AN ASSESSMENT OF THE IMPACT OF MICROFINANCE ON TECHNICAL EFFICIENCY OF SOME COMMERCIAL CROPS IN NIGER STATE, NIGERIA

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DECLARATION

I hereby declare that this thesis titled "**An Assessment of the Impact of Microfinance on Technical Efficiency of Some Commercial Crops in Niger State, Nigeria"** has been written by me and is a record of my own research work. No part of this thesis has been presented in any previous application for another degree or diploma in this or any other institution. All borrowed information has been duly acknowledged in the text and a list of references provided.

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CERTIFICATION

This thesis titled "**An Assessment of the Impact of Microfinance on Technical Efficiency of Some Commercial Crops in Niger State, Nigeria"** by HussainaUmmikhanni**MAHMUD** meets the regulations governing the award of the degree of Doctor of Philosophy in Agricultural Economics of Ahmadu Bello University, Zaria, and is approved for its contribution to knowledge and literary presentation.

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DEDICATION

This thesis is dedicated to Uma, for all what she stood for me.

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ABSTRACT

The study was designed to carry out an assessment of the impact of microfinance on technical efficiency of some commercial crops in Niger State. Major commercial crops grown by the sampled farmers include yam, rice millet, maize cowpea, sorghum and groundnut. These crops are grown in combination with another during one farming season. A multistage sampling technique was usedin selecting the respondent farmers. Primary data was used for this study.A cross-sectional data from farm survey of crop farmers for 2014 growing season was collected from a total of 360 crop farmers sampled from 18 Local Government Areas of the State. The tools used in analyzing the data collected were descriptive statistics, stochastic production frontier and double hurdle models. The results from the analysis of the socioeconomic characteristics of the loan beneficiary and non-loan beneficiary farmers reveals that there was no significant difference between both groups of farmers in terms of age, education levels, farming experience and household size. Food crop production in the study area was found to be inelastic with a decreasing return to scale for both groups of farmers. Whereas, the mean output tested for both group was not statistically different from one another. The result from the distribution and level of technical efficiencies for both groups of farmers examined shows a mean technical efficiency of 52.9% and 74.2% for the loan beneficiary and non-loan beneficiary farmers respectively. It further reveals a significant difference in the technical efficiency level obtained by both groups of farmers. The result also showed that there was a statistically significant relationship between the socio-economic factor and technical efficiency in crop production among the loan beneficiary and non-loan beneficiary farmers.It further indicates that 85.7% and 3.9% of the total variation in aggregate food crop production by the loan beneficiary and non-loan beneficiary respectively was due to technical inefficiency.The impact of micro credit on technical efficiency of the loan beneficiary farmer shows that credit use was statistically significant in respect of land, fertilizer and herbicides. While it does not have any significant difference in terms of labour usage, quantity of seeds and consequently the yield obtained as compared to the non-beneficiary farmer. Though the accessibility of microfinance to crop farmers was found to be determined by household and loan characteristic of the farmers. It shows that there was a significant difference in the total income, farm capital, land size, household size and education level between the two groups but no significant difference in their age, marital status, farming experience and output level. It further shows that majority of the loan beneficiaries (70) borrowed above ₦100, 000.00; the average loan amount borrowed was ₦145, 166.67 at an average interest rate of 15.16% for 10months.Based on the findings of the study, it was concluded that food crop farmers, especially microcredit users' respondent in the study area, have low technical efficiency (TE) value and low output levels. It further concludes that credit alone cannot engender higher technical efficiency except it goes with other complementary factors such as good agricultural practices (GAPs), efficient utilization of farm inputs, and timely disbursement of loan and sufficient loan volume.

CHAPTER ONE
INTRODUCTION

1.1 Background to the Study

The practice of Microfinance in Nigeria is culturally rooted and dates back to several centuries, with traditional role of providing credit for rural and urban low-income earners in agriculture related businesses. The Microfinance Institutions are mainly of the informal Self-Help Groups (SHGs) or Rotating Savings and Credit Association (ROSCAs) types. Other providers of such services include savings collectors and co-operative societies. However, the informal financial institutions generally have limited outreach due primarily to paucity of loanable funds (CBN, 2005).

In Nigeria, credit has been recognised as an essential tool for promoting small and Micro Enterprises (SMEs). About 70 percent of the population is engaged in the informal sector or in agricultural production. The Federal and State governments have recognized that for sustainable growth and development, the financial empowerment of the rural areas is vital, being the repository of the predominantly poor in society and in particular the SMEs. If this growth strategy is adopted and the latent entrepreneurial capabilities of this large segment of the people is sufficiently stimulated and sustained, then positive multipliers will be felt throughout the economy. In order to enhance the flow of financial services to Nigerian rural areas, Government in the past has initiated a series of publicly-financed micro/rural credit programmes and policies targeted at the poor and to improve rural enterprise production capabilities (Olaitan, 2006). Notable among such programmes were the Rural Banking Programme, sectoral allocation of credits, a concessionary interest rate, and the Agricultural Credit Guarantee Scheme– ACGS(1978). Other institutional arrangements were the establishment of the Nigerian

Agricultural and Co-operative Bank Limited- NACB(1972), the National Directorate of Employment-NDE(1986), the Nigerian Agricultural Insurance Corporation-NAIC(1987), the Peoples Bank of Nigeria- PBN(1989), the Community Banks-CBs(1990), and the Family Economic Advancement Programme- FEAP(1997) (CBN, 2005). Despite these schemes, many rural businesses have not had adequate capital finances, nor have they experience expansion in such businesses due to funding constraints.

In 2000, Government merged the NACB with the PBN and FEAP to form the Nigerian Agricultural Cooperative and Rural Development Bank Limited (NACRDB) to enhance the provision of finance to the agricultural sector. It also created the National Poverty Eradication Programme (NAPEP), National Agricultural and Land Development Authority (NALDA), National Policy on Integrated Rural Development (NPIRD) and others with the mandate of providing financial services to alleviate poverty(CBN, 2005).

Microfinance is about providing financial services to the poor who are traditionally not served by the conventional financial institutions. It refers to the entire flexible structures and processes by which financial services are delivered to micro entrepreneurs as well as the poor and low income population on a sustainable basis. It recognized poor and micro entrepreneurs who are excluded or denied access to financial services on account of their inability to provide tangible assets as collateral for credit facilities (Jamil, 2008). It plays an important role by alleviating poverty through promoting the use of farm inputs. This in turn creates opportunities for increasing agricultural productivity among small and marginal farmers (Nosiru, 2010).

Microfinance as a tool of rural financial services has a clear impact on poverty by positively affecting the household economic development, ensuring Income Generating Activities (IGA), sources of income, reducing vulnerability, housing tenure and enterprise growth.

Microfinance does not just have a positive impact on poverty but on agricultural productivity. Despite Nigeria's abundant agricultural resources and oil wealth, poverty is still a challenge in the country (IFAD, 2009). Agricultural productivity is very low in Nigeria. This is because about 90 percent of Nigeria's food is produced by small scale farmers who cultivates small plots of land and depend on rainfall rather than on irrigation. Neglect of rural infrastructure affects the profitability of agricultural production. The neglect of rural roads impedes the marketing of agricultural commodities; prevent farmers from selling their produce at reasonable prices and leads to spoilage. Limited accessibility to credit cuts small scale farmers off from sources of inputs, equipment and new technology and this keeps yields low (IFAD, 2009).

In realization of the enormous potentials of small and medium enterprises as an engine room of economic development and grassroots empowerment, Microfinance are granted to farmers for arable crop cultivation, roots crops cultivation, animal husbandry, poultry farming, fish farming and processing and marketing of agricultural products.

1.2 Problem Statement

Access to finance is a necessity when it comes to investing in economic activities so as to ensure production and growth (Nosiru, 2010). Many times, the impact assessments have been based on simple comparisons of loan beneficiaries and non- loan

beneficiaries from Microfinance institutions. However, not much has been debated on the real impact of credit, particularly microcredit on production level.Proponents stated that it reduces poverty through higher employment and higher incomes. This in addition, is expected to lead to improved nutrition and improved education of the loan beneficiaries' children. Some argued that microcredit empowers women (Goldberg, 2005). Critics say that microcredit has not increased incomes, but has driven poor households into a debt trap (Bateman, 2010). They argued that the money from loans in most cases are small and is often used for durable consumer goods or consumption instead of being used for productive investments.

Despite the recent growth in the microfinance sector, advancing loans and credit to farmers to increase crop production is still a challenge (Tenaw and Islam, 2009). Miller (2011) reports that in order for microfinance organizations to venture into crop agriculture, it is important to understand the context of crop agriculture and their potential role in it. Indeed, agricultural microfinance is not business as usual but requires a different approach from that typically applied in many microfinance organizations. The agricultural sector is characterized by generally much lower returns on capital, slower velocity of capital, higher uncontrolled risks and less understanding of finance and business (Miller, 2011). Although, it is argued that improved productivity and output levels will be achieved through the introduction of new production technology, credit is a prerequisite to gain access to such technology particularly for the small-scale farmers in Africa with little or no capital of their own. Therefore, microfinance is very critical in increasing crop production.

The significant role of agriculture in nation building all over the world cannot be overemphasized. Agriculture isa major contributor to Nigeria's Gross Domestic Product and small-scale farmers play a dominant role in thiscontribution (Rahji and Fakayode 2009), but their productivity and growth are hindered by limited access tocredit facilities (Odoemenem and Obinne 2010).

The problem is, there are many obstacles impeding the contribution of microfinance to food and cash crops production. These are the quantity and volume of credit, credit access, high transaction costs, and limited knowledge ofMicrofinance and inadequate management of information system necessary for Microfinance to achieve positive impacts on agricultural production in the study area. For this reason farmers rely on the costly source of accessing financial services especially through informal sources at higher costs and difficult loan terms and repayment, thus necessitating the research to find out to what extend this institutions have contributed to crop production and the factors militating against the achievement of farmers goals in the study area.

In the light of the above, this study tends to answer the following research questions:

i. What are the socioeconomic characteristics of the crop farmers who borrowed from Microfinance and those who did not in the study area?
ii. What are the factors determining technical efficiency in crop production among loan beneficiaries and non-loan beneficiaries of microfinance?
iii. What is the influence of microfinance on technical efficiency of crop farmers in the study area?
iv. What are the factors determining the accessibility and farmers' level of accessibility to microfinance in the study area?
v. What are the factors militating against crop production in the study area?

1.3 Objectives of the Study

The broad objective of the study was to examine the status and influence of microfinance among crop farmers as well as the determinant of technical efficiency in crop production in the study area. The specific objectives were to:

i. describe the socio-economic characteristics of crop farmers (both loan beneficiaries and non-loan beneficiaries) in the study area;
ii. examine the determinants of technical efficiency in crop production among loan beneficiaries and non-loan beneficiaries in the study area;
iii. determine the influence of microfinance on technical efficiency of crop farmers in the study area;
iv. identify the factors determining the accessibility and level of accessibility to microfinance among the loan beneficiaries;
v. identify the factorsmilitating against crop production in the study area.

1.4 Justification of the Study

Poverty reduction has been an important development challenge over decades. One of theidentified constraints facing the poor is lack of access to formal sector funds to enable them to take advantage of economic opportunities to increase their level of output, hence move out of poverty. Traditional aid has not helped in solving this problem. One of the development strategies to promote financial sustainability for poor individuals in the society is microfinance (Lindvert, 2006).

Despite the significant demand for financial services in rural areas, institutions offering financial services-such as Banks, credit unions, cooperatives, Microfinance Institutions (MFIs) or insurance companies-are typically reluctant to serve in rural areas due to

precarious nature of agricultural production. As a result, the majority of poor households are bereft of financial access to the formal financial system(CBN, 2014).

Although, a lot of changes were done on the policy framework establishing microfinance, these were due to the perceived failure of the existing microfinance framework. Adeyemi (2008) captured this thus, "despite decades of public provision and direction of provision of microcredit, policy orientation, and the entry of new players, the supply of microcredit is still inadequate". He identified some of the challenges which microfinance institutions face that impinge on their ability to perform to include; undercapitalization, inefficient management and regulatory and supervisory loopholes. To these, Mohammed and Hassan (2009) added usurious interest rates and poor outreach. Further buttressing the challenges facing microfinance banks, Nwanyanwu (2011) identified diversion of funds, inadequate finance, and frequent changes in government policies, heavy transaction costs, huge loan losses, low capacity and low technical skill in the industry as impediments to the growth of this subsector. These challenges many of which contributed to the failure of previous microfinance schemes are still be-devilling the microfinance banking scheme in Nigeria.

Though the informal institutions provide loans, but at exorbitant interest rates. The setting up of micro financial institution will allow the poor to have easy access to credit at relatively lower interest rate compared to the informal credit sources and in the same vein, devoid of encumbrances (Anyanwu, 2004). The policy framework establishing microfinance institutions in the country, saddles them with the responsibility of providing easy, cheap and affordable financial services to resource poor farmers, in a timely and competitive manner, which would enable them to undertake and develop

long-term, sustainable entrepreneurial skill, mobilizing loans and creating employment opportunities and increase the productivity of these rural farmers, thereby increasing their farm income and output and uplifting their standard of living (Olawuyi et al, 2010). Though Mejeha and Nnanna (2010) noted that among the factors responsible for lack of significant effect of credit schemes are insufficient loan amount, poor loan repayment and corrupt practices of loan beneficiaries and loan officials. Supporting this view, Nwaru (2005) and Omeh (2006) stated that Nigerian small-scale farmers are known to be economically weak with little or no capital investment. Consequently, they use low technology tools and methods in their production activities, which in turn lead to reduced output and productivity. Ekwueme *et al* (2007) and Ifeoma (2008)explained that, inadequate access to economicresources especially financed by the numerous sparselylocated farmers across Nigeria continues to inhibitagricultural development. This calls for criticalexaminations and the adoption of an approach to avoiddeclaring farmers "an endangered species".

It is therefore an irony of circumstance that thesmall-scale farmers who produce about 85% of food consumed in thecountry and the agricultural exports are perpetually handicapped by lackof production credit and bedeviled with poverty.Nevertheless, few studies have been carried out to examine the influence of Microfinance on the technical efficiency of farmers in Niger state. Thus, for a meaningful planning, it is desirable that a study of this nature be carried out to identify factors militating against the achievement of farmer's objectives which is optimum production, as well as access to Microfinance in the study area. Also, it is anticipated that the findings from the study would be useful to farmers in making medium and long-term investments, which will in turn boost agricultural development as a whole.

1.5 Limitation of the Study

The factors that limited the scope of the study include the following:

i. The reliance on one season data made it impossible to account for production uncertainties that are common in agricultural production.

1.6 Hypotheses

- There is no significant relationship between output level of the beneficiaries and non loan beneficiariesin crop production in the study area.
- There is no significant difference in technical efficiency between the loan beneficiaries and non loan beneficiary farmers from microfinance for crop production.

- There is no significant relationship between the socio-economic factors and technical efficiency in crop production.

CHAPTER TWO

LITERATURE REVIEW

2.1 Conceptual Framework

The term 'Microfinance' means providing very poor families with very small loans (Microfinance) to help them engage in productive activities or develops their tiny businesses (The Microfinance Gateway, 2008). According to the Consultative Group to Assist the Poor (CGAP), Microfinance is the supply of loans, savings and other basic financial services to the poor, including working capital loans, consumer credit, pensions, insurance and money transfer services. Similarly, Hossain (2002) defines Microfinance as, the practice of offering small, collateral-free loans to members of cooperatives who otherwise would not have access to the capital necessary to begin small business or other income generating activities.

Microfinance helps an individual to become independent economically and provides additionalincome generating activities (Rahman and Rahim, 2007).Micro enterprises and small enterprises not only raise the living standards of the poor and the self-employed,they also provide jobs and contribute to GDP and economic growth. Yet such enterprises oftenhave limited access to financial services. Providing financial services to the entrepreneurial poor increaseshousehold income, reduces unemployment, and creates demand for other goods and services especiallynutrition, education, and health services (Brandsma and Chaouali, 2004).Sociological perspective of micro finance emphasize that access to credit provides the poor with productivecapital that helps to build up their sense of dignity, independence, and self-confidence, and hence aremotivated to become participants in the rural economy. Micro credit presents the poor with income, food,shelter, education and health and can therefore have immediate and long term consequences (Adams andBartholomew, 2010). Microfinance is

emerging a survival strategy of rural families in developing countries. It has proven thatmicro credit is a powerful tool for poverty reduction by improving the ability of poor people to increaseincomes and build assets (Herani et al. 2007). Microfinance promoter favor raising lending rates to marketlevels to improve cost recovery. In credit market, informal lending is much costly than formal lending butformal lending have long process which poor people borrow (Briones, 2007). Microfinance plays a key rolein fighting against poverty to build income and property. It is the main source for poor to maintain theireconomic lifestyle in developing countries (Haq et al. 2008).

