CREDIT USE AND ITS EFFECT ON PROFITABILITY AMONG SMALLHOLDER MAIZE FARMERS IN THE BRONG AHAFO REGION OF GHANA

BY

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DECLARATION

I, Benjamin Sarfo, hereby declare that with the exception of references to other people's work which have been duly acknowledged, the work contained in this thesis "Credit Use And Its Effect On Profitability Among Smallholder Maize Farmers in the Brong Ahafo Region of Ghana" is the result of the research carried out by me in the Department of Agricultural Economics and Agribusiness, University of Ghana, Legon from August 2016 to June 2018. This thesis has not been presented either in whole or in part for any other degree in this university or elsewhere.

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DEDICATION

I am able to complete this thesis successfully through the abundant grace, mercies, favor and the protection of God the Father, God the Son and God the Holy Spirit unto whom I sincerely dedicate this thesis.

I also dedicate this work to my lovely wife Mrs. Abigail Sarfo Adjei, my mother Mrs. Mary Owusu, Uncle Mr. Felix Anning Danso, my sister Portia Appiah, and all my family and friends whose selfless love and sacrifices have made me what I am today.

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ABSTRACT

The study assesses credit use and its effect on profitability among smallholder maize farmers in the Brong Ahafo Region. A multistage sampling technique involving purposive sampling, stratified sampling and simple random sampling technique were employed to select the region, two municipalities from the region and 200 smallholder maize farmers respectively for the survey using well-structured questionnaires. The study took into consideration a description of the sources of credit which included friends and relatives, Susu, famer Groups, Trade creditors, Rural Banks, Money lenders, NGOs. The factors influencing the decision of a farmer to use credit, determinants of farmers' credit use intensity and the indicators of profitability among smallholder farmers were investigated. Frequencies and percentages were employed to describe the sources of credit available to farmers in the study area. The study employed a binary probit model to estimate the factors influencing the decision of a farmer to use credit whiles using the Tobit regression model to estimate the credit amount used intensity of smallholder maize farmers. Indicators of profitability such as Gross margin, Net revenue and Return on investment analyses were employed to estimate the profitability among smallholder farmers. A mean test for significance was employed to estimate the statistical differences among the maize farmers profitability. Tables, percentages and frequencies were employed to describe the socio-economic characteristics of the respondents as well as the sources of credit to farmers. The probit regression results revealed that the marginal effect of age, gender, and experience in farming, farmer objective, collateral, farm size, and farmer association significantly influence smallholder farmers decision to use credit. Results from the Tobit model revealed that landownership, educational level, production cost per hectare and interest rate had a significant relationship on farmers credit amount used for maize production. The mean net revenue among credit users and non-credit users were GH¢312.23 and GH¢192.42 respectively. The p-value calculated for gross margin is statistically significant at 0.001 which is less than the significance level of 0.05 set as the standard. This result implies that there is a significant difference in the Gross margin among credit users and non-credit users. Finally, it was revealed that use of credit has a significant positive effect on smallholder maize farmers' gross margins, net revenue and returns on investment. The study recommends that stakeholders' in agricultural industry such as MOFA, NGOs etc. should include in their sensitization programmes ways of enhancing farmers to adopt better farm management practices, since they are variables influencing farmers' use of credit. Farmers in groups should also develop the habit of monitoring their group members on credit use. This will improve on their credit use and grant access to more members.

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LIST OF ABBREVIATIONS

MOFA – Ministry of Food and Agriculture

GPRS - Ghana Poverty Reduction Strategy

FASDEP – Food and Agricultural Sector Development Policy

METASIP – Medium Term Agricultural Sector Investment Plan

MIDA - Millennium Development Authority

GDP – Gross Domestic Product

GSS – Ghana Statistical Service

ADB – Agricultural Development Bank

MASLOC – Micro Finance and Small Loans Center

FAO – Food and Agriculture Organization

NDPC – National Development Planning Commission

ISSER – Institute of Statistical, Social and Economic Research

AEA – Agricultural Extension Agent

PSIA – Poverty and Social Impact Analysis

NGO – Non-Governmental Organization

SRID – Statistics, Research and Information Directorate

CSIR – Council for Scientific and Industrial Research

MDG – Millennium Development Goal

MFI – Micro Finance Institutions

CHAPTER ONE

INTRODUCTION

1.1 Background

Agriculture is said to be a strategic sector in the development of most low-income countries. Ghana is largely an agrarian economy where most of her citizens rely solely on agriculture for survival. The agricultural sector is very essential and dominant in Ghana's economy. It accounts for over 50 percent of foreign exchange earnings to the country (MoFA, 2011).

Farmers in most developing countries are smallholders operating on limited scale and often rely on family land and labour. The Ghanaian agriculture sector for instance is dominated by small scale farmers who are found in rural areas farming less than two hectares each. Small scale farmers in Ghana use about 90% of the total agricultural land cultivated (MoFA, 2011). These farmers are often constraint with farming logistics such as inputs and other machinery to support their production mainly due to inadequate finance to purchase those items. Productivity is often too low leading to low yield mainly due to the inadequate investment in logistics into their farming business and hence unable to increase their profitability.

Maize production in Ghana requires more investment in fertilizer and other agrochemicals to enhance productivity. These farmers who are producing on small scale and cannot afford most productive resources on their own certainly need support in terms of resources and other farm inputs such as improved seeds, fertilizers, labour and above all credit to be efficient in order to stay profitable in their farming businesses. Extending credit to smallholder farmers will enable them have access to adequate farm lands, afford both skilled and unskilled labour to work on farms and also to deploy modern farm technology to boost production and enhance farm profit.

The dominance of the smallholder farmers in Ghana therefore implies that, policy enacted to enhance agricultural development should target the smallholder farmers.

Policies such as the GPRS II, FASDEP II, METASIP and financial institutions such as the Agricultural Development Bank were designed to help support the smallholder farmers with access to input resources and market by making credit available and accessible to the farmers. The motivation for these policies and institutions were to improve farmers' productivity to enhance increased farm income and improve their living standards (World Bank, 2008). Current rural development strategies outlined in the FASDEP II are converging on agricultural modernization through transformation of the subsistence smallholder farmers to the one that is producing for the market. The purpose is to achieve commercial orientation, adoption of productivity enhancing technologies and associated inputs like credit. To improve farmers' access to credit, it is important to strengthen the capacity of operators in credit management system, by way of intensifying loan procedures, education of farmers and also seeking to link the formal and informal financial service delivery. In view of this, MoFA seeks to improve farmers' income and improve their living standards by enhancing the cultivation of staple crops through the use of credit as an instrument (Olwande & Mathenge, 2012).

Use of credit by smallholder farmers helps in acquiring requisite farm inputs and engages in other off farm activities. According to Bashir *et al.* (2010) farmers' ability to use inputs extensively and appropriately is determined by access to credit. This confirms the study by Girabi & Mwakaje (2013) and Ashaolu *et al*. (2011) that farmers proved that credit users are more productive than those without credit. Research findings by Al-Hassan *et al*. (2006), Omiti *et al.* (2009), Jari & Fraser, (2009) and Siziba *et al.* (2011) highlight higher profit and prospects

of curbing poverty to ensure sustainable livelihoods, expanded production and the adoption of productivity enhancing technologies for credit users.

Since farmers securing credit depends largely on their will and ability to repay at a price which covers the total loan by a lender, it has become very difficult for these smallholder farmers to access credit because most of them do not have the required collaterals to signal their guarantee credit worthiness of repaying the loans. According to Onumah & De-Graft Acquah, (2011), credit sustainability and other financial services to farmers and the rural inhabitants in the low-income countries has resulted to be a tedious task which has become a major development obstacle.

The Brong Ahafo Region of Ghana remains the major maize crop producer (MoFA, 2010). Among the cereal production in Ghana, maize accounts for 50-60% representing the second largest crop after cocoa (MiDA, 2010). It is estimated that about 70% of smallholder farmers are into maize production in Ghana and lack the necessary finances to invest in input resources such improved seeds, fertilizer, mechanized services, among others. Since the ability of a farmer to secure extra funding forms the bedrock of most smallholder farmers' source of massive investment, it is worthwhile that a comprehensive study is undertaken to unearth the bottlenecks involved in the process and to identify the effects of the credit usage on farmers' profit.

This study therefore investigates how the smallholder maize farmer accesses and uses credit and how it directly or indirectly affects their farm profitability.

1.2 Problem Statement

The Brong Ahafo Region of Ghana is largely dependent on Agriculture and about 66.4% of the economically active population in the region engages in it for their livelihoods (GSS, 2010). About 65% of household income in the region comes from agriculture (GSS, 2010). Most of the agricultural activities in the region are done by small scale farmers who rely on their personal earnings to finance their agriculture activities (MoFA, 2011). This is evident in the findings of Sadick *et al.* (2013) that smallholder farmers finance their agricultural activities through equity funds from their own on –farm and off –farm activities. This situation has led to low or little income for smallholder farming households to meet their consumption needs and as well carry on timely purchase of cash inputs such as improved seeds, fertilizer, herbicides, mechanized services, among others for their agricultural production which decreases their productivity as reported in Ellis (2000).

In addition, farmers have limited access to credit facilities to supplement their personal savings for their farm investment which translates into low working capital, thus impeding their ability to purchase productive inputs. Although financial institutions exist in the region to support farmers with credit, they often feel reluctant to lend to smallholder farmers due to the risky nature of the farming business in Ghana (Akosa, 2011). Akosa (2011) reported that though credit is used as a tool to combat poverty in the case of smallholder farmers, financial institutions and other donor agencies feel reluctant to lend to the agriculture sector.

Various policy documents including GPRS II, FASDEP II and institutions like ADB and MASLOC were initiated by the Government of Ghana to provide credit support to farmers as a means of enhancing their input use and to enhance their profitability yet their contribution in supporting smallholder farmers with credit facilities is unknown.

There are several reasons accounting for low credit use among smallholder farmers in Ghana including rigid lending procedures in acquiring loans from formal institutions, poor repayment rate among farmers, diversion of loans from purpose, refusal to pay loans and the dispersed nature of the smallholder farmers. These factors combine to make the financial institutions very repulsive in granting loans to farmers. Other reasons for which the financial institutions refuse loans to farmers include lack of collateral and the perceived risky nature of agriculture as a result of bad weather, unforeseen diseases and pest and the uncertain nature of prices of agricultural commodities making some institutions target individuals or groups of farmers with certain demographic and enterprise characteristics. It is however argued that farmers applying for credit are mostly discouraged by complex procedures and high interest rates charged by financial institutions (FAO, 2012).

Notwithstanding the importance of credit use, many studies fail to find the effect of credit use on the profitability of smallholder maize farmers especially in Ghana. It is therefore unclear whether smallholder maize farmers who use credit in supporting their farming activities in Ghana particularly among maize farmers in the Brong Ahafo region have the potential in increasing their profitability compared to non-credit users. This makes it imperative to investigate the effects of credit use on smallholder farmers' farm profitability.

1.3 Research Questions

To help investigate the effect of credit use on smallholder farmers' profitability in the Brong Ahafo region, the following questions are raised;

1. What are the sources of credit to smallholder maize farmers?

2. What are the factors influencing smallholder maize farmers decision to use credit?

3. What are the determinants of credit use intensity among farmers?

4. Is there any difference in the farm profits of credit user and non- credit user smallholder maize farmers?

1.4. Objectives of the study

The main objective of the study is to assess the use of credit and its effect on farm profit among smallholder maize farmers in the Brong Ahafo region.

Specific Objectives:

1. To describe the sources of credit to smallholder maize farmers in the study area.
2. To identify the factors influencing the decision of smallholder maize farmers to use credit.
3. To estimate the determinants of credit use intensity among smallholder maize farmers.
4. To estimate the effect of credit on smallholder maize farmers' profitability.

1.5 Justification of the Study

Literature so far reviewed revealed that both past and recent researchers in the field of agricultural credit use and investment have focused on farmers' access to credit based on the availability of financial institutions and the farmers' own socio-economic characteristics (Reardon, 1997; Zeller et al., 1998; Njeri, 2014; Dittoh, 2006; Awunyo-Victor et al., 2016). Other researchers focused on the relationship between credit access and farm investment and the wellbeing of farmers (Mayoux and Hartl, 2009; Dong et al. 2010; Kuwornu et al. 2013). It is

clear that the intensity of credit use by farmers and the impact of credit use on the profitability among farmers has not be given much attention by researchers. Meanwhile, interest on credit and other strict obligations attached to credit given to farmers may have a negative effect on the profitability of the farmers. It is this gap that the study seeks to fill by examining the impact of credit use on the profitability of smallholder farmers.

Credit is an important source of ensuring increase in agricultural resource use. If the government of Ghana and NGOs want to ensure adequate maize production, farmers may have to be encouraged and assisted to implement various improved farming technologies by making credit available to them.

The study examines the use of credit among smallholder maize farmers and its effect on their profitability which is relevant for stakeholders to understand when examining the role played by credit in the investment activities of farmers. Studies have revealed that inadequate credit from external sources have negative effect on rural people's agricultural activities, farm income, food security, health, and sustainable livelihood and poverty status.

The study therefore determines the extent to which credit has improved the farm profit of maize farmers in the Brong Ahafo region. The results of the study will be useful to various agricultural actors and policy makers such as government by providing empirical evidence on the factors that influence access to credit and its effect on profitability of the smallholder maize farmers which will be vital in informing policies geared towards transforming small scale farming in Ghana. The study will unveil lapses and inadequacies in accessing credit and recommend corrective measures to ensure favorable results.

The results from the study would provide empirical evidence and add to literature on smallholder farmers' credit use and its effect on farm profit. The study will therefore contribute to knowledge by filling the existing gap in literature regarding smallholder farmers' credit use and its effect on farm profitability.

Also, findings from the profitability analysis will help credit users to know whether they are better off or not with regards to their profitability. It will also give direction to non-credit users with regards to their decision to access credit based on the outcome of the study. The findings of the study will also inform Government and other NGOs who support smallholder maize farmer credit schemes about the performance of credit users' profitability. This may help them in taking remedial actions depending on the outcome of the study.

1.6 Organization of the Thesis

This study is organized into five chapters. It begins with chapter one which provides the background information to the study including introduction, statement of the problem, research questions, research objectives and relevance of the study. Chapter two provides review of literature relevant to the study. Literature reviewed encompasses extensive work of authorities and individual contributions on credit accessibility, the sources of credit, factors influencing decision of a farmer to access credit and credit market in Ghana, farm profit as well as the effect of access and use of credit on farm profit of smallholder farmers. Chapter three presents the theoretical and conceptual model of the study, methods of analysis used in conducting the study, description of the study area is discussed in detail. Chapter four presents the results and

discussions on the effect of credit on smallholder maize farmers' farm profit. The final chapter, chapter five presents the summary of findings, conclusion and policy recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents a review of relevant literature regarding use of credit and its effect on farm profitability among smallholder maize farmers. The relevant areas reviewed includes the definition of credit, credit needs by smallholder farmers, the agricultural credit market, the Ghanaian financial system, and factors influencing farmers use of credit and its effects on farm profitability and the concept of smallholder farmers.

