as per the results. Subscribing to farmer groups will also make accessible credit facilities to farmers to improve upon their production levels.

It is also recommended that the dissemination of information by service providers should be done using the predominant language in the area. This will make the farmers have a sense of belongingness and also make clear information disseminated. Additionally, dissemination of information should be timely, it should not be general. Appropriate messages should be disseminated for the season when those messages are needed. Farmers should be encouraged to have a behavioural change in their search for agricultural information since the sources would not be within their reach to address their problem at any particular point in time.

A further study into farmers access to agro-inputs is also recommended since it is a compliment to the use of agricultural information.

REFERENCES

Abenyega, O., & Gockowski, J. (2001). Labor practices in the cocoa sector of Ghana with a special focus on the role of children. *STCP/IITA Monagraph IITA, Ibadan, Nigeria*.

Adebayo, K. (2004, October). Private sector participation in agricultural extension services in Nigeria. In *presentation at the Farm Management Association of Nigera Conference, held on Oct* (pp. 19-21).

Adebiyi, S., & Okunlola, J.O. (2013). Factors Affecting Adoption of Cocoa Farm Rehabilitation Techniques in Oyo State of Nigeria. *World Journal of Agricultural Science,* 9 (3): 258-265. DOI: 10.5829/idosi.wjas.2013.9.3.1736

Adeogun, S. O., Olawoye, J. E., & Akinbile, L. A. (2010). Information Sources to Cocoa Farmers on Cocoa Rehabilitation Techniques (CRTs) in Selected States of Nigeria. *Journal Media and Communication Studies, 2*(1): 009 - 015.

Adereti, F. O., Fapojuwo, O. E., & Onasanya, A. S. (2006). "Information Utilization on Cocoa production Techniques by Framers in Oluyole Local Government Area of Oyo State, Nigeria", *European Journal of Social Science*. 3 (1): 1–7.

Adesina, A.A. Mbila, D., Nkamleu, G.B., & Endamana, D. (2000). Econometric analysis of the determinants of adoption of alley farming by farmers in the forest zone of Southwest Cameroon. *Agr. Ecosyst. Environ.* 80:255-265.

Adjinah, K.O. & Opoku, I.Y. (2010). *The National Cocoa Diseases and Pest Control (CODAPEC): Achievement and Challenges*. Available at http://news.myjoyonline.com/features/201004/45375.asp

Agbebi, F. O. (2012): "Assessment of the Impact of Extension Services on Fish Farming in Ekiti State, Nigeria", *Asian Journal of Agriculture and Rural Development*, 2(1): 62-68

Agbongiarhuoyi, A. E., Abdulkarim, I. F., Fawole, O. P., Obatolu, B. O., Famuyiwa, B. S., & Oloyede, A. A. (2013). Analysis of farmers' adaptation strategies to climate change in cocoa production in Kwara State. *Journal of Agricultural Extension,* 17 (1):10 - 22

Ahmad, S., Jamal, M., & Ikramullah, A. (2007). Role of extension services on the farm productivity of district Swat (A case study of two villages). *Sarhad Journal of Agriculture (Pakistan)*.

Ajzen, I. (1985). From intentions to actions: A theory of planned behaviour. In Kuhl, J. and Beckman, J. (Eds), *Action control: from cognition to behaviour*. Heidelberg: *Springer*. 11- 39.

Ajzen, I. (1991). The theory of planned behaviour. *Organizational behaviour and human decision processes*, 50: 179–211.

Ajzen, I. (2001). Nature and operation of attitudes. *Annual review of psychology*, *52*(1), 27-58.

Akinola, A. A., & Adeyemo, R. (2013). Effects of property rights on agricultural production: The Nigerian experience. *Journal of Development and Agricultural Economic,* 5(10): 382-389.

Akudugu, M. A., Guo, E., & Dadzie, S. K. (2012). Adoption of Modern Agricultural Production Technologies by Farm Households in Ghana: What Factors Influence their Decisions?. *Journal of Biology, Agriculture and Healthcare*, *2*(3), 1-13.

Alabi, O. O., Lawal, A. F., Coker A. A., & Awoyinka, Y. A. (2013). Probit Model Analysis of Smallholder's Farmers Decision to use Agrochemical Inputs in Gwagwalada and Kuje Area Councils of Federal Capital Territory, Abuja, Nigeria. *International Journal of Food and Agricultural Economics,* 2(1) 85-93.

Alderman, M.K. (2004). *Motivation for achievement*: possibilities for teaching and learning. New Jersey: Lawrence Erlbaum Associates Inc.

Alina-Mihaela, B. & Mirela-Cristina, V. (n.d). Questionnaires Pretesting In Marketing Research. Retrived on 24th January, 2014. http://cks.univnt.ro/uploads/cks_2011_articles/index.php?dir=02_economy%2F&download=cks_2011_economy_art_052.pdf

Ali-Olubandwa, A., Odero-Wanga, D., Kathuri, N. J., & Shivoga, W., (2010). Adoption of improved maize production practices among small scale farmers in the agricultural reform era: The case of Western province of Kenya, *Journal of International Agricultural Education and Extension*, 17(1):21-30.

Allen, C.T., Machleit, R.A., Kleine, S.S., & Notani, A.S. (2003). A place for emotion in attitude models. *J. Bus. Res.,* 56(1): 1-6.

Amao, J. O., & Awoyemi, T. T. (2008). Adoption of improved cassava varieties and its welfare effect on producing households in Osogbo ADP zone of Osun State. *Gene Conserve*, (29), 520-542.

Amezah, K., & Hesse, J. (2002). *Reforms in the Ghanaian Extension System, Agriculture and Rural Development Department*, Washington D.C.: The World Bank.

Anang, B.T., Mensah, F., & Asamoah, A. (2013). Farmers' Assessment of the Government Spraying Program in Ghana. *Journal of Economics and Sustainable Development, 4(7):92-99*

Anderson, J.R. (2007). 'Agricultural advisory services.' *Background Paper for World Development Report 2008, Agriculture for Development,* World Bank, Washington, DC.

Anderson, J. R., & Feder, G. (2004). Agricultural extension: Good intentions and hard realities. *The World Bank Research Observer*, *19*(1), 41-60.

Aneani, F., Anchirinah, V. M., Owusu-Ansah, F., & Asamoah, M. (2011). An analysis of the extent and determinants of crop diversification by cocoa (Theobroma cacao) farmers in Ghana *African Journal of Agricultural Research*. 6(18):4277-4287

Aneani, F., Anchirinah, V.M.., Asamoah, M., & Owusu-Ansah, F. (2011). Analysis of Economic efficiency in cocoa production in Ghana. *African Journal of Food Agriculture Nutrition and Development, 11 (1): 4507 – 4526*

Armstrong, M. (2006). *A Handbook of Human Resource Management Practice* (10 ed.). London: Cambridge University Press

Asiabaka, C.C., & Owens, M. (2002). Determinants of Adoptive Behaviours of Rural Farmers in Nigeria, *Proceeding of the 18th Annual Conference of AIAEE, 2002*, Durban, South Africa, 13-20.

Asogwa, B. C., & Okwoche, V.A. (2012). Impact of Extension Services on Cassava Farming in Benue State, Nigeria. *International Journal of Business, Humanities and Technology,* 2(6): 89 – 98

Asres, E. (2005). *Access and Utilization of Development Communication by Rural Women in Dire Dawa Administrative Council, Eastern Ethiopia*. M.Sc. Thesis, Alemaya University.

Ayandiji, A. (2003). *Utilization of agricultural products on soybean processing by women farmers in Orire local government area of Oyo state*. Unpublished M.Sc. Thesis, Department of Agricultural Extension and Rural Development, University of Ibadan.

Ayele, S., & Bosire, C. (2011). Farmers' use of improved agricultural inputs and practices: review and synthesis of research in Ethiopia. IPMS

Baah, F. (2002). Towards a pluralistic approach in extension services delivery to Ghanaian cocoa farmers. *Journal of the Ghana Science Association*, *42*(1), 78-82.

Baah, F. (2006). *Cocoa cultivation in Ghana: An analysis of farmers' knowledge and information systems and attitudes*. PhD thesis, Institute for International and Development and Applied Economics, University of Reading, Reading, UK, 292 pages.