Khavul (2010) argues that microfinance is a new word, which is popularly used in the field of finance in recent times. He further argues that the term microfinance constitutes two words: micro and finance, which could mean small credit or 'microcredit'. Nonetheless, the concept of microfinance goes far beyond small credit and it is to be noted that not all small credit is microfinance (Khavul, 2010). Likewise, Ghosh (2006) explains that microfinance constitutes various financial services, which mostly includes savings and credit. It also contains other services like insurance, directed to eventually benefit the poor or disadvantaged section of the population, especially those who are economically poor.According to World Bank (2007), the term refers to provision of financial services including saving and credit) to the poor. Micro-finance banks therefore are institutions that are established to provide financial services to the poor.

2.2 The Theoretic Framework

It has been hypothesised that Microfinance as a tool of rural financial services has clear impact on poverty by positively affecting the household economic development, ensuring Income Generating Activities (IGA), sources of income, reducing

vulnerability, housing tenure, enterprise growth. Microfinance (MF) has become a buzzword among the development practitioners. Hulme (2000) argues that MFIs are not a cure for poverty. However, MFIs could create and provide a broad range of micro financial services that would support poor people in their efforts to improve their own prospects and the prospects of their families. He believes that effective Microfinance makes these agencies designed to help the poor more likely to achieve the goals that poor people seek to achieve.

Murdoch (1995) investigates that Micro-finance plays an important role in income and consumption smoothing. Improved access to financial services can have two principal effects on household outcomes. First, it can raise the expected value of income and therefore of consumption and future investment and asset accumulation. This is the traditional and often sole argument for provision of services by micro-finance institutions. Second, it can decrease the variances of income and consumption. For the food-insecure poor, it is particularly important to reduce the down-side risk of falling below minimum levels of disposable income for consumption of food and other basic needs.

Throughout the world, poor people are excluded from formal financial system. Exclusion ranges from partial exclusion in developed countries to full or nearly full exclusion in less developed countries (LDCs). Absent access to financial services, the poor have developed a wide variety of informal community based financial arrangement to meet their financial needs. Microfinance is created to fill this gap (Irobi, 2008). Similarly, Anyanwu (2004) noted that microfinance bank is not just providing capital to the poor, but to also combat poverty at an individual level. It also has a role at

institutional level which creates institutions that deliver financial services to the poor who are continuously ignored by the formal banking sector.

Khan (1997) suggests a variety of activities like financing housing, meeting basic needs, and promoting and financing small entrepreneurs. All these aspects, however, can be covered in a comprehensive integrated program with focus on micro financing like Bangladesh and Bolivia which has, over the last 20 years, captured the interest of multilateral donor agencies and private sector Bankers (Enugu Forum, 2006).

Adamu (2007) observed that microfinance institutions Nigeria have grown phenomenally, driven largely by expanding informal sector activities and the reluctance of commercial banks to fund emerging microenterprises. But, the number of beneficiaries of microfinance institutions is an insignificant proportion of the people in need of microfinance services. It has been estimated that formal microfinance institutions only service less than one million clients, in a country where over 70% of the country's population live below the poverty line (Dahiru and Zubair, 2008). The results also suggested that micro-financing is unsuccessful at reaching the group most prone to destitution, the vulnerable poor.The major challenges of microfinance in Nigeria include: communication gaps and Inadequate awareness; insufficient support from governments; inadequate donor funding; less attention on financial sustainability of MFIs; lack of adequate loan or equity capital to increase loan-able funds; high turnover of MFI staff; limited support for human and institutional capacity building; illegal government and NGO operations that spoil the market; and lack of standardize reporting and performance monitoring system for MFIs (Irobi, 2008).

2.3 Empirical Studies on Microfinance and Technical Efficiency of crop Production

Studies carried out on micro-financing in Bangladesh revealed that, informal credit sources such as local money lenders and wealthier community members often charge interest rates that are prohibitively high. This as a result makes the landless poor in rural Bangladesh to face severe liquidity constraints which affect their economic well being. More specifically, the inability to access credit at reasonable rates of interest limits their opportunities to rise above poverty by restricting their labour use, income and productivity. It then can be hypothesized that micro credit is expected to have a positive impact on the levels of consumption, employment, and productivity of the landless and near landless poor in rural Bangladesh (Khandker, 1999).

Maldonado (2005) study investigated microfinance's impact on Bolivian rural households' education choices. It identifies several effects of microfinance that positively influence a household's demand for child education. Microfinance's ability to expand a household's income and serve as an income smoother, the empowering effect it has on women and their ability to make decisions regarding schooling, and the demand microfinance creates for children's education—especially in programs that include an educational aspect for the mother—all lead to higher rates of primary school enrolment and completion.

Gobbi et al (2005) has done a comparative analysis of the two survey conducted in Nepal and Pakistan. They interviewed 100 women clients from at least three different microfinance institutions for each country. The women represent a sample that have borrowed in initial micro finance loan and apply for loans to start their own business.

The institutions which were selected, Priority was given to those that took into the account achievements of gender equality, empowerment, saving and self-sustainability. Their study showed that micro finance industry is fast growing in both countries and the outcomes are significant in both countries. The result showed a positive impact on profits and sales of their products in both the countries.

Girabi and Mwakaje (2013) study the impact of microfinance on smallholder farm productivity in Tanzania. Using descriptive and regression analysis, they find that credit beneficiary realize high agricultural productivity compared to the non-credit beneficiary respondents. They also find that major factors hindering smallholder farmers' access to credit are lack of information, inadequate credit supply, high interest rates and defaulting.

Jegede *et al*. (2011), in a study on impact of microfinance on poverty alleviation in Nigeria noted a significant effect of microfinance institution in alleviating poverty by increasing income and changing economic status of those who patronize them and concluded that microfinance is indeed a potent strategy of poverty reduction and a viable tool for purveying credit to the poor.

Appah *et al*. (2012), in a similar study carried out in Bayelsa state also noted a significant differences between microfinance and status of women in the state concludes that microfinance alone cannot reduce poverty in any society where basic infrastructures like good roads, steady power supply, good transportation system etc are nearly not available for women to benefit from the introduction of microfinance in Nigeria.

i. Concept of Production Efficiency

Production efficiency is an economic level at which the economy can no longer produce additional amounts of a good without lowering the production level of another product. Production efficiency is concerned with the relative performance of the process used in transforming inputs into output. This will happen when an economy is operating along its production possibility frontier. It is the ability to produce a good using the fewest resources possible. Efficient production is achieved when a product is created at its lowest average total cost. Thus, Productive efficiency occurs when the economy is utilizing all of its resources efficiently.

The concept is illustrated on a production possibility frontier (PPF) where all points on the curve are points of maximum productive efficiency (i.e., no more output can be achieved from the given inputs). Equilibrium may be productively efficient without being allocatively efficient i.e. it may result in a distribution of goods where social welfare is not maximized (Standish, 2000).Productive efficiency takes place when production of one good is achieved at the lowest cost possible, given the production of the other good(s). Equivalently, it is when the highest possible output of one good is produced, given the production level of the other good(s). In long-run equilibrium for perfectly competitive markets, this is where average cost is at the base on the average (total) cost curve i.e. where MC=A (T)C.

Productive efficiency requires that all firms operate using best-practice technological and managerial processes. By improving these processes, an economy or business can extend its production possibility frontier outward and increase efficiency further.The

concept of efficiency is concerned with the relative performance of the processes used in transforming given inputs into outputs.

ii. Empirical Studies on Productivity and Technical Efficiency

Win et al. (2007), investigates factors influence technical efficiency in groundnut production systems among farmers in Mandalay division and Magway division, Myanmar. Mandalay and Magway divisions are regions where the groundnut productions have grown the largest areas annually in Myanmar. Primary data were used in the analysis of data. The analytical tools include descriptive statistic and stochastic frontier production function by using the maximum likelihood estimation (MLE). MLE is applied on a cross-sectional of 282 sampled farmers during 2006-07 cropping season. The efficiency measure is regressed on set explanatory variables which include seed (kg/ha), land (ha), amount of chemical fertilizers (kg/ha), amount of farmyard manure (kg/ha), cost of insecticides and pesticides (kg/ha), labor (man day) access to institutions, and access to government services. The result shows that the mean efficiency in groundnut production is about 0.59. It means that it can be rise the groundnut production of Myanmar in this areas about 0.41 (41%) to produce at efficiency level.

Bravo-Ureta and Pinheiro (1997) used the stochastic parametric model to measure the technical, allocative and economic efficiencies in recent agricultural production efficiency studies. In their study of peasant farming in the Dominican Republic, using the Cobb-Douglas production frontiers, found that younger and more educated farmers exhibited higher levels of technical efficiency and that, additionally, contract farming,

medium-size farms and being an agrarian reform beneficiary had a positive association with economic and allocative efficiencies.

Ajibefun and Daramola (1999) investigated the technical inefficiency in poultry egg production in Ondo State, Nigeria, and concluded that older birds tended to be less inefficient in egg production, and that the higher the level of education and the years of experience of the decision maker of the farm, the less the level of technical inefficiency. The stochastic frontier method was employed in this study.

Liverpool-Tasie *et.al* (2011),noted that the levels of technical efficiency and productivity differ by crop, location and cropping system. Though there are some exceptions, and Nigerian farmers across all regions are below their production frontiers and consequently the opportunity exists to increase their productivity above existing level.

Similarly, in a study by Rahman and Umar (2009) on measurement of technical efficiency and its determinants in crop production in Lafia Local Government Area of Nasarawa State of Nigeria using a stochastic frontier production model noted that sixty five percent (65%) of the farmers were within the age range of 31-50 years and 67% had farm size ranging from 2-4 hectares. While the technical efficiency of crop production range from 32.7% to 89.4% with mean of 69.6%. Farm size and fertilizer were the major inputs that are associated with the variation in crop output. It also revealed that significant socio economic variables that accounted for the observed variations in technical efficiency among crop farmers were age, gender, marital status, household size, other occupation and land ownership.

iii. Empirical Studies on the Influence of Credit on Crop Production

Advocates of microfinance argue that Microfinance is a powerful tool used to alleviate poverty. In recent times, however, many studies do suggest that the reality promise of microfinance may be less attractive than the promise. Adams and Bartholomew (2010) examined the impact of microfinance from the perspectives of maize farmers in Nkoranza in the Brong Ahafo Region of Ghana. The findings of the study based on a survey of 100 participants in the microfinance program suggest that the impact of microfinance on both social and economic wellbeing is marginal. The key issue identified by most of the recipients is lack of entrepreneurial skills and market for their produce. The key recommendation from the study is the need improve infrastructure and establish linkages between the farm and non-farm sectors of the rural economy.

Similarly, Gender activists also argue in favour of microfinance as a means of empowerment by supporting women's economic participation. Boyle (2009) claims that by supporting women's economic participation, microfinance helps to improve household well-being. Littlefield (2005) reports that the opportunities created by credit availability helps a lot of poor people to invest in their own businesses, educate their children, improve their healthcare and promote their overall well-being. This is supported by a study by Karlan and Zinman (2006) in South Africa where recipients of Microfinance were shown to be better off than non-beneficiaries. In another study by Khan and Rahaman (2007) in the Chittagong district in Bangladesh, recipients of microfinance facilities were reported to improve their livelihoods and moved out of poverty. More importantly, Khan and Rahaman (2007) reported that microfinance

recipients had empowered themselves and become very active participants in the economy.

Furthermore**,** using a regression model to examine the impact of microfinance, Priya (2006) found that there is significant positive relationship between credit recipients and income; the findings suggest that program participation led to a 10% increase in income. However, the UNCDF (2009) report suggests that though Microfinance may be helpful in reducing poverty, it is never a panacea and that it is only one of such tools to reduce poverty or the vulnerabilities of the poor. Buckley (1997) and Rogaly (1996) have also noted that microfinance may not always be the best tool to help the poorest of the poor. A similar argument is made by Hashemi and Rosenberg (2006) who claim that microfinance does not reach the poorest in the community.

2.4Overview of Microfinance Activities in Nigeria

Before the emergence of formal Microfinance institutions, informal Microfinance activities flourished all over the country. Informal Microfinance is provided by traditional groups that work together for the mutual benefits of their members. These groups provide savings and credit services to their members. The informal Microfinance arrangements operate under different names: The Yoruba ethnic group refers to it as Esusu or Ajo, Igbos refer to it as Isusu or Uto and the Hausa call Adashi (Anyanwu 2004, Basu et al 2004, Alabi et al 2007, Onaolapo and Oladejo 2011). The key features of these informal schemes are savings and credit components, informality of operations and higher interest rates in relation to the formal Banking sector. The informal associations that operate traditional Microfinance in various forms are found in all the rural communities in Nigeria (Otu *et al*., 2003). They also operate in the urban

centres. However, the size of activities covered under the scheme has not been determined. The non-traditional, formalized Microfinance institutions (MFIs) are operating side by side with the informal services. The financial services provided by the MFIs in Nigeria include savings, credit and insurance facilities. In Nigeria, the formal financial system provides services to about 35% of the economically active population while the remaining 65% are excluded from access to financial services (CBN, 2011). This 65% are often served by the informal financial sector, through Non-Governmental Organization (NGO)-microfinance institutions, money-lenders, friends, relatives, and credit unions (CBN, 2011).

Microfinance services, particularly, those sponsored by government, have adopted the traditional supply-led, subsidized credit approach mainly directed to the agricultural sector and non-farm activities, such as trading, tailoring, weaving, blacksmithing, agro-processing and transportation. Although the services have resulted in an increased level of credit disbursement and gains in agricultural production and other activities, the effects were short-lived, due to the unsustainable nature of the programmes.

The microfinance industry in Nigeria had been confronted by numerous challenges since the launch of the Microfinance Policy Framework in December, 2005. Coming on the heels of the banking sector consolidation, many of those adversely affected found their way into microfinance. Thus, a significant number of the newly licensed MFBs were established or operated like 'mini-commercial banks'. Also, the erstwhile community banks (CBs) that converted to MFBs did not fare any better (CBN, 2011).
With regards to the provision of financial services, Nigeria lags behind many African countries. In2010, 36% of adults – roughly 31 million out of an adult population of 85 million – were servedby formal financial services. This figure compares to 68% in

South Africa and 41% in Kenya (CBN, 2012).Several factors have accounted for the persisting gap in access to financial services. For instance, the distribution of microfinance banks in Nigeria is not even, as many of the banks are concentrated in a particular section of the country, which investors perceived to possess high business volume and profitability. Also, many of the banks carried over the inefficiencies and challenges faced during the community banking era. In addition, the dearth of knowledge and skills in microfinancing affected the performance of the MFBs. Furthermore, there are still inadequate funds for intermediation owing to lack of aggressive savings mobilization, inability to attract commercial capital, and the non establishment of the Microfinance Development Fund (CBN, 2011).

An assessment of the microfinance sub-sector, following the launching of the policy however revealed some improvements. These include increased awareness among stakeholders such as governments, regulatory authorities, investors, development partners, financial institutions and technical assistance providers on microfinance. Specifically, a total of 866 microfinance banks have been licensed (between2006-2010), Microfinance Certification Programme (MCP) for operators of microfinance banks put in place and the promotional machinery beefed up. Accordingly, entrepreneurs are taking advantage of the opportunities offered by increasingly demanding for financial services such as credit, savings, payment services, financial advice and non financial services (CBN, 2011).

Nigeria has the third highest number of poor people in the world. Most of these poor people are dependent on micro and small-scale farm and off-farm enterprises for their livelihood. As such, their entrepreneurial contributions are strategic to the Nigerian

economic development and their growth has great potential to contribute to income generation and poverty alleviation. One of the challenges Microfinance currently faces in Nigeria is for the MFIs to reach a greater number of the poor (CBN, 2005). The size of the un-served market by the existing financial institutions is large. Enhancing Financial Innovations and Access (EFInA), in its Access to Finance Survey in Nigeria in 2008, alluded to the fact that 79 per cent of the total population in Nigeria is unbanked out of which 86 per cent are rural dwellers. Also in 2005, the aggregate microcredit facilities in Nigeria accounted for about 0.2 per cent of Gross Domestic Product (GDP) and less than one per cent of total credit to the economy (CBN, 2011). This revealed the existence of a huge gap in the provision of financial services to a large number of the economically active poor and low income households. The effect of not addressing this situation appropriately would further accentuate poverty and slow down growth and development (CBN, 2011).

Globally, micro, small and medium enterprises (MSMEs) are known to contribute to poverty alleviation through their employment generating potentials. In Nigeria, however, the employment generation potentials of small businesses have been seriously constrained by lack of access to finance, either to start, expand or modernize their present scope of economic activities. Delivering on employment generation and poverty alleviation by MSMEs, would require multiple channels of financial services, which an improved Microfinance framework should provide (CBN, 2011).