2.2 Definition and Overview of Credit

According to Reed (2011) credit is the extension of small loans to low income households. Furness (1975) defined credit as a means by which a commodity is acquired with the promise of paying later. Homby (1974) defined credit as the sum of money advanced or loaned by a bank. Besides, Ennin (2001) also regarded credit as the actual exercise of the power to borrow which is represented by an actual loan. In farmers' agriculture production, credit in combination with labor, technology adoption and land ensures productivity. It is very efficient and effective if the source of credit is situated close to the locality of the farmers than a place far away. This normally ensures easier transaction of business. Rehman *et al.* (2009) concluded that due to the lack of proximity of MFIs to farmers, the agricultural sector is facing credit constraints. These credit constraints lead to limited use of credit which hinders farmers' productivity and growth (Odoemenem & Obinne, 2010). According to Okojie *et al.* (2010), credit has benefited smallholder farmers in numerous ways in the past. Research conducted by ZHU *et al.* (2007), came out with the conclusion that both credit from formal and informal sources enhances

farmers' income which are partly used to increase his/her farm productivity as well as other investment decisions. Credit can improve the adoption of required modern agricultural technologies; productivity patterns, and makes it possible for farmers to undertake various farm and non-farm investment activities. As noted by Kimuyu & Omiti (2000) credit is termed as a temporary substitute for personal savings.

According to Freeman *et al*. (1998) smallholder farmers are able to take advantage of productive opportunities due to credit from formal sources in Kenya and Ethiopia. A farmer is said to have access to credit if the credit is available and accessible to him. Access to credit implies the ability and willingness to borrow (Schremer & Colombet, 2001). It includes repayment to cover the long-term cost of the lender.

2.3 Agricultural Credit in Rural Development

Agricultural credit is said to have significant influence on the productivity and net farm profit of smallholder farmers especially in agrarian economies. Notable credit source is microcredit which emanates from some financial institutions and perceived as a rural development intervention that seeks to influence access to small loans to the poor who are most of the time neglected by banks (Schremer & Colombet, 2001) and allows the farmer to invest towards income improvement (Anderson *et al.* 2002). As reported by Ahmed (2011), credit has a positive relationship with output since it helps smallholder farmers to purchase various inputs. Akudugu (2012) argues that, credit to the agricultural sector is an empowerment tool which is used to unlock potentials of rural economies and transform self-image of the rural poor. Ahmed (2011) indicated that, credit in itself is only a capital input and cannot holistically influence output of a farmer. Consistent with this observation, researchers like Mishra & Nayak (2004) in their study reported that, poverty of rural people is not caused by lack of access to credit and hence to attain rural

development credit is not a sufficient condition. Amin *et al.* (2003) also maintained that microcredits only reach the poor and not the vulnerable. In their explanation, they reported that factors that influence households' vulnerability are the same factors influencing their credit risk.

According to Mallick (2002) credit is vulnerable to policy changes in development priorities. Mallick (2002) further explains that giving out loan to selected people in rural areas creates jealousy, class division and fuels violence and conflict among rural dwellers. The outcome of the findings from this research is that credit is seen as an input in production and a necessary condition to enhance improvement in rural livelihood. Therefore, it is necessary for household to secure substantial amount of credit and utilize it effectively. This however depends on the operations of credit markets in the rural economy.

2.4 Credit Market in Developing World.

A farmer or household obtains credit basically from a formalized or informal source. These institutions of credit represent the credit market at different locations all over the world but their operations may differ at different places. As reported by Zeller (1994), formal and informal credit sources coexist in Madagascar with the formal sources consisting of credit and saving schemes of NGOs, Government Extension Services. In his study, he maintained the heterogeneous nature of the informal credit sector with different segments providing credit schemes under different conditions. According to Pollard (1983) farmers in Jamaica have limited access to formal credit and have to rely on informal sources such as relatives, friends and earnings from off –farm activities. Mohammed (2003) identified formal and quasi formal credit sources with limited commercial bank loan access in Tanzania. A recent study in China added that the informal sources of credit consist of mainly extended families, relatives and friends

(Tang *et al.* 2010). In Nigeria, agricultural credit markets consist of banks, NGOs, cooperatives, Government programmes, local money lenders and families and friends.

Though there exist this source of credit from the credit market, it has been associated with numerous challenges. Such challenges include market imperfection which limits market participation among economic agents. Wenner (1995) supports this hypothesis with an explanation that information asymmetry in the market results in selective rationing and market segmentation. The supply side participant therefore adopts coping mechanisms in order to avoid or minimize the probability of failure. This is evident in the study by Aryeetey and Undry (1995), that credit lenders in Africa concentrate on loan screening and monitoring as a strategy of minimizing loan defaults. According to them, the informal sources avoid information asymmetry in lending by identifying groups they can easily be controlled.

Market imperfection dominates in the informal source of credit as compared to the formal sector. This is due to the fact that implementation of most financial reforms focused more on the formal sector resulting in fragmentation of the financial market (Aryeetey, 1997). Financial savings occur most in the informal sector meanwhile government policies such as tax systems and industrial policies tend to constrain the informal sector (Tripp, 2001). This in the whole limits the development of the informal credit market hence precludes participation of potential borrowers.

Aryeetey (2008) indicated that, recent happening in the market is a growing interaction among financial institution of different kinds to mitigate imperfections and better address consumer demand. Most formal institutions in the developing world are linking up with informal market to increase supply of funds to meet demand. An example is seen in Ghana in the area of "Susu" collectors linking up with banks (Aryeetey, 2008).

The recent studies maintained that formal sources of credit from banks exist in Ghana but the sources of credit to farmers are usually non formal comprising mainly money lenders, relatives, friends, group arrangement, traders and susu collectors (Owusu- Antwi & Antwi, 2010; Awunyo-Victor & Abankwah, 2012; Quartey *et al.* 2012). These studies identify the potentials of informal credit sources and recommends improved access to these institutions among farmers.

2.5 The Ghanaian Financial System

In Ghana, the financial system is decomposed into 3 segments. This includes the formal, semi-formal and informal sources of credit. According to Andah (2005) the Bank of Ghana is the sole institution which registers and regulates the operation of the formal credit institutions. These formal financial institutions include Banks, Non-banking institution such as saving and loan companies. The semi-formal credit institutions are in operation as well but are not under the regulation of the central bank in Ghana. They include credit unions and Non-Governmental Organization (NGO). The informal credit institutions according to Andah (2005) are susu collectors, relatives and friends among others who are not under any regulation.

Many researchers believe that credit sources in Ghana are in different ways since their provision of financial intervention comes in different forms like other developing countries (Ekumah & Essel (2002) and Mensah (2004). Ekumah & Essel (2002) and Mensah (2004) explain that the sources of informal credit in Ghana are mainly from money lenders, relatives, friends, traders and susu groups.

Steel *et al.* (2003) grouped Ghana's financial system into three main categories namely;

(a) Formal Financial Institutions

(b) Semi- Formal Institutions

(c) Informal Financial Institutions

2.5.1 Formal Credit Institutions

In Ghana, all formal financial institution is licensed under the companies Act. The companies code 1963 (Act 179) mandates all formal credit institution (Steel & Andah, 2003). Yartey (2006) reported that, 75% of the financial systems assets are found in the banking sector. Access to financial service in a form of credit from the formal source needs collateral and as well seen in undertaking highly risky ventures. This is evident in the fact that, most financial institutions or especially banks are reluctant to serve smallholder farmers with loan amount mostly if they lack collateral (GSS, 2008; Quartey *et al.* 2012). The Agricultural Development Bank which was established to facilitate credit to the agricultural sector has limited branches in rural areas where agriculture is massively done. This has compelled rural banks to play the role of lending credit to the rural poor for their agricultural activities (Awunyo-Victor & Abankwah, 2012). Rural banks therefore replace the Agricultural Development Bank which is mostly operated by the rural inhabitants themselves making credit accessibility and availability to farmers relatively easier.

2.5.2 Semi-Formal Financial Institutions

This form of financial institution includes the non-governmental organizations (NGOs), the various credit unions and traders. These financial sources are legally registered but not licensed by the Bank of Ghana to operate as a financial institution. They are mainly focused on poverty alleviation programs. They provide multiple services to poor clients including microcredit. The NGOs both local and foreign are broadly categorized as financial institutions which are defined as semi-financial sector that provides financial service to meet the financial needs of the poor and the vulnerable in society (Staschen, 1999).

Traders make up a major section of rural finance in Ghana. They usually use collaterals in their operations for the farmer to sell their crops to them after being harvested. Their interest is to make more profits by buying from the farmers and selling at a higher price.

2.5.3 Informal Credit Institution

Kashuliza *et al*. (1996) noted that informal credit markets service implies transaction that occurs off the formal structures of the regulated financial system. Their activity includes intermediaries such as moneylenders, private finance firm, relatives, friends, traders, house owners and house tenants. Owusu Antwi & Antwi, (2010) indicated major component of the informal credit market as groups, money lenders, "susu" collectors and the use of instituted warehouse receipt system. According to Aryeetey (1992), "susu" workers deposit moneys received from their clients with the bank for them to invest in the bank's own trading and as well lend to others. With his report, the linkage between formal and informal is established since savings are done in the formal market with operation from the informal financial market through lending.

The informal credit market exists in the context of traditional way of banking such as the "susu". The individuals within the credit schemes go beyond financial product by incorporating interpersonal relationship in securing trust in the activities of parties in the scheme. This implies cultural roles are identified when dealing with the informal financial market in Ghana. The informal sector loans are mechanized to minimize default in loan repayment since good relationships are always established between lenders and clients (Aryeetey, 2008).

2.5.4 Informal Credit Market Weaknesses

In many African countries, tax systems through Government policies tend to constraint informal markets (Tripp, 2001). Most smallholder farmers' access credit through the informal source

according to literature but policies to develop the informal credit sector is still limited. According to Andah (2005) the informal sector of credit market has been left to survive on its own because it's not affected by the regulation by the Central Bank of Ghana. According to Alabi *et al.* (2012) the susu schemes mostly are not licensed or insured. Mensah (2004) reported that the informal credit sector has not been effective due to various reasons. Due to these challenges, the unregulated financial sector attracts high interest rate hence very expensive for the rural farmer to afford (Quartey *et al.* 2012). According to Awunyo-Victor & Abankwah (2012) the informal source of credit in particular requires collateral and strict credit payment procedure which deters borrowers from going in for it.

2.5.5 Supply Side Challenges of the Ghanaian Credit Market.

In Ghana, credit markets are faced with numerous challenges which make the economy stagnate. In analyzing factors that affect economic growth of Ghana, Easterling *et al.* (2008) identified some setbacks in the financial market. According to him the setbacks includes low rate of expansion on rural banking, inadequate banks in rural areas, and limited collateral. Easterling *et al.* (2008) indicated that this setback decreases the growth of the agricultural industry. It is asserted that, credit institutions most of the time extends credit to people who are perceived to be financially sound or have the ability to pay when they default. This limits other participants' chances of accessing credit (Schremer & Colombet, 2001). These challenges in the supply side therefore limit the use of credit.

2.6 Factors Influencing Farmers Access to Credit.

The ability and willingness to borrow according to Schremer & Colombet (2001) defines what access to credit is. It includes repayment to cover the long-term cost of the lender. Several socio-demographic and enterprise characteristics are reported by different studies as factors influencing

farmers decision to use credit. Socio-demographic characteristics mostly considered by researchers include farmers' age, educational level, experience of the farmer, household size, gender and marital status of farmers. On the other hand, economic activities engaged by farmers significantly influence their borrowing decision. These economic activities include types of farming activities, other livelihood activities, purpose of farming etc. Notwithstanding this, organization and management of the farm enterprise also influence farmer use of credit

2.6.1 Socio-Demographic factors

According to Mohammed (2003) age of the farmer, gender, level of education and income all have negative effect on decision to borrow or use credit. In his explanation, he opined that significance of gender to imply that females have low access to credit than their male counterparts. Negative effect of gender on access to credit was also reported by Ekumah & Essel (2001) and more recently Tang *et al.* (2010); Anyiro & Oriaku (2011); Awunyo-Victor & Abankwah (2012).

According to the researchers, men are risk taking people in terms of borrowing and are more engaged in activities that requires more investment capital than their female counterparts. As argued by Awunyo-Victor & Abankwah (2012), women own few assets and cultivate smaller farm size with low yield hence little farm income in the Ghanaian situation. Akudugu (2012) however maintain a different stand on the issue of gender access to credit. He postulates that, some credit schemes such as those offered by NGOs seek to improve productivity of rural women through enhancing their access to credit hence being a female has positive influence on access to credit. With respect to gender, empirical research reports mixed effect on the issue of credit given the diverse source of credit/loan delivery system.

Age of a respondent is reported to have a significant positive relationship on access to credit according to Mpuga (2010). Irrespective of these findings, other empirical studies do not support the positive effect stands of age with respect to access to credit. For instance, Anyiro & Oriaku (2011) maintain a negative influence of age on access to credit. Also, Baiyegunhi *et al*. (2010) posited that credit constrained households tend to have older heads with lesser education. They reported their position on negative effect of age on access to credit with the conviction that older household heads seem risk averse and may not want to take credit. With this, the finding of Akudugu (2012) and Baiyegunhi *et al.* (2010) differ. Akudugu (2012) posit an opposite effect of age and level of education to the reports of Baiyegunhi *et al.* (2010).

According to Anyiro & Oriaku (2011), married household have lesser probability of accessing credit because of other social problems and can easily use up credit for other purposes resulting in loan default. The same report by Anyiro & Oriaku (2011) posit a significant relationship between the probability of credit use and household size bringing to the fore of contradiction the effect of household size on access to credit. This report is supported by Henri-Ukoha *et al.* (2011).

Notwithstanding this, Mpunga (2010) and Kongolo (2012) however maintain that married people tend to have more access to credit though their studies fail to argue strongly to defend this stand. The contradictory findings from various researchers imply that households' demographics have different effects on access to credit, differing from the operation of the credit scheme and the perception of individuals at different places.