Baah, F. (2008). Cocoa Farmer Characteristics and Access to Research based Information in two Districts of Ashanti, Ghana. *Journal of Science and Technology: 28 (3). 10 – 18.*

Baah, F. (n.d). Cocoa yields on research farms and how to close the gap with farmers, CRIG – COCOBOD.

Baah, F., Anchirinah, V., Badger, E., & Badu-Yeboah, A. (2012). Examining the cocoa farmer- purchasing clerk relationship in Ghana. *Global Journal of Science Frontier Research Agriculture and Veterinary Sciences:* 12(11)

Baah, F., Anchirinah, V.M., Badger, E & Badu- Yeboah, A. (2010). Report on the Baseline survey of Cocoa Farmers in Cadbury International operational districts under the Public-Private partnership cocoa Extension Programme. Tafo: Cocoa Research institute of Ghana, 152 pp.

Babbie, E. & Mouton J. (2001). *The Practice of Social Research*. Cape Town: Oxford University press

Babu, S. C., Glendenning, C. J., Okyere, K. A., & Govindarajan, S. K. (2012). Farmers' information needs and search behaviors: case study in Tamil Nadu, India. In *2012 Conference International Association of Agricultural Economists, Foz do Iguacu, Brazil* (pp. 18-24).

Bandiera, O., Rasul, I. (2003). Complementarities, social network and technology adoption in Mozambique. Available: http:/econ.lse.ac.uk./staff/bandiera/adoption.pdf.

Barreiro, P. L., & Albandoz, J. P. (2001). Population and sample: Sampling techniques. *Management Mathematics for European Schools, De - Comenius - C21*

Barrientos, S. W., Asenso-Okyere, K., Assuming-Brempong, S., Sarpong, D., Anyidoho, N. A., & Kaplinsky, R. (2008). Mapping Sustainable Production in Ghanaian Cocoa—A Report to Cadbury by Institute of Development Studies and the University of Ghana.

Bartlett, J. E., Kotrlik, J., Chadwick, W. Higins, C. (2001). Organizational Research: Determining Appropriate Sample Size in Survey Research, *Information Technology, Learning, and Performance Journal,* 19(1):43-50

Benard, R., Dulle, F., & Ngalapa, H. (2014). "Assessment of information needs of rice farmers in Tanzania; A case study of Kilombero District, Morogoro". *Library Philosophy and Practice (e-journal).* Paper 1071. http://digitalcommons.unl.edu/libphilprac/1071

Benin, S., Mogues, T., Cudjoe, G., & Randriamamonjy, J. (2009). Public expenditures and agricultural productivity growth in Ghana. In *International Association of Agricultural Economists 2009 Conference, Beijing, China, August* (pp. 16-22).

Benin, S., Nkonya, E., Okecho, G., Pender, J., Nahdy, S., Mugarura, S., Kato, E., & Kayobyo, G. (2007). *Assessing the Impact of the National Agricultural Advisory Services (NAADS) in the Uganda Rural Livelihoods*. IFPRI.

Beshir, H. (2014). Factors Affecting the Adoption and Intensity of Use of Improved Forages in North East Highlands of Ethiopia. *American Journal of Experimental Agriculture.* 4(1): 12-27.

Bhasin, V., & Akpaulu, W. (2001). *Impact of micro – finance on the efficiency of micro- enterprises in cape coast.* IFLIP Research paper 01 – 5, ILO, Geneva.

Bibiani Anhwiaso Bekwai District Profile (2006). http://bab.ghanadistricts.gov.gh/?arrow=nws&_=135

Binam, J. N., Gockowski J., & Nkamleu G. B (2008). Technical Efficiency and Productivity Potential of Cocoa Farmers in West African Countries, *Dev. Econ.*, XLVI (3): 242-63.

Birner, R., Davis, K., Pender, J., Nkonya, E., Anandayasekeram, P., Ekboir, P., Mbabu, A., Spielman, D., Horna, D., Benin, S., & Cohn, M. (2009). From "best practice" to "best fit": A framework for analyzing pluralistic agricultural advisory services worldwide. *Journal of Agricultural Education and Extension* 15(4): 341–355.|

Boone, H. N., & Boone, D.A. (2012). Analysing Likert Data. *The journal of Extension*. Available at http://www.joe.org/joe/2012april/tt2.php

Boz, I. & Ozcatalbas, O. (2010). Determining information sources used by crop producers: A case study of Gaziantep province in Turkey, *African Journal of Agricultural Research,* 5(10): 980 - 987.

Breisinger, C. D. X., Kolavalli, S., & Thurlow, J. (2008). The Role of Cocoa in Ghana's Future Development, Ghana Strategy Support Program (GSSP). *International Food Policy Research Institute, Accra*.

Brown, L.A. (1981). *Innovation diffusion: A new perspective*. New York: Methuen.

Bulale, A.I. (2000). *Smallholder dairy production and dairy technology adoption in the mixed farming system in Arsi highlands of Ethiopia*. Dissertation, University of Berlin. German.

Bulmer, M. (2004). *Questionnaires, 1st edition, Sage Benchmarks in Social Science Research Methods*, edited by: Bulmer, M., Sage Publications, London, 354

Burnett, H. (2003). *The influence of communication on the success of micro and small business*: a case study, AGSE, Swinburne University of Technology, Hawthorn Victoria, Australia.

Burton, R. J. F. (2004). Reconceptualising the 'behavioural approach' in agricultural studies: a socio- -psychological perspective. *Journal of Rural Studies*, 20(3):359 - 371.

Byamugisha, H.M., Ikoja-Odongo, R., Nasinyama, G.W., & Lwasa, S. (2008). Information seeking and use among urban farmers in Kampala district, Uganda, *Agricultural information and IT proceedings of IAALD AFITA. 24 to 27August 2008*, Tokyo University, Japan.

Castillo, J. J. (2009). Research Population, Available at Experiment Resources: http://www.experiment-resources.com/research-population.html

Caviglia, J.L., Khan, J.R. (2001). Diffusion of sustainable agriculture in the Brazilian rain forest: A discrete choice analysis. *Econ. Dev. Cult. Change*, 49:311-333.

Chambers, R., & Conway, G. (1992). Sustainable rural livelihoods: practical concepts for the 21st century. *IDS discussion paper, 296.* Brighton: IDS.

Chaudhry, K. M., Muhammad, S., Saghir, A. & Ashraf, I. (2008). Rural women's access to various sources of information in tehsil Faisalabad. *The J. Anim. Plant Sci.*, 18(2-3): 99-101.

Chen, S., & Ravallion, M. (2008). The developing world is poorer than we thought, but no less successful in the fight against poverty. *World Bank Policy Research Working Paper Series.*

Christiaensen, L., & Demery, L. (2007). *Down to Earth Agriculture and poverty Reduction in Africa*, the World Bank Group.

Christoplos, I. (2010). *Mobilizing the potential of rural and agricultural extension*. Food and Agriculture Organization of the United Nations. Rome, Italy.

COCOBOD (2013). Cocoa Production Statistics. Accra: Research Department, Ghana Cocoa Board).

COCOBOD (2012). Cocoa Production Statistics. Accra: Research Department, Ghana Cocoa Board (COCOBOD).

COCOBOD (2007). Cocoa Production and Price statistics, Ghana COCOBOD, Accra, Ghana.

Cohen, J.W. (1988). *Statistical Power Analysis for the Behavioural Sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates

Conley, T.G., & Udry, C. R. (2010). Learning about a new technology: Pineapple in Ghana. *Amer. Econ. Rev.,* 100(1):35-69.

Creswell, J. W. (2003). *Research design: Qualitative, quantitative, and mixed methods approaches* (2 ed.): Thousand Oaks, CA: Sage.

CTA. (2011). Cocoa Sector: Executive Brief: The Technical Centre for Agricultural and Rural Cooperation.

Damanpour, F., & Schneider, M. (2006). Phases of the adoption of innovation in organizations: Effects of environment, organizations and top managers. *British Journal of Management,* 17: 215–236.

Danso-Abbeam, G., Aidoo, R., Agyemang, K. O., & Ohene-Yankyera, K. (2012). Technical efficiency in Ghana's cocoa industry: Evidence from Bibiani-Anhwiaso-Bekwai District. *Journal of Development and Agricultural Economics*, *4*(10): 287-294.

Daudu, S., Chado, S. S. & Igbasha, A. A. (2009). Agricultural Information Sources Utilized by Farmers in Benue State, Nigeria. *Publication of Faculty of Agriculture,* Nasarawa State University*, 5 (1): 39-48*

Davis, J. R. (2003). *The Rural non – farm economy, livelihoods and their diversification: issues and options*. Chatham, Natural Resources Institute.