Government interventions, through a multiplicity of credit institutions established in recent years, have not resulted in significant improvement in financial intermediation. The liberalization of the economy since the introduction of the Structural Adjustment

Program in the 1980s has tended to exacerbate the financial problems of the agricultural sector. Loanable funds from government sources have dwindled considerably. The cost of borrowing has escalated and the financial outlay for agricultural enterprises has multiplied several-fold irrespective of the scale of operation, due to the ravages of inflation. Consequently, only a limited number of entrepreneurs are in a position to meet their financial requirements. The difficulties faced by agricultural financing are not unrelated to the liberalization of the economy and reforms in the financial sector in particular(Olomola and Gyimah-Brempong,2014). Unlike the situation during the pre–structural adjustment era, lending to agriculture has been decontrolled since the mid-1980s. Interest rates are now determined on the basis of market fundamentals. Usually, commercial banks set their lending rates based on the Central Bank of Nigeria (CBN) rates, the risk levels, the cost of doing business (which has been judged to be very high in the country), and profit markups and other considerations. This results in very high lending interest rates for the private sector in general and for agriculture in particular. Rates are sometimes in the double digits and appear very unattractive to any investor in the agricultural sector. This has accounted for commercial banks' low rate of participation in agricultural financing. Moreover, monetary policy provides a risk-free haven for commercial banks to invest in. The open market operations of the CBN, which involve mopping up excess liquidity through the issuance of government securities in an attempt to control inflation, has indirectly affected the flow of investment funds to the agricultural sector. More often than not, the biggest buyers of such securities are commercial banks. In such cases, funds that should have been loaned out to the private sector by banks are instead invested in risk-free government securities. This leads to the crowding out of bank lending to the private sector, making

it even more difficult for highly risky sectors such as agriculture (Olomola and Gyimah-Brempong,2014).

The agricultural sector has been poorly served by the financial system partly on account of the unfavourable policy environment, which includes weak regulatory regimes, poor physical and financial infrastructure, and policies that repress the formation of effective linkages between the financial and real sectors of the economy. The Nigerian financial sector has witnessed fundamental reforms since 2005, but the effects on agricultural financing have been lackluster. The traditional arguments that the agricultural sector is too risky, farmers are too dispersed and inaccessible in remote rural locations as well as the supply-side constraints continue to be relevant. It is still expensive to provide financial services in rural areas, which typically less-dense economic activity poorer infrastructure than urban areas and is more subject to risks from weather and agricultural price changes(Olomola and Gyimah-Brempong, 2014).

(a) Goals of Microfinance Institutions

The establishment of Microfinance banks in Nigeria has become imperative to serve the following purposes (CBN, 2011):

i. Provision of timely, diversified, affordable and dependablefinancial services economically active poor;

ii. Creation of employment opportunities and increase the productivity and household income of the active poor in the country, thereby enhancing their standard of living;

iii. Promotion of synergy and mainstreaming of the informal Microfinance sub-sector into the formal financial system;

iv. Enhancement of service delivery to micro, small and medium enterprises (MSMEs);

v. Mobilization of savings for intermediation and rural transformation;

vi. Promotion of linkage programmes between microfinance institutions (MFIs), Deposit Money Banks (DMBs), Development Finance Institutions (DFIs) and specialized funding institutions;

vii. Provision of dependable avenues for the administration of the microcredit programmes of government and high net worth individuals on a non-recourse basis; and

viii. Promotion of a platform for microfinance service providers to network and exchange views and share experiences.

(b) Microfinance Suppliers

(i) Commercial Agriculture Credit Scheme (CACS)

As part of its developmental role, the Central Bank of Nigeria (CBN) in collaboration with the Federal Government of Nigeria, represented by the Federal Ministry of Agriculture and Rural Development (FMARD) established the Commercial Agriculture Credit Scheme, hereinafter referred to as CACS, for promoting commercial agricultural enterprises in Nigeria, which is a sub–component of the Federal Government of Nigeria

Commercial Agriculture Development Programme (CADP). This Fund was to complement other special initiatives of the Central Bank of Nigeria in providing concessionary funding for agriculture such as the Agricultural Credit Guarantee Scheme (ACGS) which is mostly for small scale farmers, Interest Draw-back scheme, Agricultural Credit Support Scheme, etc (CBN, 2014). The scheme was to be financed from the proceeds of the N200billion three (3) year bond raised by the Debt Management Office (DMO). The fund was to be made available to the participating bank(s) to finance commercial agricultural enterprises. In addition, each State Government could borrow up to N1.0billion for on-lending to farmers' cooperative societies and other areas of agricultural development provided such initiatives/interventions are in line with the objectives of CACS (CBN, 2014).

(ii). Development Finance Institutions

Development Finance Institutions (DFIs) channel the public sector's access to financial initiativesfor Micro,Small and Medium Enterprises (MSMEs). Unfortunately, while DFIs run multiple interventions, client outreach is limited.

The Bank of Agriculture (BoA) serves 1.9 million clients – mainly farmers, entrepreneurs andwomen's groups – including 700,000 MSME clients with loans provided at 8% p.a. The BoA hasdeveloped rural branch networks encouraging cooperative societies and self-help groups.However, the BoA has been a loss-making institution largely due to capital depletion from OpExand lean losses.

While the Bank of Industry (BoI) targets SMEs across all sectors with loan rates capped at 10%. Majorinterventions by BoI include the NGN 5 billion Small Business Development Fund, the USD 4million accessesto Renewable Energy Project and the

NGN 3 billion MSME Development Fund.Revenue growth has been limited by its small asset portfolio but the bank is profit-making,achieving NGN 2.6 billion in 2010 (CBN, 2012)

(iii) Commercial Banks and Microfinance Institutions

Following the 2009 financial crisis and CBN intervention, the sector has undergoneconsolidation, with three banks being acquired by existing local players and a further threenationalized by the Asset Management Corporation of Nigeria (AMCON), resulting in a total of21 commercial banks as of September 2011.Between 2006 and 2011, total assets grew by 29% and deposits by 35%. High-cost branch distribution channels largely drove this growth. Commercial banks, while not operating at their optimum, are best placed to drive FinancialInclusion due to their large network and capital base (CBN, 2012).

While the Non-bank microfinance institutions (MFIs), which include financial NGOs, financial cooperatives,self-help groups, trade associations and credit unions, though not regulated by the Central Bank ofNigeria work through linkageprogrammes such as RUFIN. Today, 671 MFIs are registered with CBN, serving 346,266clients (CBN, 2012).

(c) Challenges of Micro Financing

i. Rates of interest

According to Anyanwu (2004) the interest rates in the Microfinance institutions are much higher than the prevailing rates in the Banks. This ranges between 32-48%.

During this period the Banks are charging between 19.5% and 21.6 % (Anyanwu, 2004). Money lenders at informal sector charge interest rates of 100% or more. Some of the clients when interviewed by MFI evaluators bitterly complained about the interest rates being too high.

Two reflections could be made. First, given the fact that people borrowing at this rate indicate that they are industrious and productive. It is only that they are not given access to financial institutions, because they do not have collateral to meet the requirements of formal financial institutions and then they remain poor and liabilities to the economy instead of being assets. Second, the objective of Microfinance to combat poverty might be defeated since the clients have to repay back double of what they have received at all cost.

ii. Inequitable in the Distribution of Wealth and Income

The conventional Micro financing in Nigeria aggravates the inequitable distribution of income and wealth in Nigeria. This is due to the fact that while interest rate on borrowing from Microfinance institutions ranges from 30% to 100%, interest rates on both voluntary and mandatory savings for the clients are between 4.5% and 6% per annum. Again, lending at this rate is taking the rewards of poor and redistributes it to the rich. The poor loan beneficiaries must pay the amount through group pressure even if it resort them to another borrowing or selling their properties (Anyanwu, 2004).

Moreover, the current micro financing in Nigeria gives loan to commerce based activity to the detriment of agriculture based which is the source of income and sustenance for the majority of poor Nigerians. In a study conducted by CBN on the major ten MFIs in

Nigeria it was found that the loan disbursement goes to the trade and commerce because of its fast yield and high return. The average loan on this sector was 78.4%. The corresponding figure on agriculture which most poor rely on for their livelihood was only 14.1%. It was only 3.5% on manufacturing and absolutely no funding is given towards housing and consumption (Folake, 2005).

iii. Outreaching the poor

According to Central Bank of Nigeria's estimate the unreachable client of Microfinance reaches 40 million (CBN, 2004). Microfinance specific institutions in Nigeria have not been able to adequately address the gap in terms of credit, savings and other financial services required by the micro entrepreneurs. The existence of huge un-served market - over 80 million people (65% of Nigeria's active population).In 2005, the share of micro credit as a percentage of total credit was 0.9%, while it contributed a meagre 0.2 percent of the GDP (Bamisile, 2006). The inequitable redistribution exists in the sense that the Microfinance institutions represent the rich category of the people while the clients represent poor category and still the former charge the latter higher interest rate on loan as high as 100% in some cases and pays only 5% on savings made by the clients, an unfair justification for that matter.

According to the CBN Governor after introducing new policy on Microfinance he stated that the new focus on small and medium-scale enterprises was borne out of the realization that the country could not go far in employment generation and poverty alleviation without these enterprises having their pride of place (Soludo, 2008). He added that the Microfinance policy, which evolved as a result of the perceived need for funding of businesses, which have no access to Banks. These Funds will benefit only

35 per cent of the nation's population, particularly micro and small scale entrepreneurs, due to uneven spread of the MFBs across the states (Soludo, 2008).

It is well documented that for many small and development oriented donor agency (multilateral and large scale farmers) that lack of access to financial services is bilateral and a critical constraint to the establishment or expansion of a Microfinance programme and many viable agricultural enterprises. Microfinance may enable the small and marginal farmers to purchase inputs which are needed to increase their productivity, as well as financing other agricultural activities. With an estimated 1.3 billion people of the world, access to savings facilities also plays a key part in living on incomes of less than $1 a day. Though most Governments (especially the Sub-Saharan Africa) employ programmes which enables the poor to smoothen their consumption, expenditures and financing investments which improves their livelihood. These results in enormous productivity in agriculture and other economic activities and hence, reduces poverty. However, a lot has to be done to integrate Microfinance institutions fully into the mainstream of rural services such as savings and credit to the poor. Also financial systems especially commercial banks have to recognize household finances as necessary but not a sufficient condition for rapid poverty reduction.

(d) History and Performance of Microfinance Bank in Niger State

As of July 2011, Nigeria had 866 microfinance banks (MFBs), the majority of which wereformerly community banks and are now single branch institutions. Only 82 MFBs service theNorth-West and North-East geopolitical zones combined – the regions with the highestunbanked rate – compared to over 500 in the South-West and South-East geopolitical zones. The MFB network serves 3.8% of the adult population (3.2 million

clients). Of the 3.2 millionMFB clients, 65% use savings products, 14% use credit products and 4% have an ATM card.The biggest challenges for MFBs are the high refinancing costs compounded by a low focus ondeposits, high operating expenses and low staff capacity, leading to poor asset portfolios. Assuch, the vast majority of MFBs lack the scale and operating capacity to have a strong impact onFinancial Inclusion (CBN, 2012).

Though, previous administration in the State had numerous agenda on Microfinance in order to compliment the policy at the centre (The Federal Government), until in 2008, in line with the Federal Government policy, the State converted its Community Banks into Microfinance Bank and made it as a matter of policy at least each Local Government should have one or more Microfinance Bank. Thus the new era for fully operational Microfinance Bank in the State began (Niger State Government Gazette, 2009).

2.5 Agricultural Productivity

The concept of productivity is a relative term and sometimes it is considered to be an overall efficiency and effectiveness of productive units or as a ratio of output to the corresponding inputs used. Though all these definitions are apparently conflicting to each other but their different interpretations have common characteristics i.e. productivity is someone's' ability to produce more economically and efficiently (Mohammad, 1992). In this study therefore, agricultural productivity could be defined as ratio of output to inputs in relation to fertilizers, improved seeds, labour and chemicals (herbicides/pesticides) employed in agriculture.

i. Technical Efficiency

This in production is defined as the physical ratio of product output to the factor inputs. The greater theratio, the greater the magnitude of the technical efficiency, implying existence of difference in technicalefficiency between firms/farms. The production function pre-supposes technical efficiency, whereby maximumoutput is obtained from a given level of inputs combination; hence it is a factor-product relationship. Animportant assumption underlying efficiency concept is that firms operate on the outer bound of productionfunction that is, on their efficiency frontier, implying that when firms fail to operate on the outer bound oftheir production function, they are said to be technically inefficient. For such firms, an improvement intechnical efficiency could be achieved in three ways, through (a) improved production techniques, whichimplies a change in factor proportions through factor substitution under a given technology, thus representinga change along the given production function; (b) an improvement in production technology, which representsa change in the production function itself such that the same amount of resources produce more output, oralternately, the same amount of output is derived from smaller quantities of resources than before, and (c) asimultaneous improvement in both production techniques and technology (Amazaet al., 2001). The technicalefficiency of individual farmers is defined by Ogundari and Ojo (2007), as the ratio of observed output to thecorresponding frontiers output, conditional on the level of input used by the farmers. In essence, technology according to Ogundele and Okoruwa(2004) plays a very significant role in determining the levels of technical efficiency of a firm, and that wherethe producing unit did not comply strictly with the accompanied recommendation, the result may bedevastating. Efficiency level of farmers, according to Awotide and Adejobi (2006), has direct

bearing on thecost of production which consequently translates to more profit to the farmers.

iii. Measuring Efficiency Using Frontier Production Function

Efficiency is a very important factor of productivity growth, especially in developing agricultural economies where resources are meager and opportunities for developing and adopting better technologies are dwindling (Ali and Chaudhry, 1990). Such economies can benefit greatly by determining the extent to which it is possible to raise productivity or increase efficiency, at the existing resource base or technology. For efficient production, non-physical inputs, such as experience, information and supervision, might influence the ability of a producer to use the available technology efficiently. Each type of inefficiency is costly to a firm or production unit (e.g., a farm household) in the sense that each in-efficiency causes a reduction in profit below the maximum value attainable under full efficiency.

In a production function context, a farm is said to be technically inefficient, for given set of inputs, if its output level lies below the frontier output (the maximum flexible output) (Rahman, 2003). The popular approach to measure the efficiency is the use of frontier production function (Tzouvelekas et al, 2001; Wadud and White, 2002). The variation of actual output from the frontier due toinefficiency and random shocks can be captured throughstochastic frontier approach .The existence of inefficiencyin crop production comes from inefficient use of scarceresources. There exist two main competing methods foranalyzing technical efficiency and its principaldeterminants: the parametric frontier (stochastic frontierapproach) and the non-parametric frontier (dataenvelopment analysis). Non-parametric frontier suffersfrom the criticism that it

takes no account of the possibleinfluence of random shocks like measurement errors andother noises in the data (Coelli, 1995).The parametric frontier uses econometrics method toestimate the parameters of both stochastic frontierproduction function and inefficiency effect model. The stochastic production function as a tool of analysis based on parametric stochastic efficiency decomposition methodology is used to estimate the technical, allocative and economic efficiency measures of a firm (farm). The Cobb Douglas model is usually used to fit stochastic production frontiers for farmers by using the maximum likelihood technique. The functional form has been widely used in farm efficiency analyses for both developing and developed countries (Bravo-Ureta and Evenson, 1994). Thebiggest advantage of stochastic frontier approach is theintroduction of stochastic random noises that are beyondthe control of the farmers in addition to the inefficiencyeffects. The disadvantage of this approach is that itimposes explicit restriction on functional forms anddistributional assumption for one-sided error term (Coelli and Battese, 1996).

In opposite to the stochastic frontiermethod, data envelopment analysis is a deterministicfrontier, meaning that all deviation from the frontier isattributed to inefficiency only. It is difficult to accept thisassumption, given the inherent variability of agriculturalproduction in developing countries due to a lot ofexogenous factors like weather shocks, pests, diseases,etc (Coelli and Battese,1996).Furthermore, because ofthe low level of education of farmers in developingcountries, keeping accurate records is not a commonpractice. Thus, most available data on production are morelikely to be subject to measurement errors.

vi. Usefulness of Stochastic Frontier Analysis

• Stochastic Frontier Analysis (SFA)produces efficiency estimates or efficiency scores of individual producers. Thus one can identify those who need intervention and corrective measures.

• Since efficiency scores vary across producers, they can be related to producer characteristics like size, ownership, location, etc. Thus one can identify source of inefficiency.

• SFA provides a powerful tool for examining effects of intervention. For example, has efficiency of the banks changed after deregulation? Has this change varied across ownership groups?

CHAPTER THREE

METHODOLOGY

3.1 Study Area

The study was conducted in Niger state. The state is located between latitudes 8.2°N and 11.3°N and longitudes 3.3°E and 7.2° E. It is bordered at the north by Zamfara state, northwest by Kebbi and south by Kogi state and southwest by Kwara state. Kaduna and Federal Capital Territory Abuja are in the northeast and south east respectively (See figure 1).