2.6.2 Farm Management Factors

In commercial enterprise establishment, access to large capital is essential to acquire inputs such as labor for increase output and maintain higher profit levels. A study by Mokoena *et al*. (1997) reports that women access to credit conforms to this position of output increase and profit levels if they get access to credit. This implies that, farming for commercial purposes has direct influence on access to credit. This draws attention of stakeholders to commercialize subsistence agriculture via enhancing farmers' access to credit. Though credit is reported as a tool in subsistence agricultural development, empirical studies indicate that, some section of the rural poor are mostly targeted hence increase in average farm income decreases the probability of accessing credit (Mokoena *et al*. (1997); Mohammed (2003); Kongolo, (2012). The rational for the decrease in accessing credit is that, such relatively high income earners can afford to finance production activities with their own equity. This therefore suggest that low income earners will need to enhance increase in income hence enterprise that are profit motivated tends to have more access to credit Mokoena *et al*. (1997); Rahji & Fekayode (2009); Awunyo-Victor & Abankwah, (2012). Anyiro & Oriaku (2011) therefore indicated that farming experience, contact with extension services and distance to financial institution have positive influence on farmers probability of borrowing. According to Anyiro & Oriaku (2011) the effect of co-operatives on credit access did not meet their expectation. Also when the cost of disseminating information on loans is high it reduces credit access by rural households. This according to Schremer & Colombet (2001) is caused by rural distance which requires that loan officials undertaking special trips to disseminate information. The value of household asset holding may also influence individual/household access to credit. This is due to the fact that most credit lenders demands collateral which subsistent farmers' lack (Elhiraka & Ahmed, 1998).

The demand for collateral is an initiative due to the high default probabilities in the case of farmers hence asset value is reported by many researchers to have positive significant influence on farmers' decision to go for credit (Mpunga, 2008; Baiyegunhi *et al.* 2010; Hosseini *et al.* 2012). Farmers who cultivate cash crop according to Akudugu (2012) are more likely to go in for credit. This is supported by Rahji & Fakayode, (2009). Anyiro & Oriaku (2011) however maintain that large farm size decreases the probability of accessing credit with the conviction that, such farmer concentrates the efficiency of land use rather than expansion in cultivated areas.

2.7 The Relationship between Credit and Credit Amount Invested.

Credit according to Chowdhury (2009) is a small collateral-free loan provided to the poor people in order to foster income. The investment decisions of a smallholder maize farmer in developing countries are determined by their financial environment. An investment input normally maximizes the present discounted value of the profits generated by those investments. Access to credit enables farmers to strengthen their productive assets. This enables farmers to invest in their farming and non-farming activities which includes new tools, improved seeds and standard fertilizers. Besides, Meyer (2002) argued that credit leads to increased production and incomes which give rise to further investment.

Access to credit and investment relate to each other. An increase in credit accessibility complement with low cost of production indicates higher impact on investment in farm and non-farm activities leading to an increased farm production and investment (Benu, 2003). Moreover, if an investment activity is successful, it can enhance, smoothen and diversify the borrower's income and increase farm ownership. As the farmers' accessibility for credit increase, it is expected that the quantity, composition and the timing of investment activities of the farmer will likely improve considerably. As reported by Ghosh *et al.* (2000), credit is an important

component which allows investments among various producers most especially farmers who depend on owners' equity. It also offers households the ability of obtaining money in an emergent manner. The investment decision paradigm emphasizes on the farmers income-earning activities whereas the credit accessibility paradigm emphasizes on the effects on the farmers expenditure and particularly the use of the loan for investment purposes. Credit constraints affect farmers' investment decision (Fafchamps & Pender, 1997), whiles investment constraints also affect productivity. Ellis *et al*. (2010), argue that urban people stand the chance of securing credit and save for most investment purposes than the rural people. The amount of loan being devoted to farming activity by the farmer is the measure of percentage of farm investment whiles investment accessibility is driven by having a positive attitude in taking risk in borrowing and engaging in various farming and non-farming activities. Microcredit accessibility is driven by factors which make it convenient to the farmer such as low interest rate, proximity of MFIs, early loan disbursement, collateral-free requirement and belonging to a farming association, no guarantor requirement, adequate credit size and long repayment period of the loan. Microcredit availability and accessibility lead to investment enhancement adoption. This is because;

1) Credit provides working capital to various farmers to enable them improve their farming and non-farming activities and also undertake various investments (Mead, 1990).

2) Credit availability and accessibility enable farmers to diversify their farming operations through the use of improved technologies to realize profits in order to cater for their household food, clothing and shelter there by improving their standards of living.

3) Credit aims at democratizing global financial markets through new contracts, organization and technological investments.

4) Microcredit accessibility can equip farmers to diversify their incomes into more lucrative non-farm ventures to realize increased profits.

In conclusion, credit allows various smallholder maize farmers to undertake farming and non-farming investments whiles investments in financial institutions also ensures the availability of credit to farmers. This confirms the earlier findings of Njeri (2014) that credit access has an inverse relationship with investment. This is to say that, availability and accessibility of credit leads to investments into farming and non-farming activities due to the availability of working capital and vice versa.

2.8 Concept of Smallholder Farmers

The definition of smallholder farmers differs from country to country and it does not lend itself to a precise delineation. As noted by Vermeulen & Cotula (2010), a smallholder farmer is based on regions and between agro-ecological zones. They reported that farmers with land holding of less than 1 hectare in populated areas or those with 10 hectares in semi-arid locations are classified as smallholder farmers. According to Ekboir *et al*. (2002) a smallholder farmer implies a farmer who cultivates less than 5 hectares of land whiles MoFA (2011) maintains that a farmer is classified as a smallholder based on land holdings of less than 2 hectares. According to Chamberlin (2007), smallholder farmers in Ghana can be defined on other perspectives based on the extensive work done by him. Also, PSIA conducted by Asuming-Brempong *et al*. (2004) recommended that in defining Ghanaian smallholder farmers, preference should be given to different resource and risk conditions among them rather than simple measures of landholdings. Following from the above lessons this research study principally defines a smallholder farmer based on landholdings. The Ministry of Food and Agriculture report of about 2 hectares landholding is used to characterize a smallholder farmer.

2.8.1 Smallholder Farmers and Maize Production in Ghana

In Ghana, a lot of challenges confront the agricultural sector. Among the challenges is the access to agricultural resources by farmers. Dittoh (2006) pointed out that access to credit is the topmost priority of smallholder farmers in the Northern Region. Credit access will imply that farmers are able to invest in input resources to enhance their productivity.

Maize is the second staple food apart from rice, consumed among many households in Ghana according to Alhassan (2008) and MOFA (2011). According to Awunyo-Victor *et al.* (2016), maize is used to feed the livestock and poultry industry. MoFA reported that, irrespective of the myriad importance of maize, farmers continue to experience low yields, making Ghana self-insufficient in the production of maize (MOFA, 2012).

The Middle belt of Ghana including most parts of; Ashanti, Brong-Ahafo, Northern, Western and Eastern region supplies over 60% of total maize output in the country (SRID and MOFA 2009). Maize yields in Ghana are on average approximately 1.5 metric tons per hectare (MOFA, 2009). However, yields as high as between 5.0 to 5.5 metric tons per hectare can be achieved by farmers with improved seeds, fertilizer, mechanization, irrigation among others.

2.9 Effect of Credit Use on Farmers Profitability

Credit is very vital to the farmer to experience increased productivity. Importance of credit use is quite enormous. Credit will be needed by a farmer right from land preparation to harvesting, as well as the marketing of the produce. According to Ledgerwood (1999) the introduction of credit serves as an alternative economic tool which targets poor people through the provision of flexible credit services with goals of combating poverty. Fernando (2005) indicate that source of finance has become one of the crucial driving mechanisms of achieving the MDGs most especially with respect to the target of halving extreme poverty and hunger by 2015. Problems

like lack of institutional capacity, requisite technical skills, high illiteracy rate and demand-driven products for the target customers often lead to increase credit constrains to these microfinance institutions. Moreover, Yunus (2011) concluded that, a continuous accessibility of subsidized credits by the MFIs to the poor will render these MFIs totally weak to operate in full strength financially. Rehman *et al*. (2009) concluded that due to lack of proximity of MFIs to customers, the sector is facing credit constraints. Remenyi (1991) and Rogally (1996) lamented that, it is an identifiable fact in several previous studies that credit contributes to income generating activity of the borrower by providing the farmer with a working capital in order to increase farm investments.

According to Mayoux & Hartl (2009), the use of credit will enable farmers to undertake long term investments and economic activities. One solution to impending poverty and food insecurity is making credit accessible to rural farm households (Mead, 1990). Actually, it is difficult to assess the role of credit for rural, non-farm enterprises in many developing countries. There are two different viewpoints on the impact of credit in the rural farm household. The other prevailing viewpoint of the impact of credit in other studies is that, perhaps credit is not the panacea for solving poverty issues and securing household livelihoods (Rogaly, 1996). Indeed, it has been demonstrated in some studies that people are made worse off as a result of credit. It was argued by Rogaly (1996) that "performance of credit varies. The less poor the borrower, the greater the increase in income from a micro-enterprise loan. Reardon (1992) claims that non-farm activities can be a vital source of cash income, which can potentially improve farm productivity.

Moreover, Sebstad *et al.* (1996) also stated that credit can play a significant role in a non-farm activity by either increasing or decreasing income. If there is an increased income from a non-

farm activity, there may be an eventual investment into the farming system whiles Reardon *et al.* (1995) stated that "credit programs that aid non-farm enterprises may be as or more helpful to farm investment than credit targeted to farming per se". According to Reardon (1997), credit can be used to flush income and food consumption patterns. On the other hand, credit must be used as the sole blueprint to solve poverty in most parts of the developing world. Most Ghanaian farmers diversify their farming activities to manage their household. Dichter (1996) argues that the role of NGOs in financial intermediation is short lived. This implies that NGOs operates in a limited time in extending credit to some section of the rural poor.

According to Dong *et al.* (2010), farmers' ability to use credit is a key factor for increasing farm profits and improving the living standards of people in developing countries. According to Zeller *et al.* (1998), access to credit affects the income of household which in the long run affects their welfare outcomes. Most smallholder farmers' show negative cash flow at this period and therefore access to credit becomes important to timely purchase an essential productive inputs to enhance productivity and achieve higher farm incomes.

Zeller *et al*. (1998) reveal that, farming households who access credit increase their ability of bearing risk and by adopting a risk coping strategy. They stressed that, access to credit is linked to smoothing household consumption as a pathway which is closely linked to other pathways. Household production is limited if working capital accessibility is lacking hence borrowing funds can help poor households expands their production and ends up in increasing their farm income.

CHAPTER THREE

METHODOLOGY

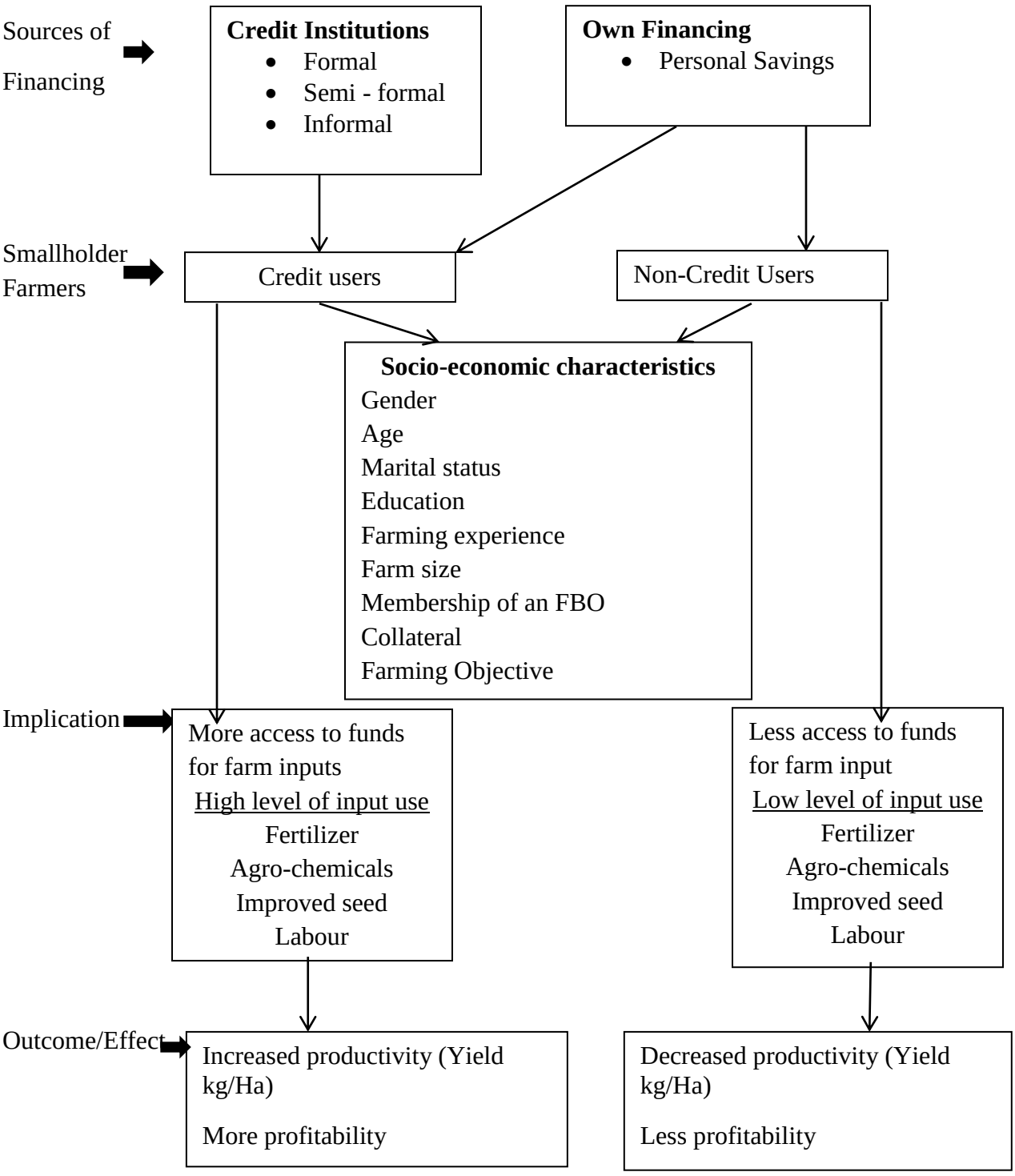
3.1 Introduction

This chapter outlines the methodology for the study. It presents the conceptual framework, theoretical framework and the specific methods with their theoretical underpinnings and specification of empirical models for data analysis. It also presents the methods of data collection, data types and sources, sampling procedure and the study area.