Davis, K. (2008). ‘‘Extension in Sub-Saharan Africa: Overview and Assessment of Past and Current Models, and Future Prospects.’’ *Journal of International Agricultural Education and Extension,* 15 (3): 15-28.

Dayo, P., Nkonya, E., Pender, J. & Oni, O.A. (2009). *Constraints to Increasing Agricultural Productivity in Nigeria*: A Review. Background Paper No. NSSP 006, International Food Policy Research Institute, IFPRI.

Dercon, S., Gilligan, D., Hoddinott, J. & T. Woldehanna. (2007). *The Impact of Agricultural Extension and Roads on Poverty and Consumption Growth in Fifteen Ethiopian Villages.* CSAE WPS/2007- 01. Centre for the Study of African Economies, University of Oxford.

Deribe, K. (2007). *Agricultural Information Networks of Farm Women and Role of Agricultural Extension*: *The Case of Dale Woreda, Southern Nations, Nationalities & Peoples' Region*. M. Sc. Thesis, Alemaya University.

DFID. (2001). *Sustainable Livelihoods Guidance Sheets*, Department for International Development, http://www.livelihoods.org/. (Accessed on 20th February, 2014).

Dormon, E. N. A. (2006). *From a technology focus to innovation development: the management of cocoa pests and diseases in Ghana*, Wageningen University, Wageningen.

Dormon, E.N.A., Van Huis, A., Leeuwis, C., Obeng-Ofori, D., & Sakyi-Dawson, O. (2004). Causes of low productivity of cocoa in Ghana: farmers' perspectives and insights from research and the socio-political establishment. *NJAS,* 52(3/4): 237 - 259

Dos, C.R., & Morris, M. L. (2001). How does gender affect the adoption of agricultural innovation? The case of improved maize technology in Ghana (Electronic version). *Journal of agricultural economics*, 25: 27 – 29

Dzene, R. (2010). What drives efficiency on the Ghanaian cocoa farm? *Ghana Institute of Management and Public Administration (GIMPA), Accra*.

Ebrahim, J. (2006). *Adoption of dairy innovations: its income and gender implications in Adami Tulu district*. Unpublished M.Sc. Thesis, Haramaya University.

Edeoghon, C. O., Ajayi, M. T., & Ugboya, T. O. (2008). Awareness and use of sustainable agricultural practices by arable crop farmers in Ikpoba Okha local government area of Edo State. *J. Sust. Dev. Agri. Envir.,* 3(2): 55-63.

Essegbey, G.O., & Ofori-Gyamfi, E. (2012). Ghana Cocoa Industry-An Analysis from the Innovation System Perspective. *Technology and Investment*, (3):276-286. doi:10.4236/ti.2012.34038.

Fadiji, T.O., Adeeogun, A.O. & Kehinde, A.E. (2006). Social Activities and Socio-Economic Status of Rural Farmers Cultivating Improved Maize in Kaduna State, Nigeria. *Global Approaches to Extension Practice*, 2(1): 29-36.

FAO (2005). *Fertilizer use by crops in Ghana, Land and Water Development Division, Land and Plant Nutrition Management Service*. Food and Agricultural Organization of the United Nations (FAO), Rome.

FAO & World Bank (2001). *Farming systems and poverty-improving farmer's livelihoods in a changing World*, Rome and Washington D.C.,1- 41.

FAO (1998). *Women feed the world* – Tele food material, Rome

Farm Radio International (2008). *Communicating with Radio: What Do We Know? Findings from selected rural radio effectiveness evaluations.* African Farm Radio Research Initiative (AFRRI). Ottawa, Canada.

Farooq, S.S., Muhammad, S., Chaudhary, K. M., & Ashraf, I. (2007). Role of print media in the dissemination of agricultural information among farmers. *Pakistan J. Agri. Sci.,* 44(2): 378-380.

Fekadu, B. (1997). *Integration of Farmers' Knowledge into Agricultural Research: Challenges and Strategies*: the case of Ada's District, Central Oromia (Ethiopia), Wageningen Agricultural University, The Netherlands.

Fengying, N., Li, Z., Jieying, B., Fujiang, L., & Xiaochao, T. (2011). Evaluation of a rural information project in Ningxia, China. In D. J. Grimshaw and S. Kala (Eds.), *Strengthening Rural Livelihoods. The impact of information and communication technologies in Asia,* Practical Action Publishing Ltd, 109-132.

Ferris, S. (2005). *Developing market information services in Eastern Africa: the food net experience, local, national and regional market information services*. International Institute of Tropical (IITA), Ibadan Nigeria.

Floyd, C., Harding, A., Paudel, K. C., Rasali, D. P., Subedi, K., & Subedi, P. P. (2003). Household adoption and the associated impact of multiple agricultural technologies in the western hills of Nepal. *Agricultural Systems*, (76): 715-738.

Frey, L. R., Botan, C.H., & Kreps, G. L. (2000). *Investigating Communication: An Introduction to Research Methods*. 2nd ed. Boston: Allyn and Bacon.

Fuglie, K. (2008). Is a slow down in agricultural productivity growth contributing to the rise in commodity prices? Agricultural Economics 39(2008), Supplement 431 – 441

Gakpo, J. O. (2012). Nurturing a youthful generation of cocoa farmers. Feature Article. Modern Ghana. 30 May 2012. Accessed on 1st November, 2013.

Glendenning, C.J., Babu, S., & Asenso-Okyere, K. (2010). *Review Of Agricultural Extension In India Are Farmers' Information Needs Being Met?* Discussion paper 01048, International Food Policy Research Institute (IFPRI).

Gockowski, J., Weise, S., Sonwa, D., Tchtat, M. & Ngobo, M. (2004). Conservation because it pays: shaded cocoa agroforests in West Africa. A paper presented at the *National Academy of Sciences in Washington DC on February 10, 2004 at a symposium titled "The Science behind cocoa's benefits"*.

Göktaş, A., & İşçi, O. (2011). A Comparison of the Most Commonly Used Measures of Association for Doubly Ordered Square Contingency Tables via Simulation. *Metodološki zvezki*, 8(1): 17-37

Goldstein, H. 1995. *Multilevel Statistical Models*. Halstead Press, New York, NY.

Goswami, B. (2012). Factors Affecting Attitude of Fish Farmers towards Scientific Fish Culture in West Bengal. *Indian Research Journal of Extension Education,* 12 (1): 44 – 50

Haba, S. (2004). *Factors influencing the willingness to pay for agricultural information delivery technologies by cooperative-oriented agribusinesses in Rwanda: evidence from the Abahuzamugambi Coffee Growers Cooperative of Maraba.* Master's thesis, Texas A&M University. Available on http://handle.tamu.edu/1969.1/2414

Habtemariam, K. (2004). *Agricultural Extension with Particular Emphasis on Ethiopia*. Ethiopian Economic Policy Research Institute, Addis Ababa, 80.

Hailu, B. (2008). *Adoption of Improved Teff and Wheat Production Technologies in Crop and Livestock Mixed Systems in Northern and Western Shewa Zones of Ethiopia*, PhD Dissertation, University of Pretoria, South Africa.

Hainmueller, J., Hiscox, M. J., & Tampe, M. (2011). Sustainable Development for Cocoa Farmers in Ghana. *Baseline Survey: Preliminary Report*: Humanity United and the William and Flora Hewlett Foundation.

Haji, B. (2003). *Adoption of Cross bred Dairy Cows in Aris Zone. The Case of Tiyo and Lemu Bilbilo Woreds*. M.Sc Thesis (Unpublished), School of Graduate Studies of Alemya University, Alemaya.

Heemskerk, W. (2005). *Participatory approaches in agricultural research and development*. Available on http://knowledge.cta.int/en/Dossiers/Demanding Innovation/Participatory-approaches-in-ARD/Articles/Participatory approaches-in agricultural-research-and-development.

Holton, E. H., & Burnett, M. B. (1997). Qualitative research methods. In R. A. Swanson, and E. F. Holton (Eds.), *Human resource development research handbook: Linking research and practice*. San Francisco: Berrett-Koehler Publishers.

Hütz-Adams, F. & Fountain, A.C. (2012): Cocoa Barometer 2012.