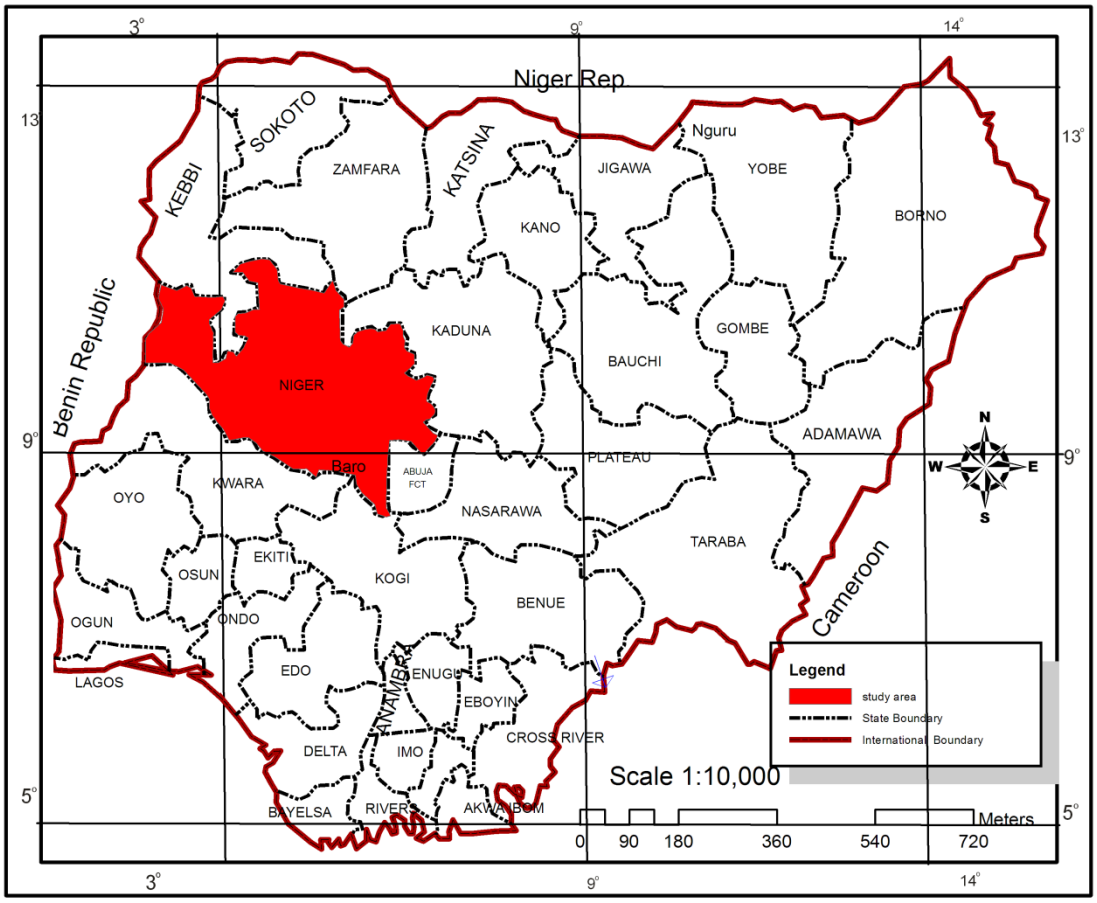


Fig. 1 Map of Nigeria showing Niger State

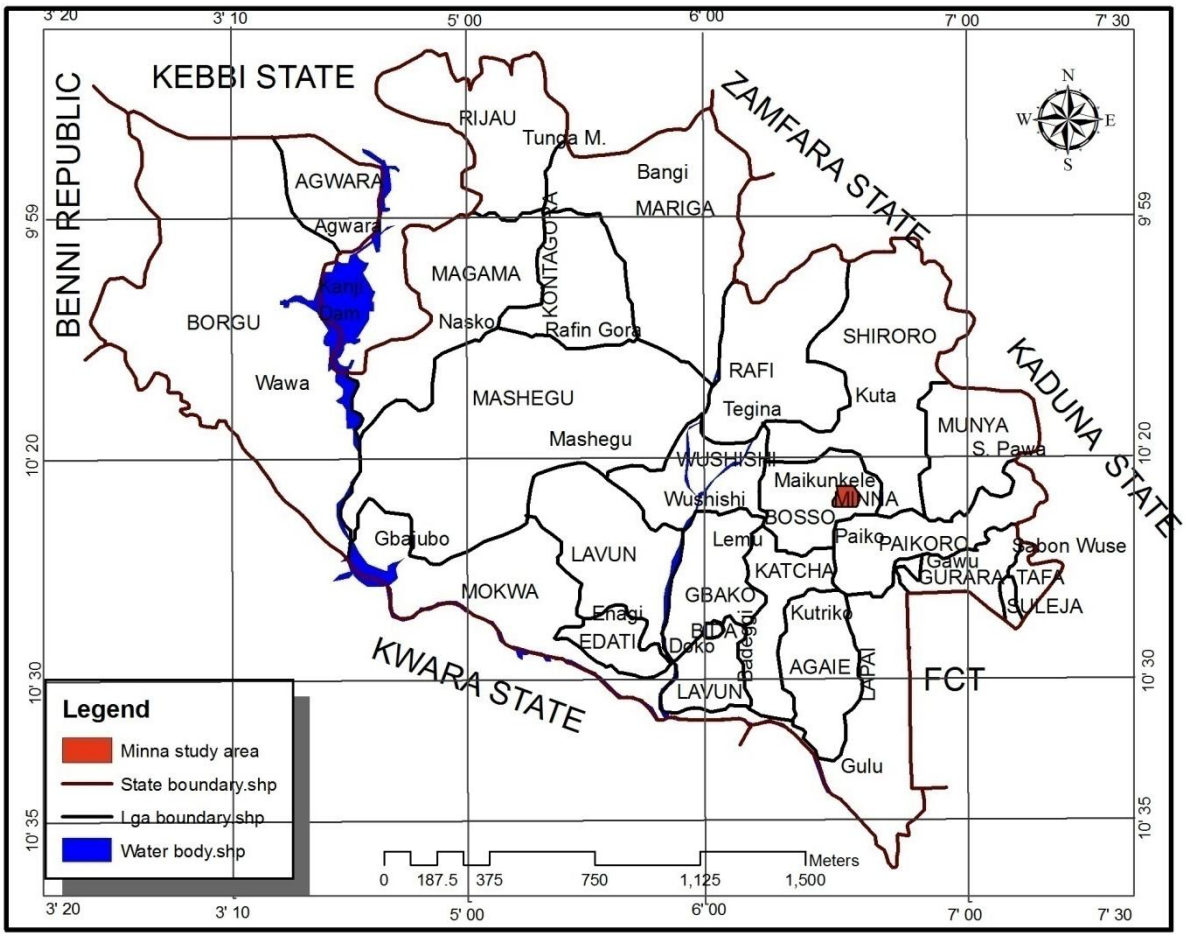


Fig.2 Map of Niger Stateshowing the Study Area

As at 2006, the state has population of about 3,950,249 persons of which 2,032725 are men while the remainder are females (NPC, 2006). It is one of the largest states in Nigeria with a landmassof 86,000km2 (8.6 million hectares) which represents about 9.3% of the total landmass of Nigeria. Niger state experiences distinct dry and wet seasons with annual rainfall varying from 1,100mm (120 days) in the northern part to 1,600mm (150 days) in the southern part. This makes it possible for cultivation of certain crops in certain part of the state (Niger State Government, 2011).

Occupationally 85% of the adult populace are farmers while the remainder are engaged in vocational and white collar jobs. The state is blessed with vast arable land for agricultural activities (farming, fishing and livestock rearing) and numerous natural resources like solid minerals (gold, talc, kaolin, graphite, ball clay, marble, copper iron, manganese, feldspar). The two major dams for electricity generation in the country are located in the state. The extensive flood plains in the southern boundary of the state, availability of large water bodies, dams and reservoirs offer great opportunity for dry season cultivation of *fadama* crops such as rice, sugarcane, maize and assorted vegetables. The abundant grassland and fodder, favourable weather and abundant water supply give an ideal condition for livestock production (Niger State Government, 2011).

Niger state is divided into three zones, each zone with a marked climatic pattern and a defined agricultural activities namely; Zone I, II, III. Zone I is found in the southern part of the state and comprises of Agaie, Bida, Edati, Katcha, Gbako, Lapai ,Lavun and Mokwa Local Government Areas (LGA). And Zone II comprises of Rafi, Bosso, Shiroro, Chanchaga, Paikoro, Gurara, Tafa, Munya and Suleja LGA. While Zone III comprises of Agwara, Borgu,Kontogora, Magama, Mariga, Mashegu, Rijau and Wushihi LGA.

The zones have agriculture as its major traditional occupation with trade and crafts as the secondary occupation. Mixed cropping is the major farming practice in the three zones with a combination of various food crops in the mixture. The most important food crops grown include rice, maize, yam, millet, sorghum, groundnut, cassava and cowpea. Livestock keeping is also predominantly practiced by the farmers especially

the female members of the household (especially poultry, goats and sheep)(Niger State Government, 2011).

Major commercial crops grown by the sampled farmers include yam, rice millet, maize cowpea, sorghum and groundnut. These crops are grown in combination with another during one farming season.

3.2 Sampling procedure

A multistage sampling technique was used. Multi-stage samplingtechnique involves a procedure whereby the selection of units into thesample is organized into stages. It usually involves a combination ofsampling methods. All the three agricultural zones were covered in thisstudy. There are thirty two (32) Microfinance Banks established in the state (as at the time of this research) but only nineteen (19) have commenced full financial operations. In stage one; the list of crop farmers (those cultivating rice, maize, yams and other crop for commercial purpose from the three distinctive zones) using micro credits was obtained from the Microfinance Board. This list represents the sample frame for the micro credit beneficiaries. For stage two;six LocalGovernment area was randomly selected from each agricultural zone. Inthe third stage;one operational microfinance bank was randomly selected from each of the six Local Government areas. In the fourth stage; ten (10) percent of the beneficiaryfarmers each were randomly selected. This gave rise to one hundred and eighty five (185) microfinance beneficiary farmers.

On the other hand, multi-stage sampling technique was used in regards to non loan beneficiaries too. In stage one; all the non micro-credit beneficiary farmersin the six

Local Government areasselected were identified. Instage two; ten (10) food crop farmers each who do not borrow from microfinance were randomly selected. This gave rise to one hundred and ninety (190) farmers who are non-loan beneficiaries of microfinance.

Thus, the sum of the two categories (375)was used for the study, this formed the sample size. The sample selection was done in line with the suggestion by Cooper and Schindler (2002). According to them, a sample size of a hundred (100) respondents is good for any statistical analysis.

Table 3.1 Microfinance Banks in Niger State and their Locations

	LGA	Location	Name of MB	No of loan beneficiaries (farmers)	Sample size (10%)
1	Agaie	Agaie	Babba	107	11
2	Agwara	Agwara	Kpacharka	135	13
3	Bida	Bida	Edumama	59	6
4	Chanchaga	Chanchaga	Lapo	94	9
5	Chanchaga	Chanchaga	Minna	53	5
6	Edati	Enagi	Dangizhi	98	10
7	Gbako	Lemu	Chibgeyaji	84	8
8	Gurara	Gawu babangida	Bmazazhin	114	11
9	Lavun	Busu	Busu	46	5
10	Lavun	Kutigi	Lavunkpan	130	13
11	Magama	Nasko	Naisa	152	15
12	Mashegu	Makera	Tattali	135	13
13	Mariga	Bangi	Kunagaba	156	15
14	Munya	Sarkin pawa	Acheajebwo	116	11
15	Paikoro	Paiko	Pana	147	14
16	Rafi	Kagara	Masoyi	131	13
17	Rijau	Rijau	Gulfare	62	6
18	Shiroro	Gwada	Bwayi	67	6
19	Wushishi	Wushishi	Tanadi	53	5

Source;Niger State Microfinance Board (2013).

3.3 Method of Data Collection

Primary data was used for the study. The primary data wascollected by trained enumerators and the researcher by administration of structured questionnaire through informal discussion and personal interviews with the farmers' household head. A cross-sectional data from a farm survey of crop farmers for 2014 growing season was used. The data collected includes demographic information, such as age, educational level, marital status, farm size, amount of credit obtained, types of crops grown and years of experience in farming.

Production information was also collected; this includes output and inputs such as seed, fertilizer, pesticide, herbicides and labour used.

3.4 Analytical Tools

The analytical tools that were used to achieve the objectives are; descriptive statistics, stochastic frontier production functionsand double hurdle analysis.

3.4.1 Descriptive statistics

Descriptive statistics used were mean, percentages and frequency distribution in achieving objectives that describe the socio-economic characteristics of crop farmers and identifies the factors militating against crop production in the study area (i.e. objective 1 and 5 of the study).

3.4.2 Stochastic frontier production function

The stochastic production frontier was used to achieve objectives 2 and 3 of the study. This function have been employed in other studies to determine technical efficiency of agricultural production (Bakhsh et al., 2006; Erhabor and Emokaro, 2007; Binuomota et

al., 2008). The general stochastic production frontier with a multiplicative disturbance term of the farm is shown below:

$$Y = f\left(X\beta\right)\exp^{E} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(1)$$

Y= the quantity of farm outputs

X= Vector of input quantities

β= a vector parameters

E=Stochastic disturbance term consisting of two independent elements U and V.

Where E=V-U

The symmetric component, V, accounts for factors outside the farmers' control, such as weather and diseases. It is assumed to be independent and identically distributed normal random variable (O, δV^2). A one side component U≤O reflects the technical inefficiency relative to the stochastic frontier, $F\left(X\beta\right)^{E}$. The distribution of U is half normal. The stochastic production frontier model can be used to analyze cross sectional data. The model simultaneously estimates the individual efficiency of the respondent farmers as well as determinants of technical efficiency (Batesse and Coelli, 1995). The frontier of the farm is given as.

$$Y = f\left(x\beta\right)\exp^{(v-u)} \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Measures of efficiency for each farm can be calculated as

$$Y = \frac{f\left(x\beta\right)}{f\left(x\beta\right)}\exp^{(v-u)}$$

$\exp^{(v-u)}$ ..... (3)

The specific model is explicitly written as:

$LnY_j = \beta_0 + \beta_1 Ln\ X_1 + \beta_2 LnX_2 + \beta_3 LnX_3 + \beta_4 LnX_4 + \beta_5 LnX_5 + \beta_6 LnX_6 + ei$..... (4)

Where; Y_j is crop output (kilogram)

J is 1, 2, 3 ...360 crop farmers;

X_1 is farm size (hectares)

X_2 labour (man-days)

X_3 is fertilizer (kilogram)

X_4 is seeds (kilogram)

X_5 is herbicide (Litres)

X_6 is capital /access to credit (₦)

β_i is regression coefficients of inputs (input elasticities) and

$e_{i=} v_i - u_i$ is the error term.

Kumbhakar et al.(1991), assume that the technical inefficiency effects are non-negative truncations of a normal distribution with mean, which is linear function of exogenous factors whose coefficients are unknown, and an unknown variance. Invariably, it is assumed that inefficiency effects are independently distributed and U_{ij} arises by truncation (at zero) of the normal distribution with mean U_{ij} and variance $\delta U^{2.}$ In the same line, Ray (1988) and Sharma et. al (1999) estimated the determinant of technical, allocative and economic inefficiency as

$U_{ij} = \delta_0 + \delta_i Z_{IJ}$..... (5)

Where U_{ij} is the inefficiency

$^{ij}Z_{ijs}$ Are the vectors of explanatory variables associated with technical, allocative and economic inefficiencies;δ_{is} are vectors of unknown parameters to be estimated.

An explicit equation can be expressed as

$$U_{ij} = \delta_0 + \delta_1 Z_{i1} + \delta_2 Z_{i2} + \delta_3 Z_{i3} + \delta_4 Z_{i4} + \delta_5 Z_{i5} + \ldots\ldots\ldots\ldots\ldots \delta_7 Z_7 \ldots\ldots..(6)$$

Where

U_i =technical inefficiency of the ith farmer

Z_1=Farmer's age (yrs)

Z_2=Years of farming experience of the ith farmer in crop production

Z_3=Annual income level (₦)

Z_4=Years of formal education of the ith farmer

Z_5=Household size of ith farmer (number of people)

Z_6=Land ownership of the ith farmer

Z_7= Marital Status of the ith farmer measured as dummy (if married 1, 0 otherwise)

The concept of technical efficiency relates to the question of whether a firm uses the best available technology in its production process. It is assumed that 0 < technical efficiency < 1, where technical efficiency = 1 implies that the firm is producing on its production frontier and is said to be technically efficient. 1 – Technical efficiency is therefore the largest proportional reduction in input that can be achieved in the production of the output. Alternatively it can be interpreted as the largest percentage cost saving that can be achieved by moving the firm towards the frontier isoquant through radial rescaling of all inputs (Chavas and Aliber 1993).

3.4.3 Double hurdle model

Double Hurdle Model was used to achieve objective 4 of the study. The Double Hurdle model is a parametric generalization of the P-Tobit model, in which the causes and extent of access to credit are determined by two separate stochastic processes given as:

Observed loan size: $Y = d.Y^{**}$..... (7)

Loan participation: $W = \alpha'Z + u$ ($u \epsilon N(0,1)$) .....(8)

$d = 1$ if $W > 0$ and 0 otherwise.

Loan size equation: $Y^* = \beta'X + v$ ($v \epsilon N(0, \delta 2)$ .....(9)

$Y^{**} = Y^*$ if $Y^* > 0$ and 0 otherwise.

Where

W is defined whether the households decide to take out credit,

Y* is latent variable showing farmers' loan amount obtained,

Y is the observed dependent variables (the amount of money the farmer obtained),

Z is a vector of variables explaining the credit participation decision,

X is a vector ofvariables determining on the credit amount,

u and v are the correspondingerror terms assumed to be independent and distributed as $u \epsilon N(0,1)$ and $v \epsilon N(0,\delta 2)$.