3.2 Conceptual Framework for the Study

Figure 3.1 illustrates the conceptual framework for smallholder maize farmers in relation to their sources of funding and how credit use affects productivity and profitability. The framework begins with various sources of financing available to smallholder famers. These sources can be from personal savings or own financing and from the credit markets. The demographic, economic, management and supply side characteristics of a farmer have the potential to influence the smallholder farmer use of credit. This includes farm size, value of household assets and total annual income of the farmer. Farm management factors imply the decisions taken by the farmer in managing the farm. They include the farming objectives, years of experience, source of labour and access to information through joining farmer based organisation while credit institution variables also known as supply side determinants are the requirement of credit institutions such as collateral, kind of credit given and form of repayment. This is followed by whether a farmer will use credit in his/her farming activities and its implication on the farm profit of the farmer.

Figure 3.1 Conceptual Framework for the study



3.3 Theoretical Framework for the Study

The theoretical framework underlying this study is based on individual investment behavior and their respective profit maximization. The microeconomic theory on producer profit maximization is an area of economic research that has been studied intensively where investments, individual choice, prices and quantities among several other exogenous variables influence an individual (farmer) output level. A rational consumer or producer for instance a farmer would choose the best yielding options given that production inputs are substitutable goods, like fertilizers, access to credit, improved seed over local seed, technology, etc.

As posited by Mansfield (1991), producers maximize profit (output) by producing a quantity of goods that indicate the level of combination of production inputs. Based on the theory of production maximization for producers, farmers in particular derive satisfaction from the utilization of inputs (like credit) they use in farming to maximize output levels. Assuming a farmer has access to credit as an intermediate good, then the farmer's expected production output, according to Greene (2012) is represented mathematically as shown in equation (*).

$$Q_i = q_i(Y_j, X_j, e_{ij}) \qquad (*)$$

Where Q_{ij} is the Output level of farmer *i* by good/ input *j*; Y_j is the household income for farmer j, X_j is the vector of the observed characteristics of the farmer and of the given choice of the farmer, and e_{ij} is the unobserved error term of the indirect production (profit) function.

The farmer will agree to adopt an input if and only if the output (profit) derived from the improved state is greater than the profit derived from the status quo. That is, if

$$Q_i\left(Y_j - Y_i^*, X_j, e_{ij}\right) > Q_j(Y_j, X_j, e_{ij})$$

Where Y_i^* denote the amount the farmer income (profit margin). The probability that the *jth* farmer response 'yes' is an indication that he or she has access to credit is given by:

Pr (yes) = $Q_i\left(Y_j - Y_i^*, X_j, e_{ij}\right) > Q_{ij}(Y_j, X_j, e_{ij})$

A common formulation of the Production Maximization Model is the Additive Profit Model (Cameron & Trivedi, 2005). Thus the Additive Profit Model assumes that the production (profit) function is additively separable into deterministic and stochastic preferences. From equation (**), this is given as:

$Q_{ij} = Q_i(Y_j, X_j) + e_{ij}$ (**)

Hence, the probability statement that a respondent answer 'yes' to an access to credit therefore is illustrated as:

Pr (yes) = $Q_{ij}\left(Y_j - Y_i^*, X_j\right) + e_{ij} > Q_{ij}(Y_j, X_j) + e_{ij}$

Now let P_i denote the dependent variable in which the study will censor farmers who are not P for maize production. According to Greene (2012), P_i is hypothesized to be a function of farm household socioeconomic characteristics such as age, sex, education, household size, access to credit, fertilizer, etc. these exogenous variables were employed using a simple linear regression model given as:

$P_i = \beta_i X_i' + \varepsilon_i$

Where β_i the vector of the estimated parameters is, X_i is the vector of the farmers' household socioeconomics characteristics and ε_i the error term which captures all other factors that affect households' profit margins in the model.

Assumed that there is a high probability of maize farmer's access to credit, it is therefore necessary to look at the profitability analysis of maize production. The theory based on the financial analysis involves the Gross margin analysis, Net revenue and Return on investment technique. Profitability analyses were used because it takes into account both cost of inputs and

revenue from outputs. The total cost involved in the production of a Ha of maize is the sum of fixed or capital cost and variable or operational cost.

According to Jolly & Clonts (1993), fixed cost is the cost that must be paid whether there is production or not and its usually accrue before the first production period in the form of start-up cost. This fixed cost includes the cost of capital assets such as cost of land or land rentals equipment's like cutlass, hoe, silos, knapsack machine etc. That of the variable cost include the cost incurred during the operation and the cost depend directly on the scale of operations and this cost include inputs such as seeds, labour, fertilizer, pesticides etc. The output only included the quantity of maize produced yearly. This output is multiplied by the price to get the revenue of producing a certain quantity.

The theory of profit maximisation employed in this study implies that a rational smallholder maize farmer will not increase production if the cost incurred on such production increment is more than its corresponding benefits or revenue gain. This theory serves as a guide for the farmers in making rational decision on the volumes of output it produces which translates to the profit to be ascertained. The subject of the study assumed that the smallholder maize farmers are rational and therefore increasing profit will be their sole aim in their business by way of efficiently utilizing available input variables to produce more output.

3.4 Methods of Data Analysis

3.4.1 Sources of Credit to Smallholder Maize Farmers

The study seeks to among other things describe the sources from which smallholder maize farmers in the study area obtained credit. Information was gathered from respondents on whether

or not they used credit in the 2016 maize farming season and from which specific sources the credit was obtained. Descriptive statistics such as frequencies and percentages were used to achieve this objective.

3.4.2 Factors Influencing Farmers' Decision to Use Credit

The binary probit model was used to estimate the factors influencing use of credit among smallholder maize farmers in the study area. Several studies on access to credit have shown that there exist heterogeneity between credit users and non- credit users (Feder *et al.*1990; Dong *et al.* 2010).

According to Feder *et al*. (1985) many models used in measuring credit use fail to meet the statistical assumptions necessary to validate the conclusions based on the hypothesis tested. To overcome this problem with regards to the use of linear probability model, the logit and probit models have been recommended (Gujarati, 2004). In this study, it is appropriate to use the probit model since the probabilities are between 0 and 1.

The Binary Probit model is specified below;

$$\Pr(Y^* = 1/X) = \emptyset\,(X^1\beta) = Y^* = \beta_O + \beta X_1 + \mu_1 \qquad (3.3)$$

P_r =Probability (1 = when farmer used credit for maize production in the 2016 production season, 0 = otherwise),

$\emptyset$ = Cumulative density function

β = Coefficients to be estimated

Y^* = Dependent variable

X = Explanatory variables

1 = Credit Use

0 = otherwise

μ = Random disturbance term

The variables used in the model are further specified and described in Table 3.1

Table 3.1 Description of Variables Used in the Probit Regression Model

Variable	Descriptions	Measurement	A priori Expectation
Dependent	Use of credit	Dummy (if Yes=1, else=0)	
AGE	Respondent's Age	Years	+/-
GEN	Gender of Respondent	Dummy (Male=1, otherwise=0)	+
HH_SIZE	Household Size	Number	+
EDU	Educational Level	Years spent in School	+
EXP	Farming Experience	Years	+
OBJ	Farmer's Objective	Dummy (commercial=1, else 0)	+
COLTRAL	Collateral	Dummy (if required then 1;else 0)	-
FAM_SIZ	Farm size	Hectares	+
HH_INC	Annual Household Income	Ghana Cedis (GH¢)	+
FBO	Group membership	Dummy (FBO member= 1;else 0)	+
SAV	Savings Account	Dummy (Saving account=1;else 0)	
DIST	Distance to credit source	Dummy (if closer = 1; else 0)	+

Source: Authors Computation, (2017)

3.4.2.1 Explanatory Variables in the Probit Regression Model

Gender of respondent in the model is measured a dummy variable. A value of 1 is assigned to a male farmer and 0 if otherwise. Gender is expected to have a positive relationship with use of credit because male farmers are often less risk averse in taking and using credit as compared to their female counterparts. According to Buvinic *et al*. (1979), two major factors restrict women use of formal credit than men. These relates to the fact that women lack control over economic resources and the nature of their economic activity. Hence, male respondents are expected to use more credit than female respondents.

Age of a farmer is stated as the actual years lived of a farmer in the survey. This is measured in years and as a continuous variable. Age has a mixed effect on the likelihood of a farmer using credit. Age is expected to have either a positive or a negative relationship with use of credit. The age of a respondent is included in the model as a proxy for maturity and the potential ability of the borrower to utilize and repay credit (Rahji & Fakayode, 2009). Older people are normally reported as risk averse than young people and rarely enter into debt obligations. Moreover, the older people usually find it very difficult to comprehend the operations and the conditions of financial institutions (Adams *et al*.1992).

Household size measures the actual number of individuals in a particular household of a farmer who consumes from the same pot. Household size has a positive influence on farmers' access to credit since larger households will turn to demand credit to oversee consumption expenditure.

With education, formal education of farmers is measured by the years spent in school. This is expected to have a positive relationship with credit use. Studies from past literature attributed this to the fact that the higher an individual advances in formal education, the better his or her understanding will be of the procedure and requirements of obtaining credit for agricultural activities.

Experience in farming is measured by the number of years a farmer engaged in maize farming. Farmers' probability of using credit has a direct relationship with experience in farming. This can be explained on the premise that, more experienced farmers might be aware of the importance of use of credit that might have influence their access to credit.

Farmers in the region engage in maize cultivation purposely for subsistence whiles others do so mainly for sale. Farming objective in the survey is measured as a dummy where a value of 1 is

assigned to a maize farmer who's objective of farming is commercial and 0 if subsistence. The effect of farming objective is expected to have a positive relation with use of credit since commercial farmers are expected to do more investment and will require large capital from credit institutions.

Farm size is measured by the actual land holding used for maize cultivation by a farmer measured in hectares. It is expected that farmers with larger farm size will require more investment hence the likelihood of using credit. Farm size is therefore expected to have a positive influence on the probability of a farmer using credit. According to Belshaw (1959) an average land holding farm size relates positively to the chances that a farmer would use credit. This is because the larger the farm size, the more labour required to cultivate and maintain the crops, which will demand additional resources including capital to achieve a favorable result.

Household income is measured by the sum of annual income from maize cultivation and income from any other economic activity engaged in by the farmer. Household income is measured in Ghana Cedis (GH₵) and the effect on the likelihood of using credit is expected to be negative. This is explained on the premise that, high income earning farmers will be able to finance their farming activities through equity and will not go for credit.

Group membership which is a dummy variable of 1 if a farmer belongs to a farming association or a group and 0 if otherwise is included in the model. This is relevant especially in Ghana where one of the main roles of farmer organizations is to aid various farmers get access to credit as well credit providers encouraging group lending due to the dispersed nature of smallholder farmers. It is therefore hypothesized that farmers who are members of farmer associations will use more credit than those who are not.

Another variable used in the model is whether a farmer has a savings account with a bank or financial institution. This is measured as a dummy variable. The value of 1 is assumed to be "Yes" and value "0" representing "No". Farmers with savings accounts are expected to have access to credit and are likely to use credit to support their farming activities.

Distance is measured as the distance to the collection point of credit from a source. It is treated as a dummy where the value of 1 is assigned for a collection point being near and 0 if otherwise. With the table describing the variables used in the Probit model, the apriori expectation of positive sign shows a likelihood of credit use and the possibility of the variable having positive influence on the dependent variable whilst a negative sign shows a likelihood of non- credit use and the tendency of the variable having negative influence on the dependent variable.

3.4.3 The determinants of credit use intensity among farmers.

Tobit model was employed to estimate the credit use intensity of farmers in the study area. Tobit regression model establishes the relationship between a non-negative dependent variable Y_i and explanatory variable Xi. The Tobit model supposes that there is a latent (i.e. unobserved) variableY_i. This variable linearly depends on X_i via a parameter vector.

Model specifications

Tobit regression model was employed in the analysis to estimate the credit use intensity because an attempt to use ordinary least square method of estimation to model smallholder maize farmer credit use dependent variable would result in biased estimates (Maddala, 1992). Therefore, the Tobit model estimation was conducted to utilise zero and non-zero values of the dependent variable (credit amount used in maize production by credit users) in order to take into account

the significant number of variations in amount of credit observed. This model has been widely utilised in applied micro econometric studies (Brehanu & Fufa, 2008; Amemiya, 1984) and studies of household behavior (Song *et al.* 2012; Jingchao & Kotani, 2012).

The relationship between the censored variable (y) and the independent variables can be expressed by the Tobit model, where it is assumed that the observed endogenous variables Yi for observations i = 0, 0.5, 1, 1.5, 2, ..… n satisfy the following;

Y_I^* is observed to be a censured dependent variable such that $Y_I^* \geq 0$; that is non-negative.

Where Y_I^* 's is the latent variables generated using linear regression model:

$$Y_i^* = X^i \beta^i + \varepsilon_i \quad (3.5)$$

The variables used in the model are further specified and described where X^i the vector of the regressed variables is. The model error ε_i is assumed to be normally distributed with zero mean and constant variance.

$$Y_i^* = \beta_0 + X^i \beta^i + \varepsilon_{i\,;} \text{ where } \varepsilon_i \sim N(0, \sigma^2) \quad (3.6)$$

Where;

Y^* = credit amount devoted to maize production

β_0 = constant term

β^i = coefficient of explanatory variable X^i , (where i = 1, 2, …8)

ε_i= error term

Table 3.2. The Independent Variables specified as Determinants of Credit Use Intensity

Variables	Description	Measurement	Apriori Expectation
Y^*	Credit Amount Used/Ha	GH₵ /Ha	N/A
X_1	Age	Years	+/-
X_2	Household Size	Number	-
X_3	Land Ownership	Dummy (Self Ownership =1, otherwise= 0)	+
X_4	Savings	Dummy (Save @Bank = 1, Otherwise =0)	+
X_5	Education Level	Years	+
X_6	Total Production Cost/Ha	GH₵ /Ha	+/-
X_7	Interest Rate	GH₵ /Ha	+/-
X_8	Farming Objective	Dummy(Commercial =1, otherwise = 0)	+

Source: Authors Computation, (2017)

3.4.4 Effect of credit on smallholder maize farmers' profitability.

Profitability of Smallholder Maize Farmers

The profitability indicators that were used to estimate the effect of credit use on smallholder farmers profit were; gross margin, net revenue and return on investment. They were calculated on per hectare basis of maize farm cultivated for the 2016 cropping year.

Estimation of Gross Margin

Gross margin analysis is useful for production cycles of less than or equal to a year (Johnson, 1991) as this enables costs and returns to be directly linked to enterprise. It also allows us to

establish profitability of an enterprise (Adegeye & Dittoh, 1985). The research study therefore used a gross margin analysis per ha as an indication of plot level performance, that is how well credit user and non-credit user farmers' did on their land with the resources that were available to them. Gross margin is the difference between the total sales/gross income and the variable costs.