ICCO. (2007). International Cocoa Organization Annual Report 2003/2004. London:

ICCO. (2012). Quarterly Bulletin of Cocoa Statistics, XXXVIII (1) Cocoa year 2011/12

Idiegbeyan-Ose Jerome, D.B.M., & Theresa, U.A. (2009). Information as an effective tool in rural development. *International Journal of Library and Information Science.*1 (3), 22-28, Available at http://www.academicjournals.org/ijlis/PDF/pdf2009

Idris, A., Rasaki, k., Folake, T., & Hakeem, B. (2013). Analysis of Pesticide Use in Cocoa Production in Obafemi Owode Local Government Area of Ogun State, Nigeria. *Journal of Biology, Agriculture and Healthcare*, 3(6).

IFDC (2012). *Ghana Fertilizer Assessment: the African Fertilizer and Agribusiness Partnership International Cocoa Organization*.

IFDC (2006*). Nigerian company re-opens only urea fertilizer plant In Sub-Saharan Africa to meet summit call forAfricanGreenRevolution*.www.ifdc.org/New_Design/Whats_New/Notore%20Release%20Final%206%2013%202006.pdf.

IPEC (2013). *Research to identify practical measures to enhance productivity in cocoa growing communities in Ghana / International Labour Office, International Programme on the Elimination of Child Labour (IPEC)* - Geneva: ILO, vol. 1.

ISSER (2013). The State of the Ghanaian Economy in 2012. Legon: Institute of Statistical, Social and Economic Research (ISSER), University of Ghana.

Jha, K.K. (2009). Scale for Measuring Attitude of Farmers towards Social Forestry. *Indian Res. J. Ext. Edu.,* 9 (3):75 – 77

Jayawardana, J. K. J. P., & Sherief, A. K. (2012, October). Influence of socio-psychological characteristics in adoption of organic farming practices in coconut based homesteads in humid tropics. *In COCOS* (Vol. 19(2):101-104.

Johnson, R.B., & Onwuegbuzie, A.J. (2004). *Mixed Methods Research*: A Paradigm whose Time Has Come", *Educational Researcher*, 33(7): 14-26.

Julius, A. (2013). Impacts of gender and farmers' level of education on access to agricultural extension services in Abuja, Nigeria. *International Journal of Agricultural Economics and Extension,* 1 (7): 55-60.

Kacharo, D.K. (2007). *Agricultural information networks of farm women and role of agricultural extension: The case of dale woreda, southern nations, nationalities and peoples' region.* M.Sc. Thesis, in Rural Development and Agricultural Extension, Haramaya University, Ethiopia.

Kafle, B., & Shah, P. (2012). Adoption of Improved Potato Varieties in Nepal: A Case of Bara District. *The Journal of Agricultural Sciences,* 7(1): 14 – 22.

Kalusopa, T. (2005). The Challenges of Utilizing Information Communication Technologies (ICTs) for the Small-Scale Farmers in Zambia. *Library High Technology,* 23(3): 414-424.

Katungi, E. (2006). Gender, Social Capital and Information Exchange in Rural Uganda IFPRI and Melinda Smale, *IFPRI (International Food Policy Research Institute) CAPRi Working Paper No. 59, University of Pretoria.* Uganda. Available on http://www.capri.cgiar.org/pdf/capriwp59.pdf.

Kazerooni, E. A. (2001). Population and Sample, *American Journal of Roentgenology, 177*(5):993-999

Kearsley, G. (2008). Explorations in Learning & Instruction: The Theory into Practice Database. Available on http://tip.psychology.org/attitude.html

Kimaru-Muchai, S.W., Mugwe, J.N., Mucheru-Muna, M., Mairura, F.S., Mugendi, D.N. (2012). Influence of education levels on dissemination of soil fertility management information in the central highlands of Kenya. *Journal of Agriculture and Rural Development in the Tropics and Subtropics*, 113(2):89–99.

Kock, T., Harder, A., & Saisi, P. (2010). The provision of extension services in Afghanistan: what is happening?. *Journal of International Agricultural Education and Extension,* 17(1): 10.

Kolavalli, S., & Vigneri, M. (n.d). *Producer Price Determination, Quality Control and Service Provision in Ghana's Partially Liberalized Cocoa Sector*. Ghana strategy support program. IFPRI.

Kollmair, M., & St Gamper, J. (2002). The sustainable livelihoods approach. Input Paper for the Integrated Training Course of NCCR North-South Aeschiried, 9–20 September 2002, Switzerland. Accessed September 15, 2013.

Koskei, R.C., Langat, J.K., Koskei, E.C., & Oyugi, M.A., (2013). Determinants of Agricultural Information Access by Small Holder Tea Farmers in Bureti District, Kenya. *Asian Journal of Agricultural Sciences,* 5(5): 102-107

KPMG. (2013). *Improving smallholder livelihoods: Effectiveness of certification in coffee, cocoa and cotton*. KPMG Sustainability

Kruger, F., & Mitchell, B. (2005). *Research Methodology.* 3rd Edition. Cape Town: Oxford University Press.

Kumar, R. (2005). *Research Methodology: A Step-by-Step Guide for Beginners* (2nd ed.). Thousand Oaks, CA: Sage.

Kyomugisha, E. (2008). Land tenure and agricultural productivity in Uganda.*IFPRI Brief. Washington DC: International Food Policy Research Institute (IFPRI)*.

Laurent, C., Cert, M., & Lambarthe, P. (2006). Agricultural Extension Services and Market Regulation: Learning From a Comparison of Six Countries. *The Journal of Agricultural Education and Extension,* 12(1): 5 – 16.

Laven, A., (2007). Marketing Reforms in Ghana's Cocoa sector. Partial liberalization, partial benefits?. Amsterdam Research Institute Metropolitan and International Development Studies. *ODI Background Notes 4*.

Lawal, B. O., Torimiro, D. O., Banjo, A. D., & Joda, A. O. (2005). Operational Habits and Health Hazards Associated with Pesticide Usage by Cocoa Farmers in Nigeria: Lessons for Extension Work. *J. Hum. Ecol., 17*(3): 191 - 195.

Leiter, J., & Harding, S. (2004). Trinidad, Brazil, and Ghana: three melting moments in the history of cocoa. *Journal of Rural Studies, 20*: 113-130.

Lelissa, C. A. (1998). *The Determinants of Adoption, Intensity and Profitability of Fertilizer Use, The case of Ejere District, West Shewa*. An M.Sc. Thesis, Addis Ababa University, Ethiopia.

LMC-WCF. (2011). Cocoa Sustainability: LMC International and World Cocoa Foundation.

Lundstedt, H., & Pärssinen, S. (2009*). Cocoa is Ghana, Ghana is Cocoa; Evaluating Reforms Of The Ghanaian Cocoa Sector*, Master's Thesis 15 ECTS at Nationale Konomiska Institutionen Vid Lunds Universitet Department of Economics at the University of Lund, Minor Field Study Series No. 198, Department of Economics, Univ. of Lund, Sweden

MacNealy, M. S.(1999). *Strategies for Empirical Research in Writing*. New York: Longman.

Malhotra, N.K. (2004). Questionnaire Design and Scale Development. Retrieved on 25th January, 2014. Available on http://www.terry.uga.edu/~rgrover/chapter_5.pdf

Mapila, M., Kirsten, J. F., & Meyer, F. H. (2011, April). Agricultural rural innovation and improved livelihood outcomes in Africa. In *Centre for the Study of African Economies conference Economic Development in Africa, Oxford, UK, March* (pp. 20-22)

March, C; Smyth, I & Mukhopadhyay, M., (1999). *A Guide to Gender-Analysis Frameworks*. UK. Oxfam GB.

Martínez-García, C.G., Dorward, P., & Rehman, T. (2012a). Farm and socioeconomic characteristics of small-holder milk producers and their influence on the technology adoption in Central Mexico. *Tropical Animal Health and Production,* 44: 1119-1211.

Martínez-García, C.G., Dorward, P., & Rehman, T. (2012b). Factors Influencing Small-scale Dairy Farmers' Decision to Adopt and Continued use of A Successful Innovation in the Highlands of Central Mexico. *4th International Conference on Agriculture and Animal Science. IACSIT Press, Singapore, 47(13) DOI: 10.7763/IPCBEE.*

MASDAR. (1998). A Socio-Economic Study of Cocoa Farmers in Ghana. Final Consultancy Report. Accra: MASDAR International Consultants/Ghana Cocoa Board (COCOBOD). 90 - 120.