Empirical results by both Moffat (2003) and Martínez-Espiñeira (2006) reveal that theDouble-Hurdle model gives superior results to those obtained from Tobit and P-Tobitmodels.This model was solved in one procedurein Strata.The log likelihood of the Double Hurdle model is given as:

$$Log\ (L) = \sum_0 in\left[1-\phi\left(z_i^{'} \propto\right)\phi\left(\frac{x_i^{'}\beta}{\delta}\right)\right] + \sum_+ in\left[\phi\left(z_i^{'} \propto\right)\frac{1}{\delta}\phi\left(\frac{y-x_i^{'}\beta}{\delta}\right)\right]$$

Where

Log(L)= Accessibility to microfinance(i.e. loan size) (Naira)

X_1 = age of the farmer (years)

X_2 = land size (hectares)

X_3 = ownership of land (1, owned, 0 otherwise)

X_4 = marital statuses (1 if married, 0 otherwise)

X_5 = farm income of the respondent in 2014(Naira)

X_6 = cost of borrowing from microfinance (Naira)

X_7 = education level (Years)

X_8 = distance/ outreach to microfinance (Km)

X_9 = farming experience (Years)

X_{10} = family size of the respondents

X_{11} = extension contact (no of time)

Yi = whether farmers access to credit (takes the value of 1 if the farmers take credit, 0 forotherwise).

Z and *X*= is the vector of farmers characteristics

β and α= is the vector of parameters

μ and ε = the error term N (0, 1)

3.5 Test of Hypothesis

Z-test was performed to test the significance of each of the explanatory variables at alpha levels of one, five and ten percent by subjecting the two means of output and technical efficiency to the test.

$$Z = \frac{X_1 - X_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_1}}}$$

Where,

X_1 and X_2 are individual mean output and or technical efficiency of beneficiaries and non-beneficiary farmers respectively.

n_1 and n_2 are the sample size of loan beneficiariesand non-beneficiary farmers respectively.

$S_1^2 + S_2^2$ are the estimated variance of the mean output and or technical efficiency of loan beneficiariesand non-loan beneficiaries respectively.

Chows test was performed to ascertain the conformity of the result obtained from production function analysis and also test for significant difference between socio-economic factors affecting access to microfinance and technical efficiency for loan beneficiariesand non-loan beneficiary farmers. Chows test is given as;

$$F = \frac{\left[\sum e^2 p - \left(\sum e_{1+}^2 \sum e_2^2\right)\right] / k}{\left(\sum e_{1+}^2 \sum e_2^2\right) / \left(n_1 + n_2 - 2k\right)}$$

To test the hypotheses bi = Bi (null),

bi ≠ Bi (alternative)

Where,

$(\sum e_1^2 + \sum e_2^2)$= the summation of unexplained variables of the two samples (loan beneficiaries and non loan beneficiaries of microfinance model)

$\sum e^2 p$= sum of square error for the pooled sample.

(n_1+n_2-2k)= the degree of freedom.

$n_1+n_{2=}$ sample size for loan beneficiaries and non loan beneficiary farmers respectively.

K= no of estimated parameters including the intercept.

3.6 Measurement of Variables and their a prior Expectation

The variables included in the model for stochastic frontier analysis are described as follows.

i. Farm Size (X_1)

The inclusion of this variable into the model is to show the influence it has on crop production in the study. It therefore helps in determining the extent to which it explained the variability in output. The farm size was measured in hectares (ha).The quantity of output is expected to be positively related to the farm size.

ii. Quantity of Seeds (X_2)

This referred to the quantity of seeds used (i.e. its grain equivalent index). It was included in the model to examine the extent to which variations in the quantity of seeds planted affects the output of food crop. This was measured in kilogram (kg). The quantity of crop output produced is expected to be positively related to the quantity of seeds used.

iii. Quantity of Fertilizer (X_3)

This was measured in kilogram (kg). It referred to the quantity of fertilizer materials used. Fertilizer use replenishes depleted soil nutrients and hence increases agricultural productivity. It was included in the model in order to know the extent to which its variations affect the total output from the farm.The output of crops realized is expected to be positively related to the quantity of fertilizer used.

iv. Quantity of Herbicides (X_4)

This referred to the quantity of herbicides used in food crop production. It inclusion in the model was to determine the extent to which its variations affects total output from the farm. The unit of measurement used was litres (ltr).

v. Total Farm Labour (X_5)

This referred to the amount of physical effort used in man-days. It was included in the model to determine if labour was being over or under utilized in food crop production in the study area. It is expected to positively influence the mean output of crops. This is because increasing the amount of labour should help farmers to carry out critical agricultural operations on time and thus permit farmers to respond more rapidly to problems when a rapid response may be crucial in reducing crop losses (Fufa and Hassan, 2003).

vi. Output (Y)

This refers to the physical quantity of food crop in tonnes harvested from the various sampled fields.It is a measure of total quantity of crops harvested

during 2014 cropping season expressed in tonnes. It is determined from farm level data and used as the dependent variable.

The quantity of outputs of crops wasobtained in their local measures and then converted tokilogram. The output in kilograms was later converted to GrainEquivalent using the conversion factor by Kormawa(1999). This was done to allow output aggregation aswell as allowing for a technical relationship betweeninputs and outputs to be estimated for the crop mixture. Thus,all crop outputs regardless of cropping system used were aggregated into a single output grain equivalent index.

Table 3.2 Variables in Production Function and their a priori Expectations

Variables	Description	A priori expectations
X_1	Farm size	+
X_2	Labour	+
X_3	Fertilizer	+
X_4	Seeds	+
X_5	Herbicide	+
X_6	capital	+

3.6.1 Variables in Technical Inefficiency Model and their a priori Expectations

The estimated coefficients ofthe inefficiency function provide some explanations for the relative efficiency levels among individual farms. Since the dependent variable of the inefficiency function represents the mode of inefficiency, a positive sign of an estimated parameter implies that the associatedvariable has a negative effect on efficiency and a negative sign indicates the reverse. Invariably, a negative estimated coefficient ofthe inefficiency function implied a reduction in the level of inefficiency hence an increase in technical efficiency.

i. House hold size: The number of persons living in the household is hypothesized to determine inefficiency negatively and thus increasing the output. This means that households with large family size would manage their farms on time than their counterparts. This is because at the time of peak seasons, there is shortage of labor. This is possible since more labor can be deployed during peak season in order to timely undertake the necessary farming activities like ploughing, weeding and harvesting that raise efficiency.

ii. Age of the farmer and farming experience**:** .Age of the head of household, which is considered as a proxy of farmers' experience in farming, is hypothesized to have negative effect on inefficiency. This is because as age increases farming experiences increases so that efficiency increases. But after certain age interval it will have negative effect on efficiency because of older farmers are thought to be more conservative in implementing modern technologies. This means that age and efficiency have inverted u-shaped relationship i.e. efficiency increases with age up to some point and then decreases with rise in age. Hence, middle aged farmers are more efficient than old aged and younger farmers. Since farming like any other professions needs accumulated knowledge, skill and physical capability, age of the farmers is decisive in determining efficiency. The knowledge, the skills as well as the physical capability of farmers is likely to increase as age increases. However this tends to decrease after a certain age level. Older farmers will have less physical capacity to undertake their farming activities efficiently.

iii. Education**:** It is hypothesized that education of household head would be able to negatively influence technical inefficiency from the given level of inputs than their uneducated counterpart. This is because education can increase their information acquisition and adjustment abilities, thereby increasing their decision making capacity. In addition to this it will help them to adopt modern agricultural technologies and be able to produce higher output using the existing recourses moreefficiently.

Table 3.3 Signs of co-efficient in Technical inefficiency model and their a priori Expectations

Variables	Description	A priori expectations
Z_1	Age of the farmer	-
Z_2	Farming experience	-
Z_3	Income	-
Z_4	Education	-
Z_5	Household size	-
Z_6	Land ownership	-

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1 Socio-Economic Characteristics of the Farmers

The socio economic characteristics of the respondents considered in this study were age, level of education, farming experience, farm size, gender of the farmer and household size.

4.1.1 Age of the Farmers

The findings in table 4.1 showed that 3.3% and 10% of loan beneficiaries and non-loan beneficiary farmers were below the age 30. Also about31.7% and 31.6% of beneficiaries and non-loan beneficiaries respectively are between the age 30 and 40 years, while 65% and 58.3% of the same were above 40 years. The mean age was found to be 43 years and 42 years for the beneficiaries and non-loan beneficiaries respectively. This shows that large proportion of the respondents were still in their active years and are likely to be productive and can strive more to access farm credit. It also implies that the production of food and other farming activities were in the hands of the ageing population. Previous studies have indicated similar trend in the age of practicing farmers in Nigeria (Abdulfatah, 2012). This finding agrees with Tanko et.al (2011) who reported mean ages of 44 years for food crop farmers in Niger state and also the findings of Onubuogu and Onyeneke (2012) among roots and tuber crop

producers in Imo state. It is also in consistence with Adeyemi (2008) who stated that younger farmers are more likely to benefit from source of credit due to their energetic nature and abilities to adopt innovations.

Table 4.1 Ages of the Respondents

	Beneficiaries		Non Beneficiaries	
Age range	Frequency	Percentage	Frequency	Percentage
Less than 30	6	3.3	18	10.0
30 – 34	18	10.0	17	9.4
35 – 39	39	21.7	40	22.2
40 – 44	43	23.9	21	11.7
45 – 49	32	17.8	44	24.4
50 and above	42	23.3	40	22.2
Total	180	100	180	100
Minimum	25		25	
Maximum	65		63	
Mean	42		43	
Standard dev.	9.454		8.222	

4.1.2 Level of education

Literacy level is the ability of the respondent to read and write either in English or in any major Nigerian languages. Table 4.2 shows that 75% and 61.2% of the beneficiaries and non-loan beneficiaries respectively had one form of education or the other, while the remainder had no education.Out of the 75% of loan beneficiaries,15.6% had Islamic education, 22.2% had primary education, 26.1 and 26.7% had secondary and tertiary education respectively. On the other hand, 28.3% of the non-loan beneficiarieshad Islamic education, 27.8%had primary education, while 24.4% and 7.8%had secondary and tertiary educationrespectively. The level of education attained is expected to improve the performance of the farmers as education plays a crucial role in technology adoption, credit accessing and farm decision making. In the same vein,

Asefa (2012) asserted that the level of education of a farmercan increase their information acquisition andadjustment abilities, thereby- increasing their decisionmaking capacity. In addition to this it will help them toadopt modern agricultural technologies and be able toproduce higher output using the existing recourses moreefficiently.

Table 4.2 Years of Formal Schooling/Education

	Beneficiary farmers		Non Beneficiary farmers	
Form of education	Frequency	Percentage	Frequency	Percentage
No formal	45	25	72	40
Islamic	28	15.6	51	28.3
Primary	40	22.2	50	27.8
Secondary	47	26.1	44	24.4
Tertiary	48	26.7	14	7.8
Total	180	100	180	100
Minimum	1		1	
Maximum	5		5	

4.1.3 Years of Experience in Farming

Results in table 4.3 indicate that the mean years of farming experience was 24 years for both thebeneficiaryand non- beneficiary farmers. Majority (46.1% of loan beneficiaries and 37.8% of the non-loan beneficiaries) of the respondents had between 20-29years of farming, implying that the respondents were relatively young with a few decades of experience in farming.This may affect their level of awareness and access to microfinance and also go a long way to ease the bottlenecks (bureaucracy) in the process of loan acquisition from the bank. It is believed that higher years of farming experience is a necessary key for efficient crop yield, thus microfinance banks would prefer their clients to have good years of farming experience. This is in consistence with the findings of Ambali (2013), in his studies on Microcredit and Technical

Efficiency of Rural Farm Households in Egba Division of Ogun State who notes a mean years of farming experience of 23 years.

Table 4.3 Years of Farming Experience

	Borrower		**Non borrower**	
Years of experience	Frequency	Percentage	Frequency	Percentage
Less than 10	1	0.6	12	6.7
10 – 19	46	25.6	37	20.6
20 – 29	83	46.1	68	37.8
30 – 39	37	20.6	47	26.1
40 – 49	13	7.2	16	8.9
Total	180	100	180	100
Minimum	10		6	
Maximum	46		45	
Mean	24		24	
Standard dev.	8.831		9.450	

4.1.4 Household Size

This study reveals a mean household size of 9 and 10 for the borrower and non-loan beneficiaries respectively. It shows that 53.9% of the loan beneficiarieshad a household size of less than 10 persons, 37.2% of them had a household size between 10-14 persons while only 8.9% had over 15 persons in their household. Similarly, 38.3% of the non-loan beneficiaries had a household size of less than 10 persons, 46.7 had a household size between 10-14 persons and only 14.1% of them had over 15 persons in their households. This implies that the larger the family size, the more of labour component usage on the farm and the more mouths to feed but less farm income to be realized by the farmer. Tijjani (2006) noted that the major reason why farmers keep large family members is for the provision of farm labour during peak production

periods. Thus, the larger the family size, the more labour is available for farming operations.

Household size is an important factor in traditional subsistence agriculture, because it determines to a larger extent the supply of labour for immediate farm employment and for generation of income for meeting family needs. This finding is in consonance with those of Olanpekun and Kuponiyi (2009), who pointed out that a large family may serve as incentive for engaging in livelihood diversification in order to meet the obligation of the family. Effiong (2005) and Idiong (2007) reported that a relatively large household size enhances the availability of labour, though household size may not guarantee for increased efficiency.

Table 4.4 Household Size of the Respondents

	Borrower		Non borrower	
Household size	Frequency	Percentage	Frequency	Percentage
Less than 5	25	13.9	11	6.1
5 – 9	72	40.0	58	32.2
10 – 14	67	37.2	84	46.7
15 – 19	16	8.9	23	12.8
20 – 24	-	-	3	1.7
25 and above	-	-	1	0.6
Total	180	100	180	100
Minimum	3		1	
Maximum	18		28	
Mean	9		10	
Standard dev	3.643		3.856	

4.1.5 Farm Size

The result in table 4.5 shows that majority (54.4% of the borrowing and 87.8% of the non-loan beneficiaries) of the respondents had farm sizes less than 4 hectares. While between 38.8% of the loan beneficiariesand 12.1% of the non-loan beneficiaries had

farm sizes between 4 hectares and 9 hectares. The percentage of loan beneficiaries and non-loan beneficiaries having between 10 hectare and 15 hectares was 6.6% and 1.1% respectively. Though, the mean farm size for the beneficiaries and non-loan beneficiary farmers was 4.4 hectares and 2.52 hectaresrespectively. This implies that most of the food crop farmers are small holders of land for agricultural production. Farm size is an important fixed input in agricultural production and determine to a large extent the output and income of the farmer. This finding agrees with Imonikhe (2004) who opined that the size of the farm cultivated by farmers is a function of the financial background and experience of the farmer.

Table 4.5 Farm Size Distribution

	Beneficiary Farmers		Non Beneficiary Farmers	
Range(farm sizes ha)	Frequency	Percentage	Frequency	Percentage
Less than 4	98	54.4	158	87.8
4—6	44	24.4	17	9.4
7—9	26	14.4	3	1.7
10—12	6	3.3	2	1.1
13—15	6	3.3	-	-
Total	180	100	180	100
Mean	4.40		2.52	
Standard dev	3.133		1.424	

4.1.6 Gender/Sex of the Respondent

Table 4.6 shows that majority of the respondents (95% of the loan beneficiaries and 94.4% of the non-loan beneficiaries) were male. This clearly shows complete dominance in food crop production by male farmers. It further lends credence to the call for more concerted efforts at empowering the women so as to redress the gross inequality in gender distribution and greater involvement in crop production. This result

agrees with Amos (2006) and Ahmadu and Alufohai (2012) who reported that food crop production in Nigeria is dominated by male farmers.

Table 4.6 Gender of the Farmers

	Beneficiary		Non beneficiary	
Sex	Frequency	Percentage	Frequency	Percentage
Male	171	95.0	170	94.4
Female	9	5.0	10	5.6
Total	180	100	180	100

4.2 Determinants of Technical Efficiency in Crop Production

4.2.1 Relationship between Input and Output in Crop Production

Maximum likelihood estimate was applied on the data collected from sampled 360 crop farmers in Niger state. The efficiency measures was regressed on set of explanatory variables which included land (hectare), labour (man-day), fertilizer (kilogram), seeds (kilogram), herbicides (litre) and capital input (Naira).The result from the maximum likelihood estimates for the borrower and non-loan beneficiaries is shown in table 4.7.

Theresults in table 4.7 indicate that the beneficiaryand non-beneficiaryfarmer'sco-efficient sign for quantity of fertilizer were both positive and significantly related to output level. This result agrees with the a priori expectation. This indicates a direct relationship with output and contributes positively to food crop productivity. This implies that 1% in fertilizer usage will induce a 0.28% increase in total farm output. This finding agrees with Olagunju (2007) who noted that fertilizer usage in potato farming by credit users was positively and statistically related to the output. And also that of Amaza et.al (2006) who reported positive coefficients for variable in food crop production in Borno state.Though, this result is contrary to the findings of Ambali et.al (2012) who reported a negatively no significant relationship between fertilizer and food crop output in a similar study in Ogun state.