Gross margin = Total Revenue - Variable costs.

Where: Total Revenue = Total Output (Q) x Price (P), and variable costs include the costs such as fertilizer, seed, agro-chemicals, storage, marketing, transport, labour, etc. that would have been incurred in the production process until the produce has reached the market.

Gross margin analysis is an accepted tool commonly used in the evaluation of farming enterprises (Barnard & Nix, 1979) and is also used in the evaluation of the costs and benefits of a farm enterprise (Gittinger, 1984).

Model Specification

GM = TR - TVC (3.7)

Where,

GM-Gross Margin

TR-Total Revenue

TVC – Total variable cost of production

Estimation of Total Revenue

The total revenue component in the analysis includes all revenue generated from a hectare of maize farm cultivated. The calculations took into account the total output of maize obtain from a hectare of maize farm cultivated whether sold for income, consumed by households or given out as gift to others. The total quantity of maize harvested by each farmer was then multiplied by the average price of GH₵120.00 at which they sold the maize per 50 kg to obtain the total revenue.

Estimation of Total Variable Cost

In estimating the total variable cost of production, all the variable cost incurred in cultivating a hectare of maize farm was taken into account. The quantities and prices of fertilizer, improved seeds, agrochemicals, labour and land rentals per Ha, storage cost and interest on operating capital used in the 2016 cropping year were obtained from respondents and subsequently used in estimating the cost of production due to its direct link with output.

Test for significance difference in the input use among farmers

To determine whether there is a significant difference between input variables among credit users and non-credit users, the t-statistics was calculated. The formula for the t-statistics is the Z scores which is specified as follows;

$$Z = \frac{X_1 - X_2}{\int_1^2 / N_1 + \int_2^2 / N_2} \qquad (3.8)$$

Where X_1 and X_2 are sample means of alternative groups, $\int_1$ and $\int_2$ are sample variables for the two groups and N_1 and N_2 are the sample size for the compared groups.

Hypothesis:

H_O: There is no significant difference in the input use between credit users and non-credit users.

H_A: There is significant difference in the input use between credit user and non-credit users.

Where H_O is the null hypothesis and H_A is the alternate hypothesis.

Estimation of Net Revenue

$$NM = GM - D \quad (3.9)$$

Where,

NM -Net Margin

GM - Gross Margin

D- Depreciation of Fixed Assets

Estimation of Fixed cost/Assets

In estimating the fixed cost in maize production machinery and equipment such as cutlass, hoe, knapsack sprayer, silos were taken into consideration and depreciation was calculated on them.

Estimation of Depreciation on Fixed Asset

In calculating the depreciation on fixed assets, the straight line method was used.

$$\text{Depreciation} = \frac{\text{Value of asset}}{\text{Useful Life}} \quad (3.10)$$

The assets that were depreciated includes: Hoes, cutlasses and knapsack sprayers and Silos. There were no salvage values for the assets.

Estimation of Return on Investment

The net margin is the value estimated from equation 3.10. The total production cost for this analysis is the same as the total cost of production estimated for the gross margin analysis.

$$\text{Return on Investment} = \frac{\text{Net Margin}}{\text{Total Cost of Production}} \quad (3.11)$$

Hypothesis:

H_O: There is no significant difference between the profit levels of credit users and non-credit users.

H_A: There is significant difference between the profit levels of credit-users and non-credit users. Where H_O is the null hypothesis and H_A is the alternate hypothesis.

Hypothesis Test:

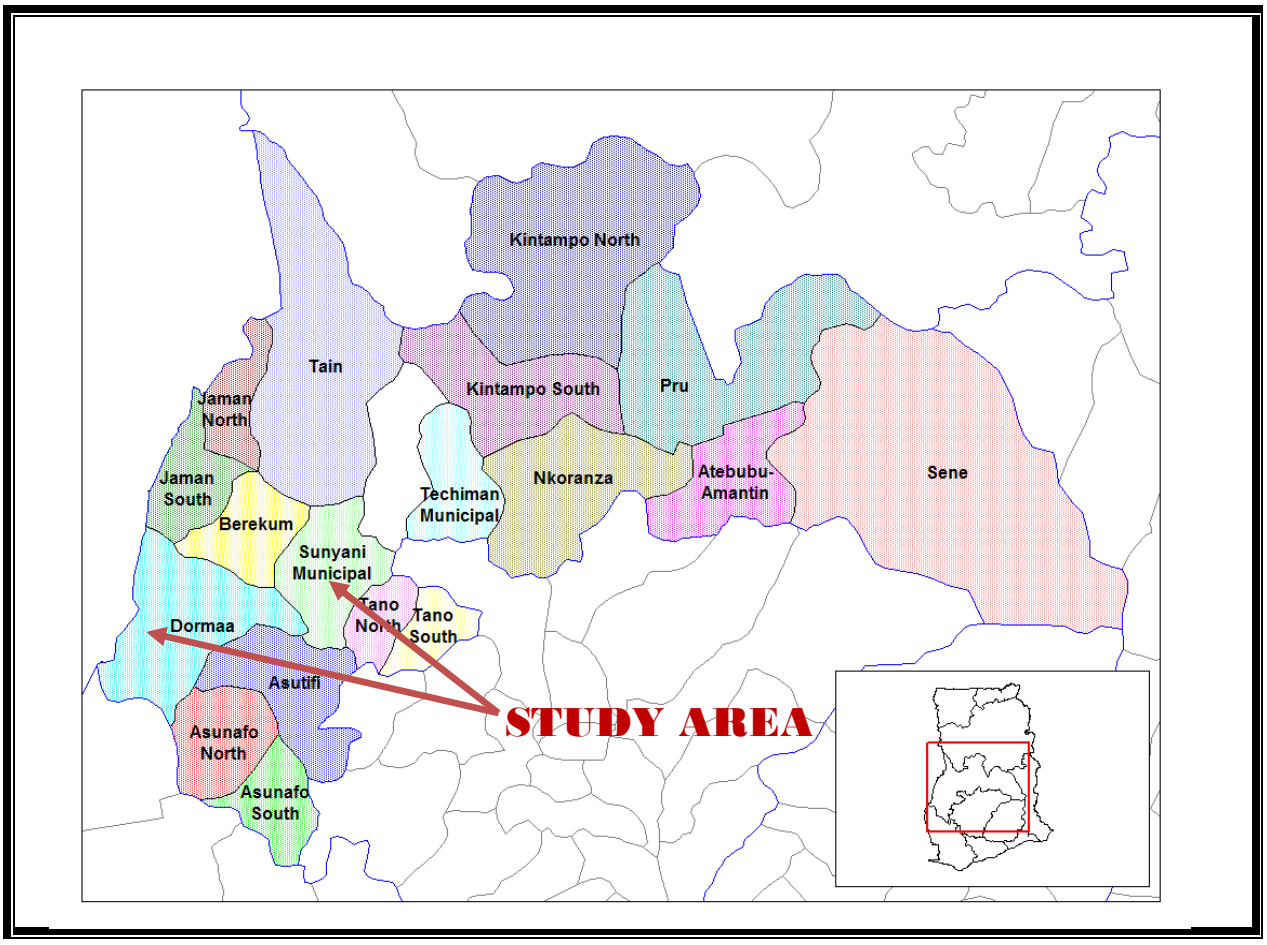
The Difference in mean test was used to determine whether there is significant difference between the gross margin and net revenue of farmers. The results from this estimates was used to determine the significant differences in the profitability indicators among credit users and non-credit users.

3.5 Description of the Study Area

The study was conducted in the Brong Ahafo Region of Ghana. The Region represents the second largest Region in Ghana with a land area of 39,558 $km^{2.}$. The region shares borders with Northern Region on the North, Ashanti and Western on the South, Eastern and Volta on the Southeast and East respectively, and La Cote D'ivoire to the West. The Region is characterized by relatively tropical temperatures however the rainfall patterns ranges from 45°C in the northern

part to 65°C in the south. The vegetation type of the region is in two forms; the semi deciduous forest in the southern and southeastern parts of the region and the guinea savannah woodland found in the Northeastern part of the region

Fig 3.2 Map of Brong Ahafo Region



Source: (Brong Ahafo Region Planning Unit**)**

The Brong Ahafo Region is made up of 27 districts. They are made of 19 administrative districts and 8 municipalities with Sunyani being the regional capital. According to the 2010 census, the population stands at 2,282,128 (GSS, 2010). Agriculture in general is the mainstay of the people in the Region. Most of the active group people are subsistent food crop farmers with large number of the populace living in rural areas. Brong Ahafo is the greatest agricultural region in

Ghana, and is often recognized as the breadbasket of its residents. Major crops grown in the Brong Ahafo Region includes staple crop like maize, cassava, plantain, yam, cocoyam as well as cash crops such as cashew, cocoa, tobacco, coffee, oil palm, mango etc.

Among the districts of the Region, maize is largely produced in the Sunyani Municipal /West, Dormaa Municipal/ East and Nkoransa District.

3.6 Research Design

This research study is an assessment of the effect of credit as an intervention on participants. The participants were smallholder maize farmers in the Brong Ahafo Region participating in maize cultivation. Agriculture in the region is often supported in form of credit by relatives and friends, 'susu', personal savings, traders, government and NGO among others. Analysis is made between credit users and non-credit users to establish significant difference in some selected variables such profit levels as well as establish factors that determine the small scale farmer decision to credit access. The focus of the study is on the 2016 cropping year activities of smallholder maize farmers.

3.7 Sources of Data

The study used primary data. The data was collected from individual smallholder maize farmers. A multistage sampling technique was used to sample the respondents (smallholder maize farmers). Secondary data was also collected in reviewing literature.

Sampling Technique and Sample Size

The Brong Ahafo Region was purposefully selected. The districts selected were Sunyani Municipality and Dormaa Municipality. The districts highest share in maize production in the region led to their selection. The second stage involves selecting communities where maize production is largely done and the stratified sampling approach was used. Four communities were selected under each sampled district. Simple random sample technique was adopted to get the total sample size desired. Twenty-Five (25) farmers were selected as respondents from each community/villages.

Table 3.3 Distribution of Sampling Units by Districts and Communities/Villages

No	Districts	Communities/Villages	Sample Size
1.	**Sunyani Municipal**	Yawhema	25
		Danyame	25
		Wawasua	25
		Nkrankrom	25
	Total		**100**
2.	**Dormaa Municipal**	Koraso	25
		Asuotiano	25
		Mantukwa	25
		Wamanafo	25
	Total		**100**
TOTAL RESPONDENTS			200

Source: Authors Computation, (2017)

The simple random sampling technique ensured that all farmers have an equal probability of being selected, which is not the case when sampling units consist of towns or villages of unequal size (Morris *et al*. 1999). The total sample size was Two hundred (200) respondents selected

from farming communities in 2 districts in the Brong Ahafo Region. The table 3.3 above shows the distribution of sampling units according to the selected districts and communities.

3.8 Data Collection Instrument

Primary data was collected from the smallholder farmers with the use of well-structured questionnaires. The questionnaire was first pre-tested in Sunyani where corrections were made before the final questionnaires were administered. The questionnaires were administered through a face to face interview with farmers either on their farms or places of residence. The questionnaire for the study is attached at Appendix I.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents and discusses the main findings of the study which seeks to assess the effect of credit use on farm profit among smallholder maize famers. The chapter begins with a description of the socio-demographic, socio-economic and production characteristics of the farmers. This is followed by a description of the source of credit available to smallholder maize farmers in the study area, the factors influencing the decision of smallholder farmers to use credit, the determinants of credit use intensity among credit users and the effect of credit use on the profitability of farmers.

4.2 Socio-Demographic and Socio-Economic Characteristics of Respondents

The results on socio- demographic characteristics and socio-economic characteristics of respondents are presented on Tables 4.1 and 4.2 respectively.

Gender of farmers: From Table 4.1, 54.5% of the sampled respondents were made up of males whilst 45.5% were females. On the results of gender distribution, it is indicated that smallholder maize farmers in the Brong Ahafo Region are dominated by males. This could be explained on the premise that female farmers perform other domestic and economic roles like housekeeping and marketing of agricultural produce and may not have equal time for farming like their male counterparts. Also, some women often help in their husbands' farms rather than having their own farm probably due to lack of productive resource such as land and other inputs. This finding confirms those of current findings such as Awonyo-Vitor *et al.* (2016) and earlier studies such as Amankwah (1996) suggest that farming in Ghana is dominated by males.

Table 4.1 Socio-Demographic Characteristics of Respondents

Variable	Frequency	Percentage
Gender		
Male	109	54.5
Female	91	45.5
Educational level		
No Education	84	42
Basic	82	41
Secondary	23	11.5
Tertiary	11	5.5
Marital Status		
Single	25	12.5
Married	155	77.5
Divorced	9	4.5
Widowed	11	5.5
Land Ownership		
Self-Ownership	25	12.5
Rent	36	18
Joint Ownership	63	31.5
Family Land	65	32.5
Government Land	2	1
Squatter	9	4.5
Farmer Association		
Yes	128	64
No	72	36
Ethnicity		
Ashanti	13	6.5
Bono	147	73.5
Ahafo's	20	10
Nkoran	15	7.5
Others	5	2.5
Religious Background		
Christianity	165	82.5
Islam	30	15
Traditional	5	2.5
Extension Contact		
Yes	145	72.5
No	55	27.5
Main Occupation		
Farming	195	97.5
Others	5	2.5

Source: Author's Computation, Field Survey, (2017)

Educational Levels of Farmers: Smallholder farmers in Ghana generally have low level of formal education. From Table 4.1, it is shown that majority of the farmers in the Brong Ahafo Region had no formal education representing 42% of the respondents. For those who had formal education, majority had only basic education representing 41%. For Senior High School (SHS) and Tertiary Levels, only few farmers attained those levels representing 11.5% and 5.5% respectively. This finding confirms to Zongoma *et al.* (2015) which indicates that majority of smallholder maize farmers do not have formal education. This result confirms the reports from the 2010 population and housing census (PHC) that majority of the residents in the Brong Ahafo Region had Basic education though a little over two-fifth of the population (42%) aged six and older had never been to school (GSS, 2010). This gives the assertion that maize farmers located in the region have some level of education which could enhance their adoption of new technologies in their farming.

Land ownership: Land ownership is identified as one of the factors influencing farmer's decision to use credit. If a farmer owns a land he/she is motivated to invest production resource. Table 4.1 indicates that majority of maize farmers representing 32.5% uses family land for maize cultivation, 31.5% uses joint ownership, 18% rents the land for farming, 12.5% owns the land, and about 4.5% of them were squatters, 1% uses Government land.