Matovelo, D.S. (2008**).** *Enhancing farmer's access to and use of agriculture information for empowerment and improve livelihoods: a case of Morogoro region.* Thesis presented at University of Dar es salaam as the requirement of Doctor of Philosophy.

Maxwell, J. A., and Loomis, D. M. (2003). Mixed Methods Design: An alternative approach. In A. Tashakkori, and C. Teddlie (eds), *Handbook of mixed methods in social and behavioural research (pp 241-272),* Thousand Oaks, CA: Sage

Meyer, H.W.J. (2005). The nature of information, and effective use of information in rural development, *Journal of information research,* 10 (2), Available at http://informationr.net/ir/10-2/paper214.html

Mgbada, J.U. (2006). Effectiveness of information sources on improved farming practices to women farmers in Enugu State, Nigeria. *Global Approaches to Extension Practice*, 2(1): 67-78.

Ministry Of Finance of Ghana (1997). "Ghana Cocoa Sector Development Strategy".

MoFA (2013). Agriculture in Ghana, Facts and figures (2012), Statistics, Research and information Directorate (SRID).

MoFA (2011). Agriculture in Ghana, Statistics, Research and information Directorate (SRID).

MoFA (2010). Agriculture in Ghana: Facts and figures. Government of Ghana Publications, 1-41.

MOFA (2006). Agriculture in Ghana in 2005, Annual Report of the Ministry of Food and Agriculture, Accra, Ghana.

MMYE (2008). Cocoa labour Survey. Accra: Ministry of Manpower, Youth and Employment/National programme for the Elimination of Worst Forms of Child Labour in Cocoa (NPECLC).

Muhammad, S. (2005). *Agricultural Extension: Strategies and Skills*. 2nd Ed. Unitech Communications, Faisalabad, Pakistan.

Muneer, S.E.L. (2008). Factors Affecting Adoption of Agroforestry Farming as a mean for Sustainable Agricultural Development and Environment Conservation in Arid Areas of Northern Kordofan State, Sudan. *Saudi J. Biological Sciences,* 15(1): 137-145.

Nambiro E, Omiti J, Mugunieri L (2006). Decentralization and access to agricultural extension services in Kenya. *Paper presented at the international association of agricultural economics conference, Gold Coast, Australia*, August 12- 18: 1 – 12.

Namwata, B.M.L., Lwelamira, J., & Mzirai, O.B. (2010). Adoption of improved agricultural technologies for Irish potatoes (Solanum tuberosum) among farmers in Mbeya Rural district, Tanzania: A case of Ilungu ward. *Journal of Animal and Plant Sciences*, 8(1): 927-935.

Nandi, J. A., Haruna, S. K., & Abudu, S. (2012). Analysis of Socio-Economic Factors Influencing Farmers' Adoption of Rice Varieties with High Yielding and Weed Suppressing Abilities in Kano River Irrigation Project (Krip), *Journal of Agriculture, Forestry and the Social Sciences (JOAFSS)*, *10*(1):32-46.

Naveed, M. A., & Anwar, M.A. (2013). Agricultural information needs of Pakistani farmers. *Malaysian Journal of Library & Information Science, 18 (3): 13-23.*

Namwata, B.M.L, Lwelamira, J., & Mzirai, O.B. (2010). Adoption of improved agricultural technologies for Irish potatoes (Solanum tuberosum) among farmers in Mbeya Rural district, Tanzania: A case of Ilungu ward. *Journal of Animal & Plant Sciences*, 8(1): 927- 935.

Negash, R. (2007). *Determinants of adoption of improved haricot bean production package on alaba special woreda, Southern, Ethiopia*. Unpublished Thesis, Ethiopia,Availableat:http://results.waterandfood.org/bitstream/handle/10568/682/Thesis_NegashDeterminants.pdf,

Nkala, P., Mango, N., & Zikhali, P. (2011). Conservation agriculture and livelihoods of Smallholder farmers in central Mozambique. *Journal of Sustainable Agriculture*, 35: 757–779.

Nkamleu, G. B., Coulibaly, O., Tamo, M., & Ngeve, J. M. (1998). Adoption of Storage Pest Control Technologies by Cowpeas' Traders in Western Cameroun: Probit Model Application. Monograph. *International Institute of Tropical Agriculture*.

Nkamleu, G. B., Nyemeck, J., & Gockowski, J. (2010). *Technology gap and efficiency in cocoa production in West and Central Africa: implications for cocoa sector development*. African development bank.

Nosheen, F., Ali, T., & Ahmad, M. (2010). Analysis of gender specific sources of information regarding home and farm practices in Potohar region: a case study. *The Journal of Animal and Plant Sciences*, 20(1): 56-59.

Nutley, S., Davies, H., & Walter, I. (2002). Conceptual Synthesis 1: Learning from the Diffusion of Innovations. http://www.st-andrews.ac.uk/~cppm/Learning%20from%20the%20Diffusion%20of%20Innovations.pdf.

Obaniyi, K.S., Akangbe, J.A., Matanmi, B.M., & Adesiji, G.B. (2014). Factors motivating incentives of farmers in rice Production training programmes (A case study of Olam/USAID/ADP/First Bank Programme). *Web Pub Journal of Agricultural Research,* 2(5): 74-81.

Ofuoku, A.U., Emah, G.N., & Itedjere, B.E. (2008). Information Utilization among Rural Fish Farmers in Central Agricultural Zone of Delta State, Nigeria. *World Journal of Agricultural Sciences,* 4(5): 558-564.

Ofuoku, A.U., Uzokwe, U.N., & Ideh, V. (2006). Comparative analysis of co-operative and non- cooperative fish farmers in the central agro- ecological zone of Delta state, Nigeria. *Extension Farming Systems Journal*, 2(1): 97-104.

Ogunleye, K. Y., & Oladeji, J. O. (2007). Choice of cocoa market channels among Cocoa Farmers in ILA local government area of Osun State, Nigeria. *Middle-East Journal of Scientific Research, 2*(1): 14-20.

Ojo, C.O., Bila, Y., & Iheanacho, A.C. (2012). Agricultural resource access and the influence of socioeconomic characteristics among rural women in Borno State, Nigeria**.** *Agris on-line Papers in Economics and Informatics*, 4 (2)

Ojo, C.O., Bila, Y., &, Iheanacho, A.C. (2013). Resource accessibility and productivity among women crop farmers in Borno State, Nigeria. *Asian Journal of Agriculture and Rural Development*, 2(3): 480-486

Okoedo-Okojie, D. U., & Aphunu, A. (2011). Assessment of Farmers' Attitude towards the Use of Chemical Fertilizers in Northern Agricultural Zone of Delta State, Nigeria. *Archives of Applied Science Research*, 3 (1): 363-369

Okoye, B.C., Onyenwaku, C.E., Ukoha, O. O., & Asumugha, O. C. (2008). Determinants of Labour Productivity on Smallholder Cocoyam Farm in Anambra State, Niger. *Acad. J. Sci. Res*. Essay, 3 (11): *559 – 561.*

Okunade, E. O. (2000). Effectiveness of Extension Teaching Methods in Acquiring Knowledge, Skill and Attitude by Women Farmers in Osun State. *European Journal of Social Sciences*, 4(2)

Okwoche, V. A., & Asogwa, B. C. (2012) Impact of Extension Services on Cassava Farming in Benue State, Nigeria. *International Journal of Business, Humanities and Technology, 2 (6):89 – 98.*

Oladele, O. (2006). Multilinguality of farm broadcast and agricultural information accessing in Nigeria. *Nordic J.Afr. Studies,* 15 (2): 199-205.

Olatidoye, G.B. (2008). Resource mobilization and motivation of rural farmers for agricultural production: Agricultural Extension, a comprehensive Treatise with Model Questions and Glossary, 117-119.

Oluyole, K. A. and Sanusi, R.A. (2009). Socio-Economic Variables and Cocoa Production in Cross River State, Nigeria. *Journal of Human Ecology*, 25(1): 5-8.

Opara, U.N. (2008). Agricultural Information Sources Used by Farmers in Imo State, Nigeria Information Development. Inform. Dev, 24(4): 289-295.

Opara, U.N. (2010). *Personal and socio-economic determinants of agricultural information use by farmers in the Agricultural Development Programme (ADP) zones of Imo State, Nigeria*. Ph.D. Thesis, Library Philosophy and Practice.