Labour was found to be highly significant and positively related to output for both group of farmers. This conforms to a priori expectation. Labour appears to be the one of important factor of production with an elasticity of 0.255, showing the labour- intensive nature of farming in the study area. This suggests that a 1 percent increase in labour will induce an increase of 0.3 percent in the farm output and vice versa. These results agree with previous work by Amaza et al. (2006).

Quantity of seeds was found to be statistically significant for both beneficiary and non beneficiary farmers but has a negative co-efficient sign which was contrary to a priori expectations. This implies that a 1% increase in quantity of seeds will bring about 0.2% reduction in output.The negative co-efficient of seeds is also an indication of excessive use of seeds by both groups during crop production.This was contrary to the findings of Amaza et.al (2006) and Mustapha and Salihu (2015) who found a positive and significant relationship of seed to output among maize/cowpea intercropping women farmers in Gombe state.

The estimated coefficient for land was negative and not statistically significant for the loan beneficiary farmer but statistically significant for the non loan beneficiary farmers. This was contrary to expectation, whichmeans that increase in land size given commensurate level of the inputs the farmers were using could onlylead to fall in crop output. Thus, land expansion may not bring marginal outputs given the way they were combining their resources. This is in consistence with the finding of Ndubueze-Ogaraku and Ekine (2015)

Herbicides was positive and not significant for the beneficiary farmer but was significant in the case of the non beneficiary farmers, this result conforms to a priori

expectations. This implies that an increase in the use of these inputs will lead to anincrease in crop production level which will invariably increase the technical efficiency of the farmers. This result is in consistence with the findings of Mustapha and Salihu (2015) in a technical efficiency study who found that the agrochemical use had a positive and significant relation to maize/cowpea production in Gombe state. And also the findings of Ambali et.al (2012) who reported a positive but significant relationship between herbicides and output of food crops in Ogun state.

Farm capital (input) was found to be positively related to output and not statistically significant for the loan beneficiary farmer but significantly related for the non beneficiary farmers.This result is in line with the a priori expectation and indicates that an increase in this variable input will bring about a proportionate increase in output of the crops. Farm capital (inputs) was found to be a significant variable factors affecting output of food crops produced by non loan beneficiaries but not for the beneficiary farmers. This result is in agreement with Enwerem and Ohajianya (2013) whose findings shows that capital input was one of the variable factors affecting output of rice farmers in Imo State.

Table 4.7 Relationship between Inputs and Output for the Loan beneficiaries and Non Loan beneficiaries.

Variables	Parameter	Co-efficient (Beneficiary farmers)	Co-efficient (Non Beneficiary farmers)
Constant	β_0	6.5963(0.5311)***	4.8064(1.1175)***
Land (ha)	β_1	-0.0913(0.1311)	-0.3824(0.1099)***
Labour (man-days)	β_2	0.2551(0.0670)***	0.1251(0.0547)**
Fertilizer (kg)	β_3	0.2820(0.5423)***	0.4169(0.1067)***
Seeds (kg)	β_4	-0.2080(0.0471)***	-0.2269(0.0354)***
Herbicides (litres)	β_5	0.0342(0.1042)	0.5627(0.1271)***
Farm capital (₦)	β_6	0.0278(0.0294)	0.1039(0.1027)
Sigma squared		1.481(0.3072)***	0.1009(0.0399)***
Log likelihood function		-200.1150	-63.2750

Figures outside the parentheses_ co-efficient, figures inside the parentheses_ Standard Deviation, ***Significant at 1% ** Significant at 5%

4.2.2 Elasticity of Production and Return to Scale

Table 4.8 shows the elasticity of the production and return to scale for both loan beneficiary and non-loan beneficiary. From the table, theelasticities of all inputs employed in crop production by the loan beneficiaries shows that labour, fertilizer, herbicide and farm capital were indicating a positive response in output, while seeds and farm size indicating a negative response in output. This also implies that a 1% change in any variable input while keeping the other inputs constant will result in a certain percentage changein the quantity of output equal to the elasticity of the variable input in the same direction as the change of the inputs. The elasticities of production with respect to various inputs indicate that only fertilizer(0.28) and labour (0.26) were the important input to which output was more responsive because of their elasticity values which was higher than the elasticities of farm size, seeds, herbicides and farm capital(0.21,0.03 and 0.09 respectively).

However, the elasticities of all inputs employed in food crop production by the non-loan beneficiary showed that labour,fertilizer, herbicides and farm capital were positive, indicating a positive response in output.This also implies that a 1% change in any variable input while keeping the other inputs constant will result in a certain percentage change in the quantity of output equal to the elasticity of the variable input in the same direction as the change of the inputs. The elasticities of production with respect to various inputs indicate that herbicides, fertilizer and farm size (0.56, 0.42 and 0.38 respectively) were the important input to which output was more responsive because of their elasticity values. This was higher than the elasticity of labour (0.13), seeds (0.23) and farm capital (0.10).

The sum of elasticities indicates the nature of returns to scale associated with a particular production system. Thus the behaviour of the output when all the factors of production are changed simultaneously in the same proportion is referred to return to scale. Return to scale is said to be decreasing, constant and increasing when the sum of elasticities of production is less than one, equal to one and greater than one respectively. From the table the result showsthat the sum of elasticities of production for both the loan beneficiaries and non-loan beneficiaries are 0.30 and 0.60 respectively. This implies that there was a decreasing return to scale for both group of farmers, meaning that if all inputs in the model were increased by 1% simultaneously, output will increase by 0.30% for the loan beneficiaries and 0.60% for the non-loan beneficiaries. It is thus advisable for both groups of farmers to use their recourse based on the marginal value productivity of the individual inputs as a guiding factor so as to maximize total output. This result so far implied that the non-loan beneficiariesare operating a little bit efficiently than the loan beneficiaries.The sum of production elasticities has a function coefficient of 0.30 and 0.60 for the two groups of crop farmers (beneficiary and non-beneficiary farmers respectively).

This means that the food crops farmers are in stage III of production function phase (i.e. irrational stage of production) which is a decreasing return to scale. This was necessitated by the low and negative value of the coefficient of farm size and seeds. Therefore, it implies that food crops farmers in Niger State are subsistent farmers and donot allocate and utilize their inorganic fertilizer optimally.

Table 4.8 Elasticity of the Production and Return to Scale

Variable inputs	**Loan beneficiaries (co-efficient b_1)**	**Non borrower (co-efficient b_1)**
Farm size (X_1)	-0.09	-0.38
Labour (X_2)	0.26	0.13

Fertilizer (X_3)	0.28	0.42
Seeds (X_4)	-0.21	-0.23
Herbicides (X_5)	0.03	0.56
Capital input (X_6)	0.03	0.10
$\sum \mathbf{b_i}$	0.30	0.60

4.2.3 Level of Inputs/Output used In Crop Production

The inputs used for crop production in this study by both group of farmers were land, seeds, fertilizer, herbicides and labour. While the output was the total tonne of crop (grain equivalent) obtained per unit area cultivated. This is shown in table 4.9

a. Land

Land is one of the most limiting resources for crop production in the study area. The loan beneficiaries cultivated an average of 4.4 hectares per person, while the non-loan beneficiaries grew an average of 2.52 hectares per person. Though the loan beneficiaries cultivated more land than the non-beneficiary counterparts, food crop is still predominantly produced by these small holder farmers. This finding is in consonance with Adesoji and Farinde (2006).

b. Seeds

The average seeds (grain equivalent) used in crop production by the borrowing and non-loan beneficiarieswas 65.91kg and 54.09kg respectively.

c. Fertilizer

Majority of the respondents used chemical fertilizer for crop production in the study. An average of 10.02kg and 8.28kg was used by the borrower and non-loan beneficiaries respectively. Despite a widely accepted view that inorganic fertilizer is necessary for sustained productivity growth, fertilizer use in Africa is estimated to have stagnated at 6-

12kg/ha/year for the last 10 years (Monpellier,2013). It was noted that no Africa country was said to have been able to achieve the 50kg of nutrient per hectare use target set for 2015 at Abuja fertilizer summit (Monpellier,2013).

d. Herbicides

Table 4.9 shows that the borrowing farmer used as much as 14.72 litres of herbicide while the non-borrowing used 6.05 litres. The high usage of herbicide(residual effect) by borrower of micro credit could possibly be attributed to less lower yield obtained than the non-loan beneficiaries.

e. Labour

The total labour used was made up of both family and hired labour. The family labour was costed and treated as hired labour based on the opportunity cost principles. The average labour used in crop production in the study area by both the borrowing and non-borrowing farmer was 138 man-days and 120.17 man-days respectively.

f. Output

The output is the total quantity (grain equivalent/grain yield) of food crop produced or harvested from a given area of land. In this study, the averageoutput obtained by the loan beneficiaries was found to be lower than the non-borrower's. The output obtained was 9093.40kg (9.09tonnes) and 9270.92kg (9.27tonnes) for the borrowing and non-loan beneficiaries respectively. This implies that the output realised by the loan beneficiary farmers was lower than their contemporary despite the credit obtained. This might be due to underutilization of some inputs by this group of farmers and also due to lack of good agricultural practices. The result is shown in table 4.9.

Table 4.9 Input/ Output Levels for Loan beneficiaries and Non Loan beneficiaries

	Beneficiary Farmers			Non Beneficiary Farmers		
Inputs variables	Min	Max	Co-efficient	Min	Max	Co-efficient
Land (ha)	2	15	4.40(3.13)	1	10	2.52(0.30)
Labour(man-day)	98	158	138.54(1261.65)	90	150	120.19(32.71)
Fertilizer (kg)	5	26	10.04(5.89)	3	22	8.28(4.45)
Seeds (kg)	35	200	65.91(47.71)	10	105	54.09(30.91)
Herbicide(ltr)	2	24	14.72(21.48)	2	17	6.05(3.09)
Farm capital (₦)	7000	500000	133512(77921)	8000	250000	112433(47462)
Output (Kg)	500	42750	9093(7801)	2500	38660	9271(7404)
Income (₦)	75000	1500000	307294(181166)	30000	580000	272556(103158)

Figures outside the parentheses_ Mean, figures inside the parentheses_ Standard Deviation,

4.2.4 Test of hypothesis

The output data obtained for both group of farmers wasstatistically tested for significance using the z-tests for comparing the two sample arithmetic means between the borrowing and non-loan beneficiaries(table 4.10).The test of significance of the output level confirmed that the mean output between the borrowerand non-loan beneficiaries wasnot statistically significant. This implies that the null hypothesis (H_o) which states that there is no significant difference in the output obtained by the borrower and non-loan beneficiaries should be accepted; while rejecting the alternative that states a significant difference in the level of output between the two groups of farmers. The implication is that there was under and over utilization of certain inputs such as herbicide and seeds by both groups which invariably resulted to no difference between them.

Table 4.10 Test of Output obtained from the two Groups of Farmers

Farmers Group	N	Mean	S.D	Z-value	Z-table	LOS
Borrower	180	9093.40	7801.24	2.76E-03	0.0120	0.01
Non borrower	180	9270.93	7403.93			

4.2.5 Estimation of Technical Efficiency of the farmers

A significant characteristic of the stochastic frontier production model is its ability to produce farm specific measures of technical efficiency. The distribution of farmers' technical efficiency indices derived from the analysis of stochastic frontier production function is provided in table 4.11.The result shows that 24.4% and 59.4% of borrowing and non-loan beneficiaries had attained between 0.71 and 1.0 efficiency levels respectively,while 34% of the loan beneficiaries and 5% of the non-loan beneficiaries were below 50% level of efficiency. This low level of technical efficiency exhibited by the loan beneficiaries is an indication that a large fraction of the output can be attributed to wastages.

The technical efficiency of the sampled farmers is less than 1 (100%) indicating that all the farmers (both the loan beneficiaries and non-loan beneficiaries) are producing below maximum efficiency frontier. A range of technical efficiency is observed across the sample farms where the spread is large. The best farm had a technical efficiency of 0.934 (93.4%) and 0.992 (99.2%) for the borrower and non-loan beneficiaries respectively; While the worst farm has a technical efficiency of 0.126 (12.6%) for the

borrower farmer and 0.226 (22.6%) for the non-borrower farmer. This implies that, on the average, the respondent were able to obtain a little over 52.9% and 74.2% (for borrower and non-loan beneficiaries respectively) of optimal output from a given mix of production inputs.

Table 4.11 Frequency Distribution of Technical Efficiency Estimates

	Loan beneficiaries		Non Loan beneficiaries	
Efficiency class	Frequency	Percentage	Frequency	Percentage
Less than 0.50	61	34.0	9	5.0
0.50—0.60	39	21.7	14	7.7
0.60—0.70	36	20.0	50	27.8
0.70—0.80	35	19.4	41	22.8
0.80—0.90	7	3.9	35	19.4
0.90—1.0	2	1.1	31	17.2
Total	180	100	180	100
Mean	0.5299		0.7428	
StandardDeviation	0.2570		0.2220	
Minimum	0.1266		0.2266	
Maximum	0.9340		0.9922	

The distribution of technical efficiency suggests that potential gains in technical efficiency among the sample farmers are large. With the mean of 52.9% and 74.2% (for borrower and non-loan beneficiaries respectively), it implies that in the short run, there is the scope for increasing technical efficiency in food crop production in the study area by 47.1% for loan beneficiaries and 25.8% for the non-loan beneficiaries.

The magnitude of the mean efficiency of the farmers is a reflection of the fact that most of the sample farmer carry out food crop production under technical condition involving the use of inefficient tools, unimproved seed varieties, under application of fertilizer and so on. The low under application of fertilizer,over usage of seeds and herbicides by majority of the farmers are one of the major factors that have influenced the level of technical efficiency.

4.2.6 Test of Hypothesis

The technical efficiency obtained by both group of farmers was also statistically tested for significance using the z-tests (table 4.12). The test of significance of the technical efficiency level confirmed that the mean technical efficiency between the borrower and non-loan beneficiaries was statistically significant at 1% level. since the p-value is the area under the normal curve below the negative of the absolute value of the z-score plus the area under the normal curve above the absolute value of z-score. This implies that the null hypothesis (ho) which states that there is no significant difference in the technical efficiency level obtained by the borrower and non-loan beneficiaries should be rejected; while accepting the alternative that states a significant difference in the technical efficiency level obtained between the two groups of farmers during crop production. This also implies that the difference in the technical efficiency levels might be as a result of inefficient allocation and utilization of farm resource by the loan beneficiary farmers.

Table 4.12 Test of Technical Efficiency level obtained from the two groups of farmers

Farmers Group	N	Mean	S.D	Z-value	Z-table	LOS
Borrower	180	0.529	0.257	-330.84***	0.500	0.01
Non borrower	180	0.742	0.222			

***Significant at 1%

4.2.7 Determinants of Technical Inefficiency

For the loan beneficiaries, age had a positive influence on technical efficiency but not statistically significant. This implies that advancement in age is a source of technical

inefficiency. This finding is consistent with Lee and Heshmati (2008), Yang et.al (2014) but contrary to the findings of Ajibefun and Daramola (2004) and Onyenweaku and Nwaru (2005) whose results showed age to be negative and not significantly related to technical efficiency.

Farming experience was positive but not statistically significant on technical efficiency of food crop farmers in the study area. This implied that this inefficiency factor was less important in determining the technical efficiency unlike the production factors. It also shows that the more experienced a farmer is, the higher the technical inefficiency effects, and consequently the less the technical efficiency. This may be as a result of the fact that older farmers are very conservative and are not receptive to new innovations for adoption, which leave them still farming in their own crude ways. This finding however confirms the findings of Esobhawan (2007), who found positive relationship between experience and inefficiency effects. The results were consistent with the findings of Idris et al. (2013) and Okon (2010).

Household size is negative and not statistically significant at affecting technical inefficiency. The greater the household size, the greater the labour force participation of household's members in agricultural activities and hence increasing effect on productivity. This result means that as the size of the loan beneficiaries' household increases, it affect technical efficiency until a certain number when it negatively affects it, *ceteris paribus*. This result shares the same version of the law of diminishing returns in production. This agrees with Onyenweaku and Nwaru (2005) who opined that large household might utilize family labour beyond the point where marginal value product is

equal to the wage rate. It is also in consistence with Sekhon et.al (2010), but it contrary with the findings by Ajewole and Folayan (2008).

Education level found to be related to technical efficiency because it has a positive contribution to it and was statistically significant at 1% level. This implies that farmers with formal education tend to be more efficient in food crop production, presumably due to their enhanced ability to acquire technical knowledge, which makes them more close to the frontier output. It is very plausible that the farmers with education responds readily to the use of improved technology such as the application of fertilizer use of pesticides etc, thus producing closer to the frontier this is in agreement with comparative finding of Amaza et.al (2006).