Marital Status: From Table 4.1, it is clear that most of the smallholder farmers in the study area were married. About 77.5% of the farmers were married with only few being divorced. It was observed that almost all those who were single were still in school representing 12.5%. Almost all the married farmers had children who are expected to help in their farming activities as family labour and 5.5% of the respondents been widowed.

Farmer Association: Table 4.1 indicates that about 64% of the respondents belong to farmer association whilst 36% of the respondents did not. Farmers' membership in these social networks generates social capital that members can rely on as 'social collateral' for accessing credit and other productive resources (Udry & Conley, 2006). This implies that respondents were more interested in joining groups and associations that promote their wellbeing. Most of the FBOs farmers belonged to were into welfare issues and mobilizing themselves for support that may come from Government or NGOs. This group is also seen as a common form of insurance for poor farmers because friends, relatives and group members can help each other in emergencies.

Ethnicity and Religion: Table 4.1 indicates that, 73.5% of the respondents were Brongs, 10% were Ahafos', 7.5% were Nkoran, and 6.5% were Ashantes and 2.5% were a mixture of other ethnicity. This result confirms the report of 2010 Population and Housing Census of Ghana which reveals that the predominant ethnic group in the Region is Akan.

Religious Background: About 82.5% of the total respondents were Christians, 15% were Muslims and 2.5% were Traditional Believers. This outcome is similar to the reported on religious statistics by the Ghana Statistical Service in 2010. Christianity dominates (70.8%) as the largest followed by Islam.

Main Occupation: From Table 4.1, it is observed that the main occupation for the respondents was farming, representing 97.5% as against 2.5% who prioritize other occupation ahead of farming. This implies that the farmers rely on their farming activities for income generation and will endeavor to explore all avenues to improve upon their farming businesses. The other occupations farmers engaged in were mostly trading in animals and other food commodities.

Table 4.2 Other Socio-Demographic Characteristics of Farmers

Variables	Credit users				Non-Credit user					
	Min	Max	Mean	S D	Min.	Max	Mean	S.D	MD	Sig.
Age of Respondent	28	72	45.6	9.832	22	67	44	12.359	1.6	0.3
Household Size	1	12	6	2.293	1	9	4.97	1.963	1.03	0.1
Farm Experience	5	45	19.1	7.98	5	50	20.14	11.361	-1.04	1.2
Farm Size (Ha)	0.2	2.4	1.268	0.5151	0.2	1.6	0.758	0.3649	0.51	0.0

Source: Author's Computation, Field Survey, (2017)

The results from Table 4.2., indicates that the average household size for credit users and non-credit users were 6 and 4.97 respectively. The minimum age of credit users was 28 years and maximum age was 72 years, with average ages of 45.6 and 44 years respectively for credit users and non-credit users whiles the mean age difference of credit users and non-credit users' stands at 1 year, 6 months. For respondents who were credit constrained, the minimum age was 22 years and the maximum of 67 years. Smallholder farmers in the study area have relatively much experience in maize farming. Credit users had an average experience of 19.1 years whilst their counterparts' non-credit users had an average experience in farming maize of 20.14 years with a mean difference of 1.04. This implies that the farmers were familiar with maize cultivating which is expected to impact positively on their productivity. This finding conforms to that of Zongoma *et al*. (2015) which revealed that about 85.9% of the sampled maize farmers had at least 11 years of experience. The average household size was 6 for household who used credit for farming and 4.67 for farmers who did not use credit for farming.

From Table 4.2, it is observed that both credit users and non-credit users had different landholding. The average agricultural landholding for credit users was 1.268 Ha with 0.2 (Ha)

and 2.4 (Ha) been the minimum and maximum respectively whiles that of the non-credit users were 0.758 Ha. Credit users tend to have more landholding than non-credit users. A minimum of 0.2 ha and a maximum farm size of 1.6 ha was attributed to farmers who did not use credit with a mean farm size of 0.758 ha. This result is in congruence with the findings of Hofny-Collins (2006) which revealed that mean farm size in Brong Ahafo region is less than 2 ha.

4.2.1 Production Characteristics of Farmers

From Table 4.3, it was observed that both credit users and non-credit users had different farm sizes. The average landholding for credit users was 3.9 Ha whiles that of the non-credit users 4.3 Ha. From the estimation, non-credit user tends to have more landholding for agricultural production than credit users. However, the area cultivated by credit users was higher (3.4 Ha) than that of non-credit users (2.72 Ha).

Table 4.3 Production Characteristics of Farmers

Variable	Credit users				Non-credit users					
	Min	Max.	Mean	S.D	Min	Max.	Mean	S.D	t-stat	Sig
Total land size (Ha)	1.6	6.2	3.9	1.53	1.6	7.5	4.3	1.45	1.94	0.06
Total Cultivated Land Size (Ha)	1.6	3.4	1.8	0.664	1.6	2.72	1.2	0.441	1.75	0.08
Maize Farm Size (Ha)	0.2	2.4	1.268	0.515	0.2	1.6	0.758	0.364	2.13	0.04
Output per Ha (kg)	850	2887.5	1749.1	352.7	500	2025	1205	203.3	-9.5	1.04
Seed used per Ha (kg)	9.4	31.3	14.4	3.46	6.4	18.6	8.5	2.34	5.93	0.0
Fertilizer used per Ha (kg)	0	435.5	213.2	94.34	0	350.4	165.5	92.5	8.92	0.0
Agro-chemicals used per Ha (litters)	2	6	2.6	0.94	2	4	1.8	1.05	1.94	0.06
Total Man-days	7	15	8.6	3.91	5	8	3.7	2.01	3.86	0.01

Source: Author's Computation, Field Survey, 2017

The credit users were able to cultivate higher area partly due to the availability of more funds to adopt modern technologies and available farm inputs in farming for which non-credit users had limited or less access.

From Table 4.3, it is observed that most of the production characteristics of credit users such as output of farm produce, improved seed, fertilizer, agro-chemicals and labour were significantly different from that of the non-credit users. The output of credit users was 1749.1 kg/Ha which was higher than non-credit users output of 1205kg/Ha. This may be attributed to the amount of inputs invested in the maize farm particularly fertilizer application and some good agricultural practices. Whiles credit users used an average of 14.4 kg /Ha of maize for sowing, non-credit users used 8.5 kg/Ha. According Adu *et al*. (2014) and MOFA (2010) the recommended quantity of seed planted per Ha should not exceed 25kg depending on the maize variety.

The use of fertilizer among the farmers from Table 4.3 gives a significant difference in the quantity used in the maize cultivation. Credit users used more fertilizer than non-credit users. Whilst credit users used an average of 213.2kg per hectare, non-credit users used 165.5 kg per hectare. The recommended fertilizer use for maize as reported by Adu *et al*. (2014) and MOFA (2010) is 210 kg/ha made up of 90kg of N, 60 kg of P and 60 kg of K. The increased usage of fertilizer among credit users may be due to the fact that some extra funds were available to them or credit users were able to purchase fertilizer for usage from the amount of credit sourced from financial institutions. The non-credit users on the other hand do not have such credit opportunity and will only rely on their personal savings. From Table 4.3, agrochemical use precisely weedicide was significantly different between the two groups. Credit users used an average of 2.6 liters per hectare whiles non-credit users used 1.8 liters per hectare. The recommended agrochemical use for maize crop is 2.5 litters of weedicides as reported by Adu *et al*. (2014) and

MOFA, (2010). For labour usage, credit users used more labour per hectare (8.6 man days) than non-credit users (3.7 man days).

4.3. Description of Sources of Credit to Smallholder Maize Farmers in the Study Area

To describe the availability and accessibility of credit, respondents who had access to credit reported that they had it from the various sources shown in Table 4.4.The assertion by Owusu-Antwi & Antwi (2010) that informal credit providers in Ghana serve as major sources of credit to farmers appears to be the case for maize farmers in the Brong Ahafo region of Ghana. About 43% respondents received and used credit from relatives and friends, 14% sourced their credit from "Susu", and 7% representing 8 respondents had their credit from Money lenders. Rural banks exist in the region and about 8% of respondents who used credit were from the rural banks. Other farmers sourced their credit from NGOs and Farmer Groups representing 6% and 11% respectively. Limited availability and accessibility of formal credit as well as the cumbersome procedures in accessing credit from the formal sources and collateral provision might be some of the reasons for the dominance of the informal credit sources as providers of credit.

Table 4.4 Description of Sources of Credit to Smallholder Maize Farmers

Credit Source	Frequency	Percentage
Relatives / Friends	47	43
"Susu"	15	14
Farmer Groups	12	11
Traders	12	11
Rural Banks	9	8
Money Lenders	8	7
NGO	6	6
Total	109	100

Source: Author's Computation, Field Survey, (2017)

Despite the recognition of many informal credit providers in Ghana, friends and relatives and Susu are the main providers of informal credit to maize farmers as revealed in the survey. The survey confirms the assertion by Aryeetey & Udry, (1995) that majority of the lending activities in the informal sector are from relatives and friends.

Table 4.5 Credit Amount Devoted to Maize Farming from the Identified Sources

Source of Credit	``N	Min.	Max.	Mean	`Std. Dev.
Rural Banks	9	300	800	500	``180.278
NGO	6	400	850	575	`154.11
Relatives / Friends	47	200	1500	731.91	`272.952
Money Lenders	8	250	1000	687.5	`278.082
Susu	15	500	800	673.33	`127.988
Farmer Groups	12	500	1000	725	`198.206
Traders	12	500	1500	841.67	`362.963
TOTAL	109	2650	7450	4734.41	`1574.579

Source: Authors computation from field survey (2017)

As shown in Table 4.5, respondents who had credit and devoted it to maize cultivation in the 2016 cropping season, indicated that, credit received from traders had a minimum amount of GH¢ 500.00 and a maximum amount of GH¢ 1,500.00 with a mean amount of GH¢841.67 devoted to maize farming. About 43% farmers who sourced their credit from Relatives/Friends had a minimum amount of GH¢ 200.00 and a maximum amount of GH¢ 1500.00 with a mean amount of GH¢ 731.91.

A minimum amount of GH¢ 400.00 and a maximum amount GH¢ 850.00 were sourced from NGOs by farmers for maize farming and averagely an amount of GH¢ 575.00 was given to farmers to invest in their production. The minimum amount received and devoted to maize

farming from Rural Bank were GH¢ 300.00 and a maximum amount of GH¢ 800.00 with an average amount of GH¢ 500.00.

4.4. Factors Influencing Farmers Use of Credit

Objective two was set out to identify the factors influencing the decision of smallholder farmers to use credit. As shown on Table 4.6, Pseudo R-squared of 0.8133 indicates the proportion of the total strength of the independent variable explaining the dependent variable. This implies that independent variables used in the model are able to explain the dependent variable for about 81.33%.

Table 4.6 Factors Influencing Farmers' Decision to Use Credit

Variables	Coeff.	Marginal Effect	P-Value
Age	-0.123	-0.048**	0.008
Gender	1.769	0.602**	0.006
Household Size	0.113	0.045	0.368
Education Level	-0.186	-0.074	0.358
Experience in Farming	0.083	0.328*	0.084
Farm OBJ	-1.307	-0.517**	0.006
Collateral	2.133	0.669**	0.001
Farm Size	1.157	0.457*	0.032
Household Income	-0.001	-0.001*	0.030
Farmer Association	2.609	1.032***	0.000
Savings	4.035	0.931	0.993
Distance	-1.602	0.577	0.997
Constant	0.197		

No. of Obs = 200; LR chi2= 222.89; Prob>chi2=0.0000; Pseudo R2=0.8133Log likelihood = -25.58349

* ,**and *** denotes significant levels of 10%, 5% and 1% respectively

Source: Regression Estimation from Author's Field Survey (2017)

Age of respondent as shown on Table 4.6 indicates that it is statistically significance at 5% and a coefficient of -0.048. This estimation implies that a 1% increase in the age of a farmer will result to a 0.048% decrease in a farmer access to credit, all things held constant. An increase in farmers' age by one year will lead to a 0.048% decrease in the farmers' decision to access credit.

Gender is statistically significant at 5% and a marginal effect of 0.602.This result agrees with the study's expectation, which hypothesized a positive influence between gender and credit uses.

Farming experience is statistically significant at 10% with a marginal effect of 0.328. The results indicate that farmers' use of credit is influenced by the number of years a farmer engaged in maize cultivation. Farming objective of smallholder maize farmers is statistically significant at 5% with a coefficient of 0.517. This result indicates that the probability of a commercial intended farmer securing credit for farming is higher than a subsistence farmer securing credit. This result agrees with the study's expectation, which hypothesized a positive influence between farming objective and access to credit.

Collateral of farmers is statistically significant at 5% with a marginal value of 0.669. This result is inconsistence with what the study hypothesized which predicts a negative influence between collateral requirement and use of credit. It is consistent with Chauke *et al.* (2013) which report a negative relationship between access to credit and collateral. Farm size is also statistically significant at 10% with a marginal effect of 0.457. This result is consistent with the study expectation which hypothesized a positive influence on farm size and access to credit. This indicates that a smallholder maize farmer who possesses large farm size has the probability of securing credit than their counterpart with smaller land sizes. This result is consistent with Obisesan (2013) which reports a positive influence on access to credit and land area cultivated.

Household income is statistically significant at 10% with a marginal effect of -0.001. This estimation is inconsistent with the study expectations which hypothesized a positive relationship between household income and access to credit.

Membership of farmer based organization (FBO) is significant at 1% and a marginal effect of 1.032 and it is consistent with the study's expectation. This implies that the probability of a farmer who belong to FBO accessing credit is higher than non-members. This result can be explained on the premise that most financial institution prefers to disburse credit to farmers belonging to an organization. This helps to reduce the moral hazards associated with credit access. This result is also consistent with Obisesan (2013) which reports a positive relationship between memberships of organization and access to credit.

Savings was also not statistically significant but it was consistent with the apriori expectation. This implies probability of accessing credit by a smallholder maize farmer who saves in a financial institution is higher compared to his /her counterparts who do not save.

4.5 Determinants of Credit Use Intensity by Smallholder Farmers

Objective three was set out to identify the factors that determine the credit use intensity of credit users. The results from the Tobit regression on Table 4.7 reveal some socio-economics factors that are statistically significant in determining the amount of credit amount used for maize cultivation.

From the results shown on Table 4.7, landownership was statistically significant at 10% with a coefficient of 247.521. This implies that the landownership status of smallholder maize farmer determines the amount of investment the farmer will devoted to farming. This result was in

agreement with the apriori expectation which hypothesized a positive correlation between credit amount devoted to maize production and landownership.