Orisakwe L., & Agomuo, F. O. (2011). "Adoption of Improved Agroforestry Technologies among Contact Farmers in Imo State, Nigeria". Asian Journal of Agriculture and Rural Development, 2(1): 1-9.

Osei-Bonsu, K., Baah, F., & Afrifa, A. A. (2001). Evaluation of cocoa conditions, problems and possible solutions in four farming communities surrounding the Kakum forest reserve, Central Region, Ghana. *Consulting Report for Conservation International, Tafo: Cocoa Research Institute of Ghana*.

Owens, T., Hoddinott, J., & Kinsey, B., (2003). The impact of agricultural extension on farm production in resettlement area of Zimbabwe. *Econ. Dev. Cult. Change*, 51: 337–357

Owolade, E.O. (2008). *Information seeking behaviour and utilization among snail farmers in Oyo state*. Unpublished M.Sc. project, Dept. of Agricultural Extension and Rural Development, University of Ibadan, 3-45.

Owolade, E.O., & Kayode, A. (2012). Information-Seeking Behaviour and Utilization among Snail Farmers in Oyo State, Nigeria: Implications for Sustainable Animal Production. *Journal of International Agricultural Education and Extension. doi*: *10.5191/jiaee.2012.19304*

Oyinbo, O., Saleh, M.K., & Rekwot, G.Z. (n.d). Determinants of Herbicide Utilization in Striga Hermonthica Control among Maize Farming Households in Giwa Local Government Area of Kaduna State, Nigeria. *Russian Journal of Agricultural and Socio-Economic Sciences,* 3(15).

Rahman, S. (2007). Adoption of improved technologies by the pig farmers of Aizawl district of Mizoram, India. *Livestock Research for Rural Development*,*19* (1): 1-5.

Raj, D.A., Poo Murugesan, A. V., Aditya, V.P.S., Olaganathan, S., & Sasikumar, K. (2011). A crop nutrient management decision support system: India. *In D. J. Grimshaw and S. Kala (Eds.), Strengthening Rural Livelihoods. The impact of information and communication technologies in Asia,* (pp. 33-52). Practical Action Publishing Ltd

Regassa, N., Sundaraa, D.S., & Ketsela, K. (2011). Access to and Utilization of Information on Sanitation and Hygiene by Rural Households in Alaba Special District, Southern Ethiopia. *Journal of Human Ecology,* 33(2): 101-112

Rehman, F. (2010). Development of a strategy to enhance the role of print media in the dissemination of agricultural information among farmers in the Punjab, Pakistan. Available at: http://prr. hec.gov.pk/Thesis/845S.pdf

Rehman, F., Muhammad, S., Ashraf, I., Mahmood, K., Ruby, T., & Bibi, I. (2013). Effect of Farmers' Socioeconomic Characteristics on Access to Agricultural Information: Empirical Evidence from Pakistan. *The Journal of Animal & Plant Sciences*, 23(1): 324-329

Rizvi, S. M. H. (2011). LifeLines: livelihood solutions through mobile technology in India. In D. J. Grimshaw and S. Kala (Eds.), *Strengthening Rural Livelihoods. The impact of information and communication technologies in Asia* (pp. 53-70). Practical Action Publishing Ltd

Robbins, S. P., & Judge, T. A. (2008). *Organizational Behaviour*, 13th ed., Prentice-Hall.

Rogers, E.M. (1995). *Diffusion of Innovations*, New York: Free Press.

Rogers, E.M. (2003). *Diffusion of innovations.* 5th ed. New York: Free Press.

Rogers, E.M., & Scott, K.L. (1997). The diffusion of Innovations Model and Outreach from the National Network of Libraries of Medicine to Native American Communities. *Draft paper prepared for the National Network of Libraries of Medicine,* Pacific Northwest Region, Seattle, USA.

Ryan, B., & Gross, N.C. (1943). The diffusion of hybrid seed corn in two Iowa communities. *Rural Sociology,* 8: 15– 24.

Saadi, H., Mahdei, K. N., & Movahedi, R. (2008). Surveying on wheat farmers' access and confidence to Information and Communication Channels (ICCs) about controlling eurygaster integriceps in Hamedan province, Iran. *American Journal of Agriculture and Biological Sci*ence, (2): 497-501.

Salomon, L., & Engel, (1997). Networking for innovation: A participatory actor-oriented methodology. Royal Tropical Institute, KIT Press, Amsterdam, the Netherlands.

Sani, L., Boadi, B.Y., Oladokun, O., & Kalusopa, T. (2014). The Generation and Dissemination of Agricultural Information to Farmers in Nigeria: A Review. *Journal of Agriculture and Veterinary Science*, 7(2): 102-111

Selesho, J.M., & Monyane, T. (2012). Analyzing Views of Intermediate Phase Educators with Regard to Their Experiences of the Revised National Curriculum Statement. *Anthropologist*, 14(2): 107-112

Shepherd, A., & Onumah, G. (1997) 'Liberalized Agricultural Markets in Ghana: The Roles and Capacity of Government', *the Role of Government in Adjusting Economies* 12, Birmingham: University of Birmingham

Shepherd, A.W., & Farolfi, S. (1999). "Export Crop Liberalization in Africa: A Review". *FAO Agricultural Services Bulletin* 135. FAO, Rome.

Singha, A.K. & Baruah, M.J. (2011). Farmers' Adoption Behaviour in Rice Technology: An Analysis of Adoption Behaviour of Farmers in Rice Technology under Different Farming Systems in Assam. *Journal of Human Ecology*, 35(3): 167-172.

Singha, A.K., & Baruah, M.J. (2012). Adoption Behaviour of Dairy Innovations by Small Farmers under Different Farming Systems in Assam. *Indian Research. Journal of Extension Edu*cation, 12 (3)

Sintayehu, Y., Fekadu, B., Azage, T., & Berhanu, G. (2008). Improving Productivity and Market Success (IPMS) of Ethiopian farmers project, International Livestock Research Institute (ILRI).

Slavin, R. E. (2006). *Educational psychology, theory and practice, 8th Ed*. Boston: Pearson.

Starasts, A. M. (2004). *Battling the Knowledge factor: A Study of Farmers' Information Seeking Learning and Knowledge Process with an online environment in Queensland*. Unpublished Ph.D. Thesis.

Stoneman, P. (2002). *The economics of technological diffusion.* Oxford, UK: Blackwell.

Suhermanto, H. (2002). Knowledge and Information Transfer in Indonesia's agricultural Society. Department of Economics, Claremont Graduate University Indonesia. Available on. http://www.stanford.edu/group/i-rite/statements/2002/suhermanto.htm#.

Swanson, B. & Rajalahti, R. (2010). ‘‘Strengthening Agricultural Extension and Advisory Systems: Procedures for Assessing, Transforming, and Evaluating Extension Systems.’’ *Agriculture and Rural Development Discussion Paper 45*. World Bank, Washington, DC.

Tadesse, D. (2008). *Access and Utilization of Agricultural Information By Resettler Farming Households: The Case Of Metema Woreda, North Gondar, Ethiopia*. An MSc Thesis presented to the School of Graduate Studies of Haramaya University.

Tashakkori, A., & Teddlie, C. (Eds.). (2003). *Handbook of mixed methods in social & behavioural research.* Thousand Oaks, CA: Sage.

Techane, A. W. (2002). *Determinants of fertilizer adoption in Ethiopia: The case of major cereal production areas*. An MSc Thesis presented to the School of Graduate Studies of Alemaya University.

Teddlie, C., & Yu, F. (2007). Mixed Methods Sampling: A Typology with examples. *Journal of Mixed Methods Research,* 1: 9. DOI: 10.1177/2345678906292430

Tenaw, S.K.M., Zahidul, I., & Parviainen, T. (2009). Effects of land tenure and property rights on agricultural productivity in Ethiopia, Namibia and Bangladesh. *University of Helsinki Department of Economics and Management Discussion Papers no 33.*

Tesfaye, Z., Tadesse, B., & Tesfaye, S. (2001). Determinants of high yielding maize technology adoption. Empirical evidence from south western Oromia. Research Report No. 38. Ethiopia Agricultural Research Organization (EARO), The Nigerian experience. *Journal of Development and Agricultural Economics*, 5(10): 382-389.

Thompson, S.K. 1992. *Sampling*. John Wiley and Sons: New York, NY.