The result shows that farm size has a negative effect on output. In other words, it can be explained that other things remaining constant, 1% increase in farm size leads to decrease production by 0.091%, on an average. Inability of the small farmers to use other inputs proportionately while increasing farm size may be liable for this surprising result. Influence of external factors like attack of insects, salinity, over rainfall in harvesting period etc. may also be liable for this negative effect of land size on output. Generally small farmers can manage small land size and unable to incur additional cost properly for cultivating additional land. Farmers search for alternate employment and thus cannot manage their own farm. So, output from additional land may decrease in the study area. But they are not able to maintain the additional cost. Sen (1964) stated that there exists inverse relationship between farm size and productivity and hence finding of this study is in commensurate with Sen's findings.

Income had negative co-efficient and was found to be statistically significant to technical efficiency, which conforms to a priori expectation. This implies that the more the income the less the technical inefficiency in crop production. This result is contrary to the findings of Rahman and Umar (2009) in a technical efficiency study who reported income having a positive a relation to output but no significant relationship with technical efficiency.

Land ownership was negative and is not significantly related to technical efficiency, and in conformity with the a priori expectations. This implies that farmers who owned land are more technically efficient in production than those who do not. This is so as those who owned land do not have constraints on the duration and usage they put it to thus making them to have better output since they will be willing to adopt output enhancing technology. Ownership of land with title provides security for the household which has been reported to encourage investment in productivity enhancing technologies resulting in higher efficiency (Gorton and Davidova, 2004; Kariuki, 2008).This result disagrees with that of Rahman and Umar (2009) and also that of Toritseju and O'raye (2014) who reported a positive influence but not significant relationship between land ownership and technical efficiency.

Gamma was estimated at 0.857 which implies that 85.7% of the total variation in aggregate food crop production by the loan beneficiaries is due to technical inefficiency. Such a result according to Tadesse and Krishnamoorthy (1997) indicates a good fit for the model.

Table 4.13 Maximum Likelihood Estimates for Borrower and non loan beneficiaries

Variables	Parameter	Co-efficient (loan beneficiaries)	Co-efficient (non loan beneficiaries)
Production Variables			
Constant	b_0	6.596(0.531)***	4.806(1.117)***
Land	b_1	-0.091(0.131)	-0.382(0.109)***
Labour	b_2	0.255(0.067)***	0.125(0.054)**
Fertilizer	b_3	0.282(0.542)***	0.416(0.106)***
Seeds	b_4	-0.208(0.047)***	-0.227(0.035)***
Herbicides	b_5	0.034(0.104)	0.562(0.127)***
Farm capital	b_6	0.028(0.029)	0.104(0.103)
Inefficiency Variables			
Constant	d_0	0.054(0.996)	1.610(0.748)***
Age	d_1	0.016(0.031)	-5.74E-04(9.7E-03)
Farming exp.	d_2	0.029(0.028)	-1.01E-04(9.8E-03)
income	d_3	-0.727E-05(0.931E-06)***	-1.38E-05(9.4E-06)
Education	d_4	0.446(0.139)***	-0.014(0.029)
Household size	d_5	-0.036(0.057)	0.025(0.014)**
Land ownership	d_6	-0.174(0.256)	-0.379(0.111)***
Diagnostic statistics			
Sigma squared		1.481(0.307)***	0.101(0.039)***
Gamma		0.857(0.039)***	0.039(0.541)
Log Likelihood Function		-200.115	-63.275
LR Test of one-sided Error		86.404	57.858

Figures outside the parentheses_ co-efficient, figures inside the parentheses_ Standard Deviation, ***Significant at 1% ** Significant at 5%

Most of the variables examined in the inefficiency model for the non-loan beneficiary farmershave negative signs which imply that these variables have positive effect on the technical efficiency of the farmers. This is also shown in table 4.13.

Age of the non-loan beneficiaries had a negative co-efficient and not statistically significant. This implies thatas the age of the farmer's increases, the technical

inefficiency of the farmers reduces. This is in consonance with the findings of Ajibefun and Daramola (2004) and Onyenweaku and Nwaru (2005) but contrary to Bravo-Ureta and Pinheiro (1997) whose results showed age to be positive and significantly related to technical efficiency.

Household size was found to be positive and statistically significant at 1% level. This implies that the household size is significantly related to technical inefficiency. This suggests that, even though large family size tends to ensure availability of enough family labour for farm operations to be performed in time, it put additional pressure on farm income for clothing, education, and health, and on output through more mouths to feed which invariably reduce the output of crop produced. This findings disagreeswith those of Onyenweaku and Nwaru (2005), and Bravo-Ureta and Pinheiro (1997) which showed household size and technical efficiency to be negative and significantly related.

Education had a negative contribution to technical efficiency and is not statistically significant. The negative coefficient of education implies that the higher the educational attainment of a farmer, the lower the technical inefficiency and the more the technical efficiency of the farmer. This result is in consistence with the finding of Bravo-Ureta et.al (1994) and Bravo-Ureta and Pinheiro (1997) but is contrary to that of Onu et al (2000), Amazaand Olayemi (2000), Onyenweaku et.al (2005), Onyenweaku and Nwaru (2005) and Nwachukwu and Onyenweaku (2007) whose results showed significant relationship of education level with technical efficiency.

Farm size had a negative coefficient and highly significant at 1% level ofprobability. This may be attributed to the ageing number of people who are involved in the production of food crop production in the study area. This finding agrees with Okoye,

et.al (2008) but contrasts those of Onyenweaku and Effiong, (2005),Onyenweaku and Nwaru (2005), and Onyenweaku, et.al (2005).

Farming experience is negative and not significantly related to technical inefficiency. This conforms to a priori expectation. It indicates that as the farmer becomes older in farming, he tends to gain more experience in farming principles and management, pest and diseases control. This result agrees with the finding of Rahman and Umar (2009) but disagrees with that of Onyeweaku and Nwaru (2005).

Income was negatively related to technical inefficiency but not statistically significant. This implies that the more income the farmer has the more inputs and farm implements he is able to purchase and also the timelier he is able to carry out certain farm activities and operation.

Land ownership was negatively significant to technical inefficiency of crop production by the non-beneficiary farmers. This is consistent with a priori expectation. This implies that landownership had a significant influence on efficiency crop production for non-beneficiary farmers. Ownership of land, especially with title, has been associated with increased security that provides farmers an incentive to invest in long term productivity enhancing practices that influence efficiency (Gorton and Davidova, 2004; Kariuki, 2008).

The estimation of gamma, which is the ratio of variance of farm-specific performance of Technical efficiency to the total variance of value productivity per hectare was

0.039, implying that 3.9% of the difference between the observed and frontier output is primarily due to the factors which are under the control of farmers.

4.2.8 Chow test

In order to test for the hypothesis which states that there is no significant relationship between the socio-economic factors and technical efficiency in crop production between the two groups of farmer, F-test was conducted using the pooled sum of squares and the sum of square of the lead equations at 348 degree of freedom and at 1% level of significant.

The result showed that there was a significant difference between the variances of the two samples and as such, we reject the null hypothesis, which states that there is no significant relationship between the socio-economic factors and technical efficiency in crop production between the two groups of farmer while accepting the alternative one. This implies that the socioeconomic factors (age, household size, education, farm size, farming experience and gender) of the famers in the study area have a very significant effect on the technical efficiency of food crop production.

Table 4.16 F-test between socio-economic factors and technical efficiency in crop production among the two groups of farmers.

Parameter	**N**	**SSE**	**(Upper limit)k**	**(Lower limit)n1+n -2k**	**F-value**	**f-tab**	**Los**
Borrower	180	6.83e+09	6	348	322.5***	2.80	0.01
Non borrower	180	4.76e+09					
Pooled	360	1.27e+10					

***Significant at 1%

4.3 Impact of Micro Credit on Technical Efficiency of the Loan Beneficiary Farmer

The result from the independent t-test between the loan beneficiary and non-loan beneficiary farmersin table 4.15shows that credit use was statistically significant for the loan beneficiaries in respect of land, fertilizer and herbicides. This may imply that the availability of credit to the loan beneficiary farmer has enhanced him by cultivating more land than the non-borrower farmer and using more input particularly fertilizer and herbicides.

Credit use does not have a significant difference in terms of labour usage, quantity of seeds and consequently the yield obtained as compared to the non-borrower farmer. Thus, it can be inferred that credit use has no effect on the yield of the borrower farmer.This result is in consistence with the findings Muhammad, et.al (2013), in similar studies in Pakistan, but contrary to those of Kamau, et.al (2014) in Kenya.

The t-test shows that the income levels of the borrower households were significantly higher than the non-borrower households. This shows that the loan advanced by microfinance had a significant effect upon the income level of the borrower farmer. This evidently shows that the income obtained by the borrower farmer might not necessarily be from the yield of his farm produce alone, possibly through other means like petty trading. This finding is contrary to the findings of Muhammad et .al (2013) who reported significant impact of credit use on the income of the borrower.

Table 4.15 Impact of Credit use on Technical Efficiency of the borrower farmer

Inputs variables	Loan beneficiaries	Non loan beneficiaries	t-test
Land (ha)	4.40(3.13)	2.52(0.301)	34.10***
Labour(man-day)	138.54(1261.65)	120.19(32.71)	0.002
Fertilizer (kg)	10.04(5.89)**	8.28(4.451)	5.86***

Seeds (kg)	65.91(47.71)	54.09(30.91)	0.65
Herbicide(ltr)	14.72(21.48)	6.05(3.088)	3.32***
Farm capital (N)	133511.59(77920.91)	112433.33(47461.73)	6.09***
Output (Kg)	9093.40(7801.24)	9270.93(7403.93)	-0.22
Income (N)	307294.41(181165.55)	272555.56(103157.54)	2.23**

Figures outside the parentheses_ co-efficient, figures inside the parentheses_ Standard Deviation, ***Significant at 1% ** Significant at 5%

4.4 Accessibility of Microfinance to Crop Farmers

Factors assumed to influence the uptake of credit are usually categorized as either knowledge based and poverty based (Wiklund and Shepherd, 2003). Knowledge based determinants includes age and education (Kimuyu and Omiti, 2000; Zeller 1993; 1994); family business history, entrepreneurial/ farming experience, industry specific know-how, training and social capital, (Lore, 2007).

Property based determinants are land size, livestock, and other assets. Determinants of borrowing tested in this study include age, educational level, marital status, family size, land ownership, income, cost of borrowing, farming experience, extension contacts (number of visits) and distance to microfinance banks.

4.4.1 Household characteristics of the farmers

Table 4.16 compares the household characteristics of loan beneficiaries and non-loan beneficiaries of agricultural microcredit in the study area. Households who were loan beneficiaries had bigger farm sizes, higher educational level, as well as higher household income and farm capital compared to non-loan beneficiaries.

Non-borrowing households had the least of these characteristics in comparison to the loan beneficiaries. Contact with extension agents was higher and statistically significant for loan beneficiaries compared to non-loan beneficiaries (Table 4.16). Also, there were more men than women in both borrower and non-borrower categories. The percentage

of educated farmers among the loan beneficiary group was marginally higher than for the non-loan beneficiary group. Hence education does not seem to vary much between the two groups which could suggest a weak influence of formal education on access to microcredit in the study area. Educated farmers may have other sources of income apart from farming, which may affect the decision to borrow.

It was also noted thatfarm capitalwas higher forloan beneficiaries indicating that it (farm capital) could influence access to credit. A fairly high proportion of non-loan beneficiarieshad household size slightly higher than that of loan beneficiaries.Another possible important determinant of access to microcredit is the total income of households. The results show statistical differences in the total income between loan beneficiaries and non-loan beneficiaries. The total income of loan beneficiaries was statistically higher than the income non-loan beneficiaries.

Table 4.16 Household Characteristics

Variables	**Borrower**	**Non-borrower**	**t-stat**
Age of farmer	42.11(9.454)	42.58(8.222)	-0.50
Education level	3.45(1.291)	2.88(1.140)	4.45***
Household size	8.93(3.643)	10.27(3.856)	-8.58***
Farm size	4.40(3.133)	2.52(1.424)	28.58***
Farm capital	1335211.59(77920)	112433.33(47461.73)	6.09***
Income	307294.41(181165.55)	272555.56(103157.54)	2.23**
Marital status	1.03(0.180)	1.03(0.165)	0.00
Gender	1.06(0.219)	1.05(0.230)	0.42
Farming	23.98(8.831)	24.13(9.450)	-0.15
experience	2.81(1.654)	0.80(0.642)	42.76***
Extension	9093.4(7801.24)	9270.4(7403.93)	-0.22
contacts			
Output			

Figures outside the parentheses_ co-efficient, figures inside the parentheses_ Standard Deviation, ***Significant at 1% ** Significant at 5%

It is evident from the table that there is a statistically significant difference between the microfinance loan beneficiaries and non-loan beneficiaries in terms of-farm capital

andland cultivated. In terms ofphysical characteristics, both group seem to be heterogeneous while in terms of socio-economic characteristics both groups seem to be homogenous and the averages ofdifferent household characteristics are not significantly different between the two groups except for household size and education levels. With regard to output level, there is a marked differencebetween the two groups. The figures show that non-loan beneficiaries of microfinance are output level was higher(9270.93kg) than the loan beneficiaries (9093.40kg) although the difference is not statistically significant.

4.4.2 Loan characteristics of the farmers

The loan characteristics of the loan beneficiaries in the study area showed average loan size of ₦145, 166.67. The interest rates charged per year on the loan beneficiaries was 15.16%, while the average duration of the loans was about 10 months. This implies that shorter loans were given to the loan beneficiaries for agricultural production (Table 4.17).

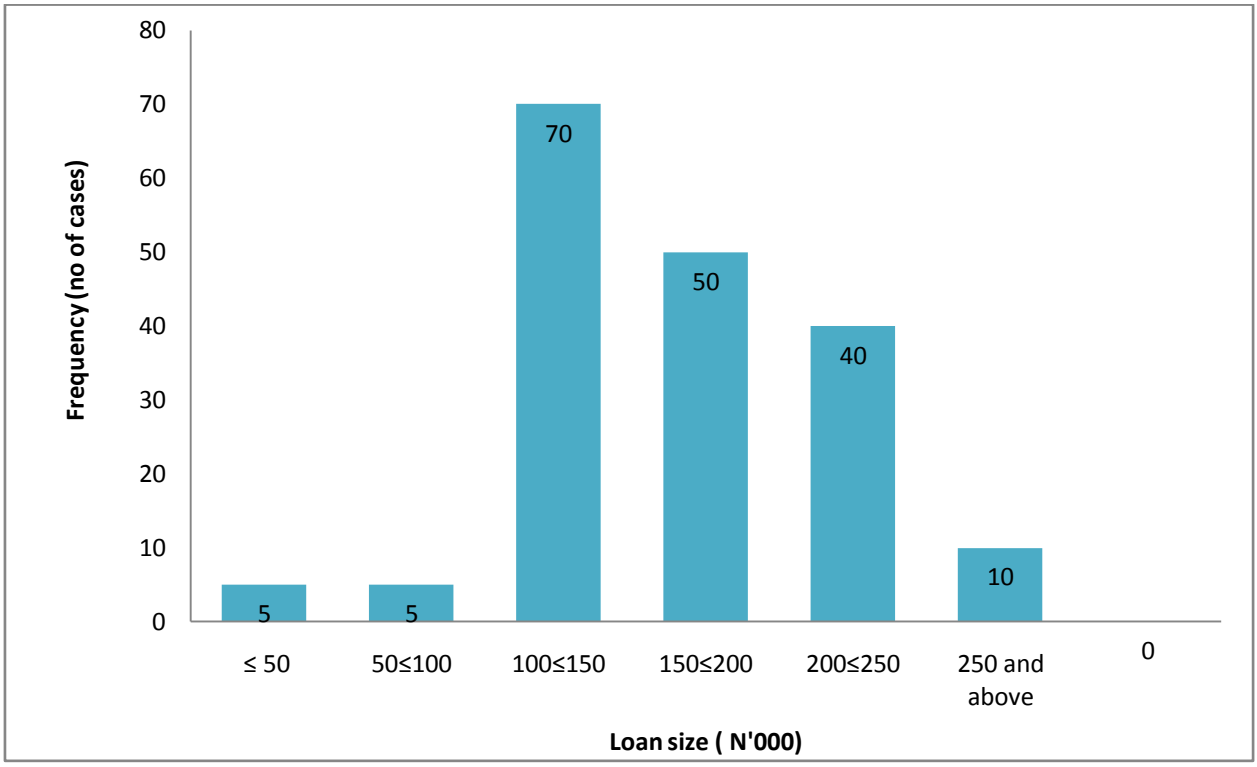
Figure 3show that most of the loan beneficiaries have an average loan of ₦ 145,166.67. Majority (70) of the farmers borrowed above ₦100, 000.00. Only ten farmers in the sample borrowed more than₦250, 000.00, jut five of the farmers borrowed least amounts (below ₦50, 000.00). Overall, the credit supplied by the formal financialinstitutions in the study area is rather limited.