Table 4.7 Tobit Regression Model on Determinants of Credit Use Intensity among Credit Users

Variables	Coef.	Std. Err	P>{t}
Age	-0.928	4.502	0.837
Household Size	20.374	19.892	0.308
Landownership	247.521*	102.547	0.018
Saving	-48.951	144.158	0.735
Education	95.282*	42.858	0.028
Total Production Cost/Ha	0.504***	0.139	0.000
Interest Rate	2.198***	0.441	0.000
Farming Objectives	-55.372	62.142	0.375
Constant	-717.602	364.427	0.052

*P<0.10, ***P< 0.01, Pseudo R-squared = 0.624, Obs = 109, Log likelihood = -812.72286, LR Chi (2) = 72.06, Prob >Chi (2) = 0.0000

Source: Regression Estimation from Author's Field Survey (2017)

Also from the analysis, education of farmers was statistically significant at 1% significant level, with a coefficient of 95.282. This indicates that, if the years of a farmer in education goes up by 1 unit, the investment decisions of smallholder maize farmer goes up by 95.282 units. This is consistent with this study expectation which hypothesized a positive correlation between education of respondent and credit amount used in maize production. This result can be explained on the premise that farmers who spent more years in school turn to understand the

financial nature of the credit system with respect to interest rate or the high cost of credit and are able to make decision regarding its usage.

Total production cost per hector is statistically significant at 1% and with a coefficient of 0.504. This is consistent with the s expectation of the study which hypothesized a positive relationship between the cost of production and the credit amount devoted into maize farming per hector basis. This result can be explain on the premise that farmers turn to invest more or use more credit if the production cost of their farms are high.

Interest rate was significant at 1% and with a coefficient of 2.198. The result is inconsistent with the expectation of the study which hypothesized a negative relation between interest rate and the amount of credit used in maize production. The results indicate that age, household size, and farming objective were not statistically significant in determining the amount of credit used in maize production.

4.6 Profitability of smallholder maize farmers.

The fourth objective of the study was set out to estimate the effect of credit use on the profitability of smallholder maize farmers.

The results of the Gross Margin estimation revealed in Table 4.8 indicates that, total cost of production among credit users ranged from GH¢ 598.00 to GH¢ 2930.00 per hectare with mean and standard deviation of GH¢ 1247.66 and GH¢ 640.425 per hectare respectively as compared to non-credit users whose minimum production cost was GH¢ 415.00 and maximum production as GH¢ 1695.00 per hectare with mean and deviation of GH¢ 782.89 and GH¢ 287.798 respectively in Table 4.9. This result implies that smallholder farmers who used credit for farming incurred an average cost difference of GH¢ 464.77 than non-credit user farmers. This

can be explained on the premise that credit users are able to adopt modern technology in farming and hence capable of acquiring improved technologies which comes with a cost. The result from the Gross Margin analysis shown on Table 4.8 shows a total revenue from maize farm for credit users being GH¢ 720.00 on the minimum and GH¢ 4200.00 per hector on the maximum with average and standard deviation of GH¢ 1644.95 and GH¢ 558.689 respectively which was higher than their counterparts total revenue of GH¢ 460.00 and GH¢ 2170.00 being minimum and maximum respectively and a mean gross revenue and standard deviation of GH¢ 975.31 and GH¢ 364.998 respectively

Table 4.8 Gross Margin Analysis for Credit Users (2016 farming season)

Variable	Minimum (GH¢/Ha)	Maximum (GH¢/Ha)	Mean (GH¢/Ha)	Std. Deviation
Total Revenue	720	4200	1644.95	558.689
Variable Cost of Production				
Total cost of seed	25	150	70.87	26.465
Total cost of fertilizer	0	200	75.23	40.325
Total cost of Agro-chemicals	15	90	45	15.943
Cost of labour				
i. Total Land clearing cost	100	350	157.25	123.257
ii. Total wedding cost	100	200	100.55	84.698
iii. Total cost of sowing	16	150	101.72	49.391
iv. Total fertilizer application cost	30	100	58.02	20.619
v. Total transportation cost	20	200	72.65	24.421
vi. Total cost of Harvesting and packaging	50	480	174.43	93.079
Interest on Operating Capital	80	210	110.02	29.37
Land (Rental Value) per Ha	120	200	100.44	15.47
Storage Cost	0	200	55.94	55.49
Cost of Credit(Interest Rate)	42	400	125.54	61.897
Total Variable Cost	598	2930	1247.66	440.425
Gross margin	122	1270	397.29	118.264

Source: Authors Computation based on survey, (2017)

The Gross Margin of credit users for the 2016 season ranged between GH¢ 122 and GH¢ 1270 and an average gross margin of GH¢ 397.29 per Ha as shown on Table 4.8 whiles non-credit users made a Gross Margin ranging between GH¢ 45 and GH¢ 495 and a mean Gross margin of GH¢ 192.421 as shown in Table 4.9 The results indicates that credit users had a higher average Gross Margin of GH¢ 204.87 than noncredit users. These results confirms the findings of Schuphach, (2014); Wainaina *et al.* (2012); Lapar *et al.* (2011); Bolwig *et al.* (2009), which indicated that credit enhances increase in gross margin of smallholder farmer.

Table 4.9 Gross Margin Analysis for Non-Credit Users (2016 faming season)

Variables	Minimum (GH¢/Ha)	Maximum (GH¢/Ha)	Mean (GH¢/Ha)	Std. Deviation (GH¢/Ha)
Total Revenue	460	2170	975.31	364.998
Variable Cost				
Total cost of seed	25	125	57.14	25.079
Total cost of fertilizer	0	150	55.31	34.7
Total cost of Agro-chemicals	15	160	40.9	10.403
Cost of labour				
i Total Land clearing cost	80	200	122.4	50.161
ii. Total weeding cost	50	120	67.25	25.348
iii. Total cost of sowing	20	90	55.02	26.244
iv. Total fertilizer application cost	20	130	52.04	14.370
v. Total transportation cost	20	120	68.91	20.055
vi. Total cost of Harvesting and packaging	45	210	115.34	30.029
Interest on Operating Capital	50	120		15.125
Land (Rental Value)per Ha	90	150	98.57	15.89
Storage Cost	0	100	50.01	20.49
Total Variable Cost	415	1675	782.89	287.798
Gross Margin	45	495	192.42	77.2

Source: Authors Computation based on survey, 2017

The Gross Margin Analysis among maize farmers' credit users and non-credit users' suggests that the credit users able to afford enough farm inputs during the farming season. This result confirms the report by Bashir *et al.* (2010) that farmer's ability to use farm inputs extensively and appropriately is determined by access to credit. Similar reports by Girabi & Mwakaje (2013) and Ashaolu *et al.* (2011) revealed that credit user farmers are more productive than those without credit due to their ability to use input resources efficiently and the returns of revenue they generate. All other things being equal, the availability and use of credit by smallholder maize farmers will enhance the gross margin of their farms.

The positive effect credit had on smallholder maize farmers may be attributed to the fact that those who used credit had more access to inputs, in terms of labour, fertilizer, improved seeds timely and efficiently. Cultivating maize in the Brong Ahafo Region requires the application of fertilizer for which non-application leads to poor yields which negatively affect profitability. Though some farmers who used credit did not purchased fertilizer, the fertilizer, improved seed used rate is higher than that of their counterparts who did not use credit which may account for the finding arrived at. Similar input rate variation is found in labour cost of both farmers.

It is again observed from Table 4.10, that most of the production characteristics of credit users such as, improved seed used, fertilizer used, and labour used, rental value of land and storage cost were significantly different from that of the non-credit users. This may be attributed to the amount of inputs invested in the maize farm particularly improved seed used, fertilizer application and some good agronomic practices as well as good storage system to await good price.

Table 4.10 Tests for Mean Differences in Input Use among Farmers. (GH¢/Ha)

Variable	Credit Users Mean	Non-Credit Users Mean	Mean Diff.	t-stats	Sig.
Improved seed	70.87	57.14	13.73	3.741	0.000
Fertilizer	75.23	55.31	19.92	1.473	0.042
Agro-Chemicals	45	40.9	4.1	3.121	0.002
Cost of Labour			0		
Land clearing cost	157.25	122.4	34.85	3.567	0.001
Weeding cost	100.55	67.25	33.3	2.452	0.014
Cost of sowing	101.72	55.02	46.7	5.731	0.000
Fertilizer Application cost	58.02	52.04	5.98	2.33	0.021
Land (Rental Value)	100.44	98.57	1.87	2.461	0.126
Storage Cost	55.94	50.01	5.93	1.564	0.163
Transportation cost	72.65	68.91	3.74	4.356	0.001
Harvesting cost	174.43	115.34	59.09	2.567	0.012

Source: Author's Computation, Field Survey, (2017)

From Table 4.10, it is observed that credit users had significantly access to all the input variables than the non-credit users. Farmers who used the credit in their maize cultivation were able to purchase requisite farm inputs for production base on the premise that their operating capital was higher than that of their counterpart non-credit users.

For improved seed as shown on Table 4.10, the mean difference of GH¢ 13.73 emerged as the excess seeds amount used by credit users than their counterpart non-credit users. In the case of fertilizer, credit users used an averaged of GH¢ 75.87 whilst their counterparts' non-credit users had a mean fertilizer used amount of GH¢ 55.31 with a mean difference of GH¢19.92. The increased usage of fertilizer among credit users may be due to the fact that some excess funds were available to purchase fertilizer. This implies that credit users were able to apply fertilizer

from their savings and own capital as well as through extra funds from other sources. The non-credit users on the other hand do not have such extra funds credit and will often spend their personal savings alone.

Agro-chemicals application by credit users was significant at 1% and with t-stats of 3.121 indicating a significant change in the amount of agro-chemicals used by smallholder farmers. The cost of labour among farmers varied with respect to the type of labour employed. The mean difference between credit users and non-credit users signifies a potential ability of credit user engaging hired labour to accomplish their farm work. This result also confirms results of Bashir *et al.* (2010), that farmer's ability to use inputs extensively and appropriately is determined by access to credit.

Table 4.11 Net Margin Analysis among Smallholder Maize Farmers (GH¢/Ha)

	Credit Users				Non- Credit User			
Variable	**Min**	**Max**	**Mean**	**Std. Dtn.**	**Min**	**Max**	**Mean**	**Std. Dtn**
Gross Margin	122	1270	397.29	118.264	45	495	192.42	77.2
Less Fixed Cost								
Depreciation	75	135	85.06	15.246	60	105	69.31	35.795
Net Margin	47	865	312.23	57.678	-15	375	123.11	41.405

Source: Authors Computation based on household survey, (2017)

The results of the Net Margin analysis shown on Table 4.11 between credit users and non-credit users revealed differences in the net profit of both farmers. The net margin of credit user maize farmers from the analysis ranged between GH¢ 47.00 and GH¢ 865.00 and a mean net margin of GH¢ 312.23 whiles their non-credit users ranged between GH¢ -15.00 and GH¢ 495.00 and an average profit of GH¢192.42Though credit users and non-credit user maize farmers have

positive range of profit, credit user have an average net margin of GH¢ 312.23 as compare to non-credit users net margin of GH¢ 192.42

This can be explained on the premise that, credit users have extra funds to invest in modern technology which at the long run yields higher revenue all things been equal. The positive effect of credit on smallholder maize farmers profit may be attributed to the fact that those who used credit had more access to inputs, received inputs timely and as well used inputs more efficiently as found earlier in the other objectives of the study. This assertion can be seen in the average net margin of smallholder farmers where credit users attained an average net margin of GH¢ 415.62 as against their counterparts average net margin of GH¢ 57.67.

Table 4.12 Return on Investment Estimation among Smallholder Maize Farmers. (GH¢**)**

	Credit Users				Non- Credit Users			
Variable	**Min**	**Max**	**Mean**	**Std. Dtn**	**Min**	**Max**	**Mean**	**Std.Dtn**
Net Margin	47	865	312.23	57.678	-15	375	123.11	41.405
Total Production Cost	598	2930	1247.66	440.425	415	1675	785.89	287.798
Return on Investment	0.0786	0.2952	0.2503	0.1309	-0.0361	0.2239	0.1567	0.1439

Source: Authors Computation based on household survey, (2017)

The analysis on Table 4.12 depicts the return on investment of credit users and non-credit users. From the results, it is observed that, an average of GH¢0.2503 suggests an effect on return on investment for farmers who used credit. This implies that a smallholder farmer who used credit is likely to increase their return on investment by GH¢0.2503 per hectare. Table 4.12 revealed an average return on investment of GH¢0.1567 for non-credit users.

This can be explained on the premise that for every cedi invested, a non –credit user will get an average amount GH¢ 0.1567 as a return. The estimates on Table 4.12 suggest that, non-credit users are worst off. Credit users are able to purchase and adopt modern farm technologies which enhance productivity and increases farm profit.

Table 4.13 Test for Mean Difference in the Profitability indicators among Farmers (GH¢)

Variable	Credit Users N=109 Mean	Non-Credit users N=91 Mean	MD	t-stat	sig.
Gross Margin	397.29	192.42	204.87	2.812	0.001
Net Margin	312.23	123.11	189.12	1.893	0.002
Return on Investment	0.2503	0.1567	0.0936	0.031	0.006

Source: Author's Computation, Field Survey, (2017)

The results on the test for mean difference in the profitability among credit users and non-credit users indicated that, the p-value calculated for Gross margin is statistically significant at 0.001 which is less than the significant level of 0.05 set as the standard. This result implies that there is a significant difference in the Gross margin among credit users and non-credit users. A difference of GH¢204.87 with a t-statistics of 2.812 indicating a positive significant difference.

The results on the net analysis indicate a significant level of 0.002 and a t-statistics of 1.893. The result on the return on investment is statistically significant at 0.006 which is less than the significant level of 0.05 set as the standard. The mean difference of 0.0936 between credit users and non-credit users with respect to return on investment implies that credit users are better off since their returns on capital invested is statistically higher than non-credit users.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

The final chapter of the study presents the summary of major findings, conclusions from findings and the policy recommendations. The recommendations were derived from the major findings based on the data analysis.

5.1 Summary of findings

The main objective of the study was to assess the use of credit and its effect on farm profit among smallholder maize farmers in the Brong Ahafo Region therefore describing the various sources of credit in the study area, factors influencing the decision of a farmer to use credit and the credit use intensity among smallholder maize farmers.

Frequencies and percentages were employed to describe the sources of credit available to farmers in the study area. The study employed a binary probit model to estimate the factors influencing the decision of a farmer to use credit whiles using the Tobit regression model to estimate the credit amount used intensity of smallholder maize farmers. Indicators of profitability such as Gross margin, Net revenue and Return on investment analyses and a test of significance differences were employed to estimate the profitability among smallholder maize farmers. Two hundred (200) smallholder maize farmers were selected for the study.