Ton, G., Hagelaars, G., Laven, A., & Vellema, S. (2008). Chain governance, sector policies and economic sustainability in cocoa: a comparative analysis of Ghana, Côte d'Ivoire, and Ecuador. *Markets, Chains and Sustainable Development Strategy & Policy paper*, *12*.

Umali, Lisa Schwartz, Dina L. (1994). Public and private agricultural extension: Beyond traditional frontiers. *World Bank Discussion Papers*, 236: 15-26.

Uwagboe, E.O., Akinbile, L.A., & Oduwole, O.O. (2012). Socio-Economic Factors and Integrated Pest Management Utilisation among Cocoa Farmers in Edo State. *American-Eurasian Journal of Agronomy*, 5 (2): 19-23.

Varkevisser, C. M., Pathmanathan, I., Brownlee, A. T. (2003). Designing and conducting health systems research projects, Data analyses and report writing, Volume 2, KIT Publishers, Amsterdam, International Development Research Centre.

Vigneri, M., & Santos, P. (2009). What Does Liberalization without Price Competition Achieve? The Case of Cocoa in Ghana. *Contributed Paper prepared for presentation at the International Association of Agricultural Economists Conference*, Beijing, China, 14-15.

Vigneri, M., & Santos, P. (2008). What does liberalization without price competition achieve: the case of cocoa in Ghana. *IFPRI GSSP Background Paper*, *14*.

Vigneri, M. (2007). Drivers of cocoa production growth in Ghana. *ODI Project Briefing* (4).

Vroom, V. H. (1964). *Work and motivation*. New York: John Wiley & Sons.

Waller, B. E., Hoy, C. W., & Henderson, J.L. (1998). Matching innovations with potential users: a case study of potato IPM practices. Agriculture, *Ecosystem and Environment*, 70: 203 – 215.

Weiligmann, B., Verbraak, G. & Van, M. (2010). Cocoa Barometer 2010, Tropical Commodity Coalition

Weir, S., & Knight, J. (2004). Externality effects of education: dynamics of the adoption and diffusion of an innovation in rural Ethiopia. *Economic Development and Cultural Change*, *53*(1), 93-113.

Williamson, G. (2008). Operationalising Variables, Speech Therapy and Information Resources, Available at http://www.speech-therapy-information-and-resources.com/operationalising-variables.html

World Bank. (2007). *World Development Report 2008*: Agriculture for Development. Washington, DC: World Bank.

Yenealem, K. (2006). *Gender disparities in adoption of improved maize varieties between male headed and female headed households in Kuni Wereda, Western Hararghe Zone, Ethiopia*. An MSc Thesis presented to the School of Graduate Studies of Alemaya University.

Zhang, W. Li, F. Xiong, Y., & Xia, Q. (2012). Econometric analysis of the determinant of adoption of raising sheep in folds by farmers in the semiarid Loess Plateau. *Ecol. Econ*, 74:145-152.

Zubair, M., & Garforth, C. (2006). Farm level tree planting in Pakistan: the role of farmers' perceptions and attitudes. *Journal of Agro forestry systems*, 66(3): 217-229.

Zuta, J. K. (2009). *Adoption of integrated pest management practices by vegetable farmers in the Greater Accra Region, Ghana.* Unpublished Mpill Thesis. Department of Agricultural extension, University of Ghana, Legon.

APPENDICES

Appendix I: Questionnaire

UNIVERSITY OF GHANA

COLLEGE OF AGRICULTURE AND CONSUMER SCIENCES

AGRICULTURAL EXTENSION DEPARTMENT

The purpose of this research is to assess the livelihood outcomes of differential use of agricultural information by cocoa farmers'. The Sefwi Bekwai Cocoa District was chosen because of its high level of cocoa production in Ghana. You are considered a major stakeholder who can provide useful and insightful information on the topic and therefore i shall be very grateful if you can spare part of your time to be of assistance to me. You are assured of confidentiality and anonymity because the study is purely for academic purposes (Master of Philosophy degree in Agricultural Extension at the University of Ghana, Legon).

Village	
Respondent's name/Mobile	

SECTION I: SOCIO-ECONOMIC FACTORS OF HOUSEHOLD HEAD

1. Sex (1) Male (2) Female

2. Age [ ] years

3. What is your marital status? (1) Single 2) Married 3) Widowed

4. What is your highest educational level? 1) No formal education 2) Basic education 3) Secondary education 4) Tertiary education

5. How many years did you spend in school? .....

6. What is the size of your household? 1) Adult [ ] 2) Children < 18years [ ]

7. What is the type of ownership of your farm? 1) Sole Proprietorship 2) Sharecropper 3) Contract farmer 4) other specify…….

8. What other work do you do apart from farming?

#	Occupation
1st	
2nd	
3rd	
4th	

9. How many years have you been involved in cocoa farming? .....

10. What is the size of your cocoa farm? …….

11. What size of the farm is bearing? ……..

12. What type of labour do you use on your farm? (Please tick all that apply)

Type of Labour	Tick here
1. Family	
2. Hired	
3. self-help group	
4. Other specify	

13. Apart from cocoa which other crop(s) do you cultivate?

#	Crop	Tick here
1	Maize	
2	Plantain	
3	Cassava	
4	Cocoyam	
5	Oil palm	
6	Rice	
7	Vegetables	
8	Yam	
9	Pear	
10	Citrus	

SECTION II: ACCESS TO AGRICULTURAL INFORMATION.

14. Answer the questions with regard to access to extension services

#	Provider	Source	1	2	3	4	5
1	Cocobod/MoFA						
2	LBCs						
3	Input dealers						
4	NGOs/private extension						
5	TV						
6	Radio						
7	Newspapers/posters/leaflets						
8	Farmer groups						
9	Friends						

Frequency of access of information; 1 = yearly, 2 = every six months, 3 = quarterly, 4 = monthly and 5 = weekly
Timeliness of access of information; 1 = never on time, 2 = rarely on time, 3 = sometimes on time, 4 = often on time and 5 = always on time.
Clarity of language used in dissemination; 1 = never clear, 2 = rarely clear, 3 = sometimes clear, 4 = often clear and 5 = always clear.
Clarity of information disseminated; 1 = never clear, 2 = rarely clear, 3 = sometimes clear, 4 = often clear and 5 = always clear.
Relevance of information; 1 = never relevant, 2 = rarely relevant, 3 = sometimes relevant, 4 = often relevant and 5 = always relevant.

15. How often do you use the information from the sources you have mentioned?

Code	Source of service	1	2	3	4
1	Cocobod/MoFA				
2	LBCs				
3	Input dealers				
4	NGOs/private extension				
5	TV				
6	Radio				
7	Newspapers/posters/leaflets				
8	Farmer groups				
9	Friends				

1 = never, 2 = rarely, 3 = sometimes and 4= always.

Section III: Orientation towards improved farming

Information seeking behaviour

16. How often do you seek new information on the following activities?

Code	Activities	1	2	3	4	5
1	Farm sanitation					
2	Pest control on cocoa					
3	Diseases control on cocoa					
4	Recommended agro-chemicals to use					
5	Cultivation of other crops					
6	Raising of animals					
7	Raising of nurseries					
8	Shade management in cocoa cultivation					

1 = never, 2 = rarely, 3 = sometimes, 4 = very often and 5 = always

Achievement motivation

How regularly do you perform the following during the year?

#	Activity	1	2	3	4	5
1	Pruning for sunshine penetration					
2	Regular mistletoe removal					
3	Regular weed control (2 –4 times)					
4	Application of fertilizer					
5	Four to six times application of fungicides					
6	Four times application of insecticides					
7	Harvesting on time, not when majority of pods are ripe					
8	Removal of black pods					

1 = never, 2 = rarely, 3 = sometimes, 4 = often and 5= always.

Innovation proneness

27. Do you use the following and how do you accept them? Tick from option on the table.

Code	Agricultural practices	Use		How do you accept the idea?		
		Yes	No	1	2	3
1	Row planting					
2	Pruning of the trees					
3	Hybrid seedlings					
4	Raising of nurseries					
5	Chemical Fertilizer					
6	Mistletoe removal					
7	Chemical weed control					
8	Harvesting regularly and not when most pods are ripe					
9	Periodic removal of black pods					
10	Drying beans from diseased pods separately from beans from healthy beans					

1= after most of the people have accepted/adopt it.
2= after consulting others who are more knowledgeable and using it.
3= whenever i become exposed to it.