The study found that majority of the smallholder maize farmers in the study area were males, Christians, married, had no formal education and belonged to Farmer Based Organisation mostly initiated by NGOs. Their major occupation was farming. The average ages of farmers were 45.6 years for credit users and 44.0 years for non-credit users whiles the average maize farming

experience were 19.1 years for credit users and 20.14 years for non-credit users. The average household sizes for both groups were 6 people and 5 people for credit users and non-credit users respectively. On the average size of maize farm cultivated, a distribution of 1.268 Ha and 0.758 Ha were for credit users and non-credit users.

Descriptive statistics used in achieving objective one revealed the existence of some sources of credit in the study area as Rural Banks, NGOs, Relatives/Friends, Money Lenders, " Susu", Farmer Groups and Traders. These sources of credit were identified as some of the financial institutions which extend credit to farmers in the study. The most common source of credit based on the results of the study is relatives / friends with 43% of the respondent receiving credit from this source. The next is "Susu" credit representing 14%, followed by Farmer Group credit, Trade Credit representing 11% each of the respondent, Rural Banks (8%), Money Lenders (7%) and NGOs (6%).

The probit regression model and the mean dependable variable were used to calculate the marginal effects of factors influencing farmers' access to credit. The null hypothesis that no explanatory variable significantly influence farmers' decision to take credit was rejected. It was observed that age, gender, maize farming experience, farm objectives, collateral, farm size, household income and membership of an FBO were the significant factors influencing smallholder farmers' decision to access to credit. All the significant factors had positive influence on access to credit except for age, farm objective and household income which had negative influence on access to credit.

The Tobit regression model was run to determine the relationship between investment decision and credit amount devoted to maize cultivation. It was observed that land ownership, educational

level of farmers, total production cost and interest rate were the significant determining the credit use intensity of farmers. All the significant factors had positive influence on the determinants of credit use intensity.

The Gross margin of farmers who used credit in the 2016 maize farming season in the study area were ranged between GH¢ 122.00 and GH¢ 1270.00 and an average gross margin of GH¢ 397.29 per Ha whiles non-credit users made a gross margin ranging between GH¢ 45.00 and GH¢495.00 and a mean of GH¢ 192.42. The mean net margin among credit users and non-credit users were GH¢312.23 and GH¢192.42. The p-value calculated for Gross margin is statistically significant at 0.001 which is less than the significant level of 0.05 set as the standard. This result implies that there is a significant difference in the Gross margin among credit users and non-credit users. A difference of GH¢ 40.6 with a t-statistics of 3.812 indicating a positive significant difference.

5.2 Conclusions

The following conclusions are drawn based on the findings and the discussion made on the specific objectives of the study.

Smallholder farmers in the Brong Ahafo Region are male dominated with low levels of formal education. The farmers are predominantly Christians. Most of them are married adults with high levels of maize farming experience. Most of them belong to farmer associations.

Also, sources of credit in the study area includes formal, semi-formal and informal credit source but the fact that many credit users received credit from the informal source that is friends and relatives implies that agricultural credit in the Region is largely from the informal source. Semi-formal source of credit in the study area is limited since few credit users received credit from

such source. Some farmers did not receive and used credit in the 2016 maize farming season which implies that some smallholder maize farmers still face the challenge in accessing credit.

On the factors influencing farmers' decision to take credit, farmers' demographic characteristics, production capacity and farm management practices adopted were associated with age of respondent, gender of respondent, experience in farming, farming objective, collateral, farm size, household income, membership of a farmer organization were the specific variables having significant influence on the decision of a farmer to use credit.

On the determinants of credit use intensity, it was revealed that landownership, educational level, production cost per hector and interest rates on credit were significant and having positive relationship on farmers credit use intensity and investment decision.

Finally, on the effect of credit use on smallholder farmers' profitability, it is concluded that the positive difference in gross margin, net margin and the mean difference in the farm input used is as a result of some farmers' ability to access and use credit for cultivating maize. Farmers who used credit were found to attain a positive range of gross margin and net margin. Non-credit users had a negative gross margin and net margin on the minimum but a positive gross margin and net margin on the maximum. The average net margin is positive for both group but credit users have a higher amount as compared to non-credit users. These findings in general terms can be concluded that there exist significant positive differences in smallholder maize farmers' profit.

5.3 Policy Recommendation

The study therefore recommends the following to improve smallholder maize farmers' access and use of credit.

i. Stakeholders in agricultural industry should intensify education of farmers on credit procedures. This will grant smallholder farmers access to credit from formal institutions.

ii. Government, NGOs and private practitioners in agricultural industry should include in their sensitization programmes ways of enhancing farmers to adopt better farm management practice, since they are variables influencing farmers' access to credit.

iii. Credit schemes are recommended for vulnerable smallholder maize farmers to use in order to benefit from accessing timely inputs so as to enhance their productivity. Access and use of credit by the smallholder farmers will enhance the timeliness of inputs acquired for production which has effect on productivity to enhance farm profit.

iv. Smallholder farmers are advised to form groups to enable them have access to credit for use in farming since farmers who belongs to FBOs were more likely to access and use credit.

v. Government, NGOs and other private individuals and organizations who work to support farmers in the credit sector are encouraged to support and empower more staple crop smallholder farmers.

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APPENDIX

Appendix I

MPHIL- RESEARCH PROJECT

CREDIT USE AND ITS EFFECT ON PROFITABILITY AMONG SMALLHOLDER MAIZE FARMERS IN THE BRONG AHAFO REGION OF GHANA

QUESTIONNAIRE FOR SMALLHOLDER MAIZE FARMERS

Administrative District……..

Name of Community……..

Questionnaire Number ……

Name of Interviewer: ……..

Date of Interview/……./……/……/

Certified by……

Benjamin Sarfo
University of Ghana, Legon
MPhil Agribusiness
February, 2017

This questionnaire is to solicit information on the **'Credit Use and Its Effect on Profitability among Smallholder Maize Farmers in the Brong Ahafo Region of Ghana'.** This research will be used for academic purposes only and will go a long way to helping the financial situation of smallholder maize farmers. It will also open a new page for efficient and effective management of financial institutions and NGOs to come to the aid of the maize farmers in Sunyani and Dormaa Municipal and provide credit to enhance their farm profit. All information provided will be treated confidential and will be used solely for the purpose of the study. Thank you for your willingness to participate.

A. DEMOGRAPHIC AND SOCIO-ECONOMIC CHARACTERISTICS OF FARMERS

1. Name of respondent ……
2. Gender 1=Male [ ] 2=Female [ ]
3. Age of respondent (In years)……
4. Marital Status 01. Single [ ] 02. Married [ ] 03.Divorced [ ] 04.Widowed/widower[ ]
5. Household size (Total Number of people in the household)……
6. No. of Children (0-17 years)…… No. of Adults (18+ years) No. of dependents (below 18 and above 64 years)……
7. Ethnicity 01. Ashanti [ ] 02. Bono [ ] 03. Guans [ ] 04. Ahafos 05. others [ ]
8. Religion 01. Christianity [ ] 02. Islam [ ] 03. Traditional [ ] 04 Others [ ]
9. What is your highest level of education attained? 1= Primary [ ] 2 = JHS [ ] 3=SHS/Technical [ ] 4=Tertiary [ ] 5=None [ ]
10. Level of education (years spent at school)……
11. . What is your major occupation? 1= Farming 2=Trading 3=Salary worker 4=Tradesman 5=Artisan 6=Other (specify)……

Farm Management Practices among Maize farmers

12. What is the status of your land ownership used to farm maize?
    01 Self –Ownership [ ] 02 Rent [ ] 03 Joint Ownership [ ] 04 Family [ ]
    05 Government Land [ ] 06 Squatters [ ]

13. What is your total agricultural landholding for 2016?

Details of Respondent's landholding in 2016 (Last year)

No	Land type and rental rates	Land size (Ha)	Amount (GH¢)
13a	Total land size owned for agricultural purposes		
13b	Total land size inherited from family		
13c	Total land size obtained from friends		
13d	Total land size rented from others		
132e	Total cultivated land size		

14. How many years have you been involved in farming (in general up to 2016 season) ……..
15. How many years have you been farming maize on your own (up to the 2016 season)? ……..
16. What is your objective of farming? 01. Subsistence [ ] 02. Commercial
17. What is the size of maize land cultivated (Ha) in 2016 cropping season. ……..
18. Are you a member of any farmers' organization? 01. Yes [ ] 02. No [ ]

18a. If yes, give the name of the FBO _____

18b. If No, why? 1= Not interested [ ] 2= No available FBO to join [ ]
3= Strict requirement by FBOs [ ] 4= Other (Specify)……

19. Do you receive extension services? 01 Yes [ ] 02 No [ ]

SECTION B. ACCESS TO CREDIT AND SOURCES OF CREDIT TO FARMERS

20. Have you applied for loan or borrow money in the 2016 farming season?01.Yes [ ] 02.No [ ]
21. Did the provider of the credit require collateral? 01 Yes [ ] 02 No [ ]
22. Did you receive the loan or Credit? 01. Yes [ ] 02. No [ ]

22a. If yes, what was the form of the credit? 01 Cash [ ] 02 kind [

22b. If No, why? 01 No need for credit [ ] 02 Loan facility not available [ ] 03 Lack of collateral [ ] 04 Long bureaucratic processes involved [ ] 05 High interest rate [ ] 06 others

23. What was the credit or loan used for? 01 Farming [ ] 02 others [ ] specify…….

24. In what form was the repayment required? a. Cash [ ] b. kind [ ] c. Both [ ]

25. Did the lender request for interest on the credit? 01 Yes [ ] 02 No [ ]

26. What form of payment was the interest rate requested? a. Cash [ ] b. kind [ ]

27. If in cash how much was the interest rate (Cost of credit)? ……

28. If in kind how much was the interest rate (Cost of credit)? ……

29. If yes (refer, Qnt 22), indicate the source and amount of the credit/loan below:

Sources of Credit, Amount of Money Requested , Amount Received And The Amount Devoted To Maize Production

Source(Multiple responses possible)	**Tick**	**Amount requested (GH¢)**	**Amount received (GH¢)**	**Amount devoted to maize production (GH¢)**
29. Formal Source				
a. Commercial Banks				
b. Rural Banks				
c. Development Banks				
d. Micro finance				
e. Cooperatives				
29. Informal Source				
f. Relatives				
g. Friends				
h. Moneylenders				
i. Susu Collectors				
j. Farmer groups				
29. Semi-formal Source				
k. Donors (Local and Int.)				
l. NGOs				

m. Government Programs				
TOTAL **(GH¢)**				

C. COSTS AND RETURNS OF A HECTARE OF MAIZE CROP CULTIVATED (2016 CROPPING YEAR)

Material Input costs for a Hectare of Maize Cultivated (GH¢***)***

Particular	Unit	Qty	Price/unit	Total Value	Credit amount used
30. Seeds a. Improved Seed b. Local variety					
31. Fertilizer a. Urea b. Ammonia c. NPK 15-15-15 d. NPK 20-20-20					
32.Chemicals and Pesticides Insecticides a. b. Pesticides a. b. Other Chemicals ……					
33.Packaging Materials (Sacks)					
Storage Cost					
Cost of Operating Capital					
Other costs…….					
Total material Input cost (Sub-total)					

NB: Kindly add the unit of seed when inputting the quantity. E.g kg, sachet, etc. If in sachet, write the size of the sachet here ……

Labour cost for the Hectare of Maize Cultivated

Particulars	**No of Labour Days**								**Wage rate for labour (GH¢)**		**Credit amount used to pay labour (GH¢)**
	Number of Family Labour				**Number of Hired Labour**						
	# people	# Days	# M	# F	# people	# Days	# M	# F	M	F	
34. Land preparation											
35.Sowing											
36. Fertilizer application											
37. Chemical application											
38.Weeding 1. 1st weeding 2. 2nd weeding											
39. Harvesting											
40.On–Farm transportation											
41. Any other costs											
D18. Sub total											

RETURNS

42. Total quantity harvested from the area planted to maize

A . Harvested (Yield (kg) ……..……

D. Returns from maize farm in the 2016 maize farm season

Maize farm proceeds	**Unit of measurement Bags (100kg) Quantity.**			**Unit price (GH¢)**	**Total price (GH¢)**
42 a. Yield (2016 season)	**Sold**	**Consumed**	**Gifted**		
Total Gross Income (Gh¢)					

43. In general, how satisfied are you about your production (inputs and outputs)?

1. Very satisfied [ ] 2. Moderately satisfied [ ] 3.Neither satisfied nor unsatisfied [ ]

4. Moderately unsatisfied [ ]5. Very unsatisfied [ ]

SECTION D. OTHER INCOME GENERATING ACTIVITY

Non-maize farm Annual income					
44. Did you engage in other crop farming aside maize during the 2016 crop season? 01 Yes [ ] 02 No [ ] 45. If you engaged in the other crop activities for income indicate below					
No.	Tick	Farm Income Activity	Quantity sold for income	Unit Price (GH¢)	Amount (GH¢)
46		*Food Crops:* Cassava			
		Yam			
		Plantain			
		Rice			
		Pepper			
		Tomato,			
		Beans,			
		Others.			
47		*Cash crops:* Palm plantation			
		Cashew			
		Cocoa			
		Others			

48		*Natural Resource:* Hunting			
		Fishing			
		Fire wood collection			
		Others			
49		*Livestock:* Goat			
		Sheep			
		Poultry,			
		Cattle Others			
Total Amount GH¢					

OFF- FARM INCOME

50. Did you engage in any non-farm activity in the 2016 season? 01 Yes [ ] 02 No [ ]

51. If yes, what were the sources of your non-farm income? Indicate below.

No.	Tick	**Non-farm income Activity**	**Amount in month (GH¢)**	**Total Amount (** GH¢)
52		Non-farm wage income Security		
		Wage Laborer		
		Teaching Others		
53		Self-employed income: Trading		
		Artisan		
		Carpentry		
		Charcoal burning		
		others		
54		Remittance (2016 season)		
		Total Income (GH¢)		

SECTION F. ASSETS OWNED BY HOUSEHOLD

No	Assets	Tick	Number	Value (GH¢)
55	**Non-productive assets**			
A	Car			
B	Motor bike			
C	Bicycle			
D	TV			
E	Radio			
F	Plot of land			
G	Fridge			
H	House			
I	Savings			
56	**Productive Assets**			
J	Cattle			
K	Poultry			
M	Goat			
N	Sheep			
O	Tractor			

For interviewer

General Observation(s):

……

……

……

Signature: …….. Phone Number (respondent): ……