Attitude towards improved farming practices

28. To what degree do you agree on the following statement?

Code	Negative Statement	1	2	3	4	5
1	Fermenting cocoa for 5 days is the best					
2	Empty bottles of agro-chemicals can be used in the homes					
3	Pods from my farm are very good for planting					
4	Planting haphazardly increases yield					
	Positive statement	5	4	3	2	1
5	Spacing of 3m*3m is the best					
6	Pruning helps prevent cocoa black pod					
7	Row planting will increase my yield					
8	Too much application of herbicides is harmful to the environment.					

1=strongly disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree for positive statement
5 = strongly agree, 4 = agree, 3 = neutral, 2 = disagree and 1 = strongly disagree for negative statement

Section IV: Institutional Factors

Credit access

29. Do you have access to credit for your production activities? (1) No 2) Yes

30. If yes what is the source of credit? (Tick all that apply)

C	1	2	3	4	5	6
	Bank	Money lender	Friends/family	PC	Input supplier	Other, please specify
T						

Market access

31. How frequently do you visit the market? (1) Not at all (2) Every market day
(3) When I have something doing there (4) other specify

32. How far is your residence from the market? ……km

<u>Group membership</u>

33. Are you a member of any social or agricultural group? (1) Yes (2) No

34. If yes name the group(s) ……

Section VI: Livelihood Outcomes

Farm yield

35. In the last season, how many bags of cocoa did you harvest per hectare?

Code	Crop	Yield (kg)
1	Cocoa	

36. Income (per annum)

Income	**GHC**
Sale of cocoa	
Income from animal sales	
Income from sales of other crops	
Food crops consumed	
Food crops given as gift	
Income from wages and salaries	
Income from remittances	
Income on personal services	
Others	

37. Farmers wellbeing

Indicate the level to which you are able to afford the following for your household?

Need	**Responses**		
	Never	**Sometimes difficult**	**Always**
Daily food needs			
Clothing			
Water			
Shelter			
Education			
Health			

37. Which of the following Assets do you possess?

Code	**Asset**	**Tick here**	**Source of funds for purchase**
1	Radio		
2	Bicycle		
3	Bed		
4	Mattress		
5	TV		
6	Motor		
7	Car		
8	Mist blower		
9	Knapsack sprayer		
10	Mobile phone		

Appendix II: Regression Analysis Tables

Appendix IIa: Effect of independent variables on access to agricultural information

Variable	Unstandardized coefficients		Standardized Coefficients	t	sig
	B	std error	B		
Constant	-12.208	17.507		-0.697	0.486
Sex	1.359	4.025	0.024	0.338	0.736
Age	0.088	0.149	0.042	0.591	0.555
Marital status	-2.182	3.907	-0.038	-0.559	0.577
Years of schooling	0.385	0.284	0.071	1.355	0.177
Household size	-1.664	0.651	-0.140	-2.557	**0.011**
Farm ownership	1.336	3.498	0.020	0.382	0.703
Other occupations	2.790	2.544	0.056	1.097	0.274
Years in farming	0.175	0.171	0.072	1.018	0.310
Farm size	-0.176	0.654	-0.014	-0.269	0.788
Labour availability	4.662	1.942	0.129	2.401	**0.017**
Growth of other crops	5.998	9.972	0.030	0.601	0.548
Access to credit	2.437	2.580	0.049	0.945	0.346
Frequency of market visit	-0.222	3.489	-0.003	-0.064	0.949
Distance to market	0.295	0.264	0.058	1.117	0.265
Group membership	14.594	3.007	0.291	4.853	**0.000**
Information seeking behaviour	1.062	0.315	0.209	3.373	**0.001**
Achievement motivation	0.168	0.204	0.044	0.825	0.410
Innovation proneness	0.213	0.343	0.037	0.623	0.534
Attitude towards improved farming	0.645	0.270	0.147	2.384	**0.018**
Dependent Variable: Access to Agricultural Information					
R^2 = 0.498, F (sig.) = 12.515 (**0.000**)					

Appendix IIb: Effect of independent variables on the use of agricultural information

Variable	Unstandardized coefficients		Standardized Coefficients	t	sig
	B	std error	B		
Constant	-3.594	3.397		-1.058	0.291
Sex	-0.012	0.781	-0.001	-0.016	0.988
Age	0.009	0.029	0.021	0.300	0.764
Marital status	-0.314	0.758	-0.028	-0.414	0.680
Years of schooling	0.058	0.055	0.055	1.057	0.292
Household size	-0.279	0.126	-0.119	-2.212	**0.028**
Farm ownership	0.637	0.679	0.048	0.939	0.349
Off – farm work	1.118	0.494	0.113	2.265	0.024
Years in farming	0.048	0.033	0.099	1.436	0.152
Farm size	-0.144	0.127	-0.058	-1.139	0.256
Labour availability	0.919	0.377	0.129	2.438	**0.015**
Growth of other crops	0.999	1.935	0.025	0.516	0.606
Access to credit	0.743	0.501	0.075	1.484	0.139
Frequency of market visit	-0.513	0.677	-0.037	-0.757	0.450
Distance to market	0.068	0.051	0.068	1.329	0.185
Group membership	2.996	0.584	0.303	5.133	**0.000**
Information seeking behaviour	0.225	0.061	0.0224	3.679	**0.000**
Achievement motivation	0.041	0.040	0.053	1.028	0.305
Innovation proneness	0.051	0.067	0.045	0.760	0.448
Attitude towards improved farming	0.094	0.052	0.108	1.790	0.075

Dependent Variable: Use of Agricultural Information

R^2 = 0.514, F (sig.) = 13.365 (**0.000**)

Appendix 11c relationship between information level of access and use

Parameter	B	t	p - value
Constant	-0.821	-2.962	0.003
access to information	0.186	46.705	0.000
R^2 = 0.894			
p value = 0.000			
Standard error = 1.607			

Appendix iii a : Operational framework for data collection.

Study Concepts	Variables	Information Required	Source of Information	Method of Data Collection
Socio-economic	1. sex 2. Age 3. Marital Status 4. Educational Level 5. Household Size 6. Farming experience 7. Farm Size 8. Type of Farm Ownership 9. Type of Labour 10. off – farm work 11. other crops cultivated	Gender, Age, Marital Status, Educational Level, Household Size, Farming experience, Farm Size, Type of Farm, Ownership type, Type of Labour, Other occupations, and Other crops grown	Farmers	Questionnaire Administration
Access to and use of agricultural information	1. Access to agricultural information 2. Use of extension service	Access to and use of agricultural information	Farmers	Questionnaire Administration
Farmers' orientation towards improved farming	1. Information seeking behaviour 2. Attitude towards improved farming practices 3. Production motivation 4. Innovation proneness	The extent of information seeking by farmers, rate of use of innovations, means of improving upon production and farmers' attitudes towards improved farming practices	Farmers	Questionnaire Administration
Institutional Factors	1.Credit access 2. Frequency of market visit 3. distance to market 4. Group membership	Credit access, frequency of visit, distance to market and Group membership	Farmers	Questionnaire Administration
Livelihood Outcomes	1. Yield 2. Farmers' average annual income 3. Satisfaction of Basic needs 4. Assets possession	Farmers' yield of cocoa, the farm income derived from various crops, other non-farm income, how well farmers are able to cater for their basic needs and assets owned by farmers	Farmers	Questionnaire Administration

Appendix III b: Descriptive statistics of independent variables

Variable	Categories	Frequency	Percentage
Type of group	Agricultural Social	114 3	97.4 2.6
Type of off-farm work	Teaching Trading Artisanal Others	7 49 42 18	6.0 42.2 36.2 15.5
Number of crops grown	≤4 >4	25 235	9.6 90.4
Reason for joining group	Learning Credit Both credit and learning	57 2 58	48.7 1.7 49.6
Sources of credit	Bank Informal From more than one source	22 103 8	16.5 77.4 6.1

Appendix iii c : Farmers orientation towards improved farming.

Variable	Category	Frequency	Percentage
Information seeking behaviour	Low Moderate High	92 133 35	35.4 63.1 1.5
Achievement motivation	Low Moderate High	45 123 92	17.3 47.3 35.4
Innovation proneness	Low Moderate High	55 160 45	21.2 61.5 17.3
Attitude towards improved farming	Low Moderate High	32 97 131	12.3 37.2 50.4