4.17 Characteristics of loan received by loan beneficiariesin the study area

Variables	Mean	S.D	T-test
Average loan size(₦)	145166.67	53539.26	2.71***
Interest rates(%p.a)	15.16	7.612	1.99**
Loan duration(mths)	10	3	3.033***

***Significant at 1% ** Significant at 5%

Fig.3 Distribution of Loan amount received by Loan beneficiaries



4.4.3 Determinants of Access to Credit by Crop Farmers

Following the results of the Probit model, access to credit was positively related to the age, farm size, income, and education level of the farmers. The coefficients in table 4.18 show that the probabilityof individual farmers' access to credit is positively affected by age, farm size, income,education level of the farmersand negatively related to farming experience, land ownership and household size. These results revealed that variables with positive signs indicate that their higher values increase the chances that the farmers have to access credit and vice versa.

Age and farm size was found to be statistically significant and having positive influence on the probability to access credit. This implies that the chances of the farmers in accessing credit in the study area increases with age which is an indication that an increase in age of the borrower by one year increases the probability of accessing loan by 5%. This means that other things remaining constant as the household age increases they accumulate collateral that enable them seek for individual loan. Coupled with this is that the chances of older people beingconsidered for credit are high, and are due to the high probability of success, with the low riskof default. This is consistent with the results from Nguyen (2007) who found out that olderhouseholds often have more assets, reputation and meet the requirement for getting formalcredit in contrast with younger household who often lack capital and other conditions forcingthem to join micro-credit groups to access informal credit. Contrary to this, Ayamaga et al. (2006) also foundthat as age increases, the probability of a farmer to participate in microcredit programmes inNorthern Ghana, decreased.

Farm size also plays a crucial role in farming decisions and was considered as an important variable in determining both access to microcredit and size of loan applied for.Households with small farm lands may not need to borrow to finance their production or may only need small loans. However households with large farm lands may need more loans. Furthermore, households with large farm lands may be wealthier or better-off in the community and this can influence their access to credit. Lenders are also more likely to give bigger loans to farmers with large farms compared to those with small farms. This finding is in consistence with Diagne (1999), who noted that farm size was a significant determinant of access to informal credit and the loan size. And also the finding of Okurut (2006), who hypothesized that household with more

land are more likely to have an interest to expand production and a higher probability of borrowing. Land can also be used as collateralfor the loan.

Income of the farmers was found to be a significant factor with a positive influence on the probability to access to microfinance.Household income plays a role in the decision-making of the household regarding whether to seek loan for farming or not. As observed by Dodson (1997), demand for agricultural credit over the short term is influenced by income level and the need to replace capital stock. In rural communities, economic status, proxied by household income, plays a major role in participation in projects and access to resources. Hence the income of the household is hypothesised to influence both loan access and size. Poorer households may be considered as risky loan beneficiarieswho can affect their loan access and amount borrowed.

Education level of the farmers was found to be a significant factor with a positive influence on the probability to access to microfinance.The level of education attained by a farmer not only increases his/her farm productivity but also enhances ability to understand and evaluate new production technologies (Eze, 2007). Possession of literacy is one of the criteria for the procurement of formal credit from micro finance banks (Njoku and Odii, 1991).

Household size is another important household characteristic which influences many household decisions. Household size was found to have a negative influence on probability to access credit but a significant factor in accessing credit. This implies that household size decreases the probability to access to microcredit. Evidence supported that household size was negatively associated with access to microcredit (Lawal et al,

2009). People with large family size are less likely to accept microcredit (Lawal et al, 2009).However, large family size of 9 and above is most likely to spend more of the microloan in financing consumption and other basic needs as such stands less chance to access microcredit (Akram et al,2008).

Farming experience and land ownership was found to have negative influence on the decision to access to microfinance. This might probably be because of non-acceptability of rural lands by most financial institutions due to its traditional ownership systems.
The chi square estimate of 11.421 is highly significant. As a measure of goodness of fit, it shows that the data set fit the regression line to a reasonably high level.

Table 4.18 Factors Affecting Access to Credit by Crop Farmers

Variables	**Coefficients**	**S.D**	**Z test**
Age	0.0507	0.0166	3.04***
Farmsize	0.2867	0.0403	7.11***
Farming experience	-0.0110	0.0156	-0.71
Income	1.07E-06	6.43E-07	1.66*
Education	0.2969	0.0638	4.65***
Household size	-0.0842	0.0274	-3.07***
Land ownership	-0.0378	0.1563	-0.24
Constant	-3.1331	0.7013	-4.47***
Log likelihood	-192.4287		
LR $chi^2(7)$	114.21		
Prob chi^2	0.0000		
Peudo R^2	0.2288		

Figures outside the parentheses_ co-efficient, figures inside the parentheses_ Standard Deviation, ***Significant at 1% ** Significant at 5%

4.4.4 Determinants of loan amount/size

Following the results in table 4.18, the determinants of the loan amount/size as calculated in the double hurdle models show that loan amount/sizehas positive

coefficient and was related to marital status, farm size, education, cost of borrowing, farming experience, house hold size, distance to the microfinance bank and extension contacts. The coefficients also show that the probabilityof borrower farmer loan size is negatively related to age of the borrower and income level.

Age was found to have to be statistically significant and having negative influence on loan amount/size.The negative coefficients of age imply that the chances of the farmers in accessing credit and its size decreases with age. It also means that old age tends to reduce the probability of accessing microfinance credit and loan size. It infers that younger farmers stand better chance than older farmers in accessing microfinance. This is however in agreement with Adeyemi (2008) who showed that older farmers stand less chance of accessing microfinance.This result is also consistent with the findings of Sebopetji and Belete (2009).

Farm size was found to be positively correlated with loan size and was statistically significant at 1% level. This finding was in consistence with Diagne (1999), who noted that farm size was a significant determinant of access to informal credit and the loan size.

Land ownership had a positive influence amount borrowed but not statistically significant in the amount/size of the loan. This is so because land in rural areas especially land held under custom, generally lacks formal documentation. Mobuogwu(2013) noted that since such lands lack documentation, securing loan with such(as collateral) becomes problematic, as banking institutions require titles for land to be eligible as collateral. In the same vein, it was noted that under many customs, rural

dwellers have only possessory rights to the land they occupy. As a result, the consent of the family or village head is needed to transact with or alienate such land. Moreover, under many cultures in Nigeria, women are excluded from inheritance, despite women representing 50 percent of the agricultural labor force and farming constituting the principal business inrural areas. As such, 50 percent of the agricultural labor force is often deprivedof the assets needed to obtain loans (FOA, 2011).

Marital status has a positive influence on loan amount/size and was found to be statistically significant at 1% level. This could be as a result and perception that marriage confers responsibility and some degree of trustworthiness which could be a strong weapon particularly when it comes to loan repayment.

Cost of borrowing from the microfinance had a positive influence on the loan size and was also significantly related to the loan amount. This implies that the more the volume of the loan acquired by the borrower the high the cost of obtaining it. This also is a determinant of loan size.

Education was found to be statistically significant at 5% level and also having a positive influence on the loan amount/size. The implication is that it may be deliberate policy of MFIs to issue microcredit to literate clientele. Education is perhaps supposed to impact positively on farmers' access to credit and other resources and even in their usage. Adereti (2005) confirms that education is an essential tool in accessing and using farm resources efficiently.

Years of farming experience of the loan beneficiaries was noted to be positively and significantly related to loan amount/size. The years of farming experience of the

household head is believed to influence both access to loan and the size of loan. This is because older farmers with years of farming experience are expected to be knowledgeable about farming and the various sources of credit. They are also expected to have better credit management skills and credibility with lenders (Anang et.al,2015).

Distance to the microfinance bank has a positive influence on the loan amount. In the findings of Pedrosa and Do (2008) noted that long distances between clients and microfinance offices limits access to basic financial services and thus a major barrier to development.

Household size was found to have a positive influence on loan size. Access to microcredit and the amount of loan borrowed are hypothesised to be influenced by the size of the farming household as it determines the household labour supply which is important for agricultural production. Households with limited labour supply may need to borrow to augment their labour supply while households with excess labour may not face such liquidity constraints. Household size can therefore ease the liquidity constraints of the household, thus influencing the decision to borrow as well as the loan amount.

Extension contacts were found to have a positive influence on the loan amount/size but not statistically significant in the amount/size of the loan acquired. This indicates that extension service delivery enhances accessibility to microcredit. The result is expected because extension agents are important source of information for many rural farmers. Extension agents also help to link farmers' groups to credit sources. Thus extension contact is expected to positively impact access to microcredit. The result agrees with

Sanusi and Adedeji (2010) who reported a positively significant relationship between extension contact and access to formal credit in Rwanda. Efforts to improve access to agricultural microcredit to smallholder farmers must therefore take into consideration the improvement of extension service delivery to farmers.

Table 4.19 Determinant of Loan Size

Loan size	Co-efficient	T value
Age	-1032.382(463.473)	-2.23***
Farm size	3669.716(947.855)	3.87***
Land ownership	7.144(4313.064)	0.001
Marital status	44985.230(13137.070)	3.42***
Income	-0.020(0.127)	-1.63
Costofborrowing	4.407(0.175)	25.07***
Education	3806.714(1871.141)	2.03**
Distance tobank	199.013(154.433)	1.29
Farming experience	792.147(386.378)	2.05**
Household size	611.824(787.543)	0.78
Extension contact	1133.284(1020.318)	1.11
-Constant	-26994.89(25997.89)	-1.04

Figures outside the parentheses_ co-efficient, figures inside the parentheses_ Standard Deviation, ***Significant at 1% ** Significant at 5%

4.4 Problems Militating Against Production Efficiency of Farmers in the Study Area

a. Low rainfall

Rainfall regime is the most important climatic factor influencing crop cultivation activities particularly in tropical regions of Nigeria (Ayanlade et al, 2010). Rainfall can vary considerably even within few distance and different time scale. This implies that crop yield is exceedingly variable over space and time which will have a big effect in determining the kind of crop to be grown, farming system to be adopted and the sequence of farm operations (Adejuwon, 2005). Ayanlade et al. (2010) reported that rainfall variability is very high in most part of northern guinea Savannah (Yola,

Minna, and Kaduna) except Jos which has a unique pattern and a significant relationship with tuber yield (cassava and yam). Ayanlade et al.(2010) further showed that rainfall pattern affect output of agricultural produce but, Owusu-sekyere et al. (2011) observed that since the peak monthly rainfall is declining there is probability that lower amount of rainfall may occur in future which may have effect on crop output. Low amount of rainfall constitute more problem to the loan beneficiaries more than their counterparts.

b. Farm machine, tools and labour

Farmers still rely on the use of tools like hoe and cutlasses, these poor tools can lead to time wastage, low yield and low farm income to the farmer. While machines are limited and expensive to hire and equally more expensive to purchase and maintain. This sometimes cannot be used in some small farm holding and some kinds of soils and also for cultivation of some crops like yam.

c. Poor Transportation

This includes bad roads, inadequate vehicles, and high cost of bringing the farm produce from the farm to the market and from rural to urban centres. This increases the activities of middle men in the movement of food crops from the farm to the urban centres where they are consumed.

d. Fertilizer/Herbicide

The scarcity and high cost of fertilizer in the study area was a major concern to the farmers. This was ascertained by almost half of the sampled farmers. Abutu (2014) noted that initially, the government was subsidizing organic Fertilizer to help boost agriculture in Nigeria. During this period, most farmers get access to fertilizers at

affordable prices. Today, most government at various levels placed low premium to subsidizing of organic fertilizer thereby making the commodity to be too expensive for the poor farmers to afford. Also, government had divorced herself from distributing fertilizers to farmers as it used to be in the past instead the procurement is left in the hands of fake or relatives of those in power who are tagged as contractors of the government. These people diverts the products to unknown destinations while the chief executives will be in the government house organizing press conference to tell the world the number of millions of metric tonnes of fertilizer distributed to farmers for that farming season. Problems with fertilizer quality, arbitrage, and timeliness of fertilizer distribution persisted. Olufokunbi and Titilola (1993) sum it up as follows: "A large percentage of the demand for fertilizers has not at any time been met. Most of the actual prices paid are as much as, or even higher than what the landed costs actually are. Unintended beneficiaries are the ones that have been gaining from fertilizer marketing arrangement."

High cost is another problem militating against theuse of herbicides. Herbicides are good especially for clearing of weed around our environment; they cause a lot of damage bykilling the non-targeted beneficial insects thereby creating more problems in the near future. Kughur (2012) noted that the high cost of herbicides is as a result of middle men'sinvolvement in the sale and distribution of herbicides. The middle men in their attempt to maximize profit buy in largequantities and hike the price of herbicides almost beyond the average price making it difficult for the peasant farmers to buy.Apart from that most of the peasant farmers' farmland is not big enough to engage people outside their family as that willamount to waste of their little resources.

e. Loan volume and delay in disbursement

It was noted from the findings of the study that the amount requested by the loan beneficiaries farmers were not the amount granted. In all cases, the amount granted and disbursed was lower than the one requested. The disbursement in most cases was not timely, in the sense that it is not disbursed in line with the time the farmer needed it most for farm activities. In such case, the loan is diverted for another use aside from what it was initially required for. Ekunwe et.al (2015) in the micro-credit access and profitability on crop production noted that untimely delivery of loan constituted the greatest constraint, a second constraint was high interest rate, and then insufficient loan volume approved. 38.3% of the loan beneficiaries reported small loan volume and delay in disbursement.

f. Storage

The inadequate storage and processing facilities has accounted for divergence between national food security and household food security. Even if the total production of food seems adequate at the aggregate level, it will not lead to significant improvement in food security unless the food is available for consumption at the right time and in the right form(Olukunle,2013). A significant quantity of products harvested in Nigeria perishes due to lack of storage and processing facilities. Simple, efficient, and cost effective technologies for perishables, such as roots, tubers, fruits and vegetables, are not as highly developed in the country compared to the storage technologies for cereal grains and legumes.

Heavy post-harvest losses occur due to inadequate storage facilities, especially in tines of bumper harvests. Olukunle (2013), noted that post-harvest food storage losses are very high, approximately 40 per cent for perishables, compared to cereal grains and pulses at about 15 percent. Traditional storage facilities have certain deficiencies, including a low elevated base giving easy access to rodents, wooden floors that termites could attack, weak supporting structures that are not moisture-proof, and inadequate loading and unloading facilities.

Across local government regions, most farmers store only a portion of their crops for consumption. They sell part of their crop early to get cash to pay for their immediate financial obligations, including, in some instances, repaying the production loan to the middlemen and microfinance institution.

g. High interest rate

High interest rates charged by most of the microfinance institute further makes the available credit not sufficient for farm use. An average of 15.9%p.a was charged as in contrast to CBN recommended charge through the Agricultural Credit Support Scheme (ACSS) funds which are disbursed to farmers and agro-allied entrepreneurs at a single-digit interest rate of 8.0 %p.a(Alegieuno,2010)

4.20 Summary of Problems faced by Crop farmers in the Study Area.

Problems	**Loan beneficiaries**		**Non loan beneficiaries**	
	Freq	%	Freq	%
Poor Transportation	51	28.3	66	36.7
Fertilizer/herbicide	111	61.7	59	32.8
Low amount of rainfall	60	31.1	12	6.7
Machine/labour	47	26.1	18	10
Storage	58	32.2	58	32.2
Loan volume/delay in disbursement	69	38.3	-	-
High interest rate	164	91.1	-	-

CHAPTER FIVE

SUMMARY, RECOMMENDATIONS AND CONCLUSION

5.1 Summary

The significance of microfinance as a major tool in financing agricultural production in Nigeria has necessitated the overhauling of its financial tools in improving /increasing crop productivity. Thus, the purpose of this study was to examine the status and influence of microfinance among the food crop farmers in Niger state.

Primary data was used for this study. A cross-sectional data from farm survey of crop farmers for 2014 growing season was collected from a total of 360 crop farmers sampled from 17 Local Government Areas of the state. An analysis of the socioeconomic characteristics of the borrower and non-borrower reveals that there was no significant difference between the both groups of farmers in terms of age, education levels, farming experience and household size.

However, the levels of input used and output obtained by these groups of farmers showed that fertilizer, seeds, labour, herbicides and farm capital were significant at 1% level of probability, implying that these values are significantly different from one another. The results further showed that an average of 10.02kg of fertilizer, 65.91kg of seeds, 14.72 litres of herbicides and 138 man-day labourswas used by the borrower farmer on each hectare of land. While the non-borrower farmer used an average of 8.28kg of fertilizer, 54.09kg of seeds, 6.05 litres of herbicides and 120 man-days labour on a hectare of land.

Crop production was found to be inelastic with a decreasing return to scale for both groups of farmers. Though the mean output tested the both group was not statistically different from one another.

The distribution and level of technical efficiencies for both groups of farmers was examined. The mean technical efficiency was found to be 52.9% and 74.2% for the borrower and non-loan beneficiaries respectively. The result further shows that there was a significant difference in the technical efficiency level obtained by the two groups of farmers.

Furthermore, the determinants of technical efficiency observed in the study were age, household size, education level, farming experience and credit access for the two groups. The result showed that there was a statistically significant relationship between the socio-economic factor and technical efficiency in crop production among the borrower and non-loan beneficiaries. The result further indicates that 85.7% and 3.9% of the total variation in aggregate food crop production by the borrower and non-loan beneficiaries respectively is due to technical inefficiency.

The impact of micro credit on technical efficiency of the loan beneficiary farmer showed a statistically significant relationship ofcredit use in respect of land, fertilizer and herbicides. While it does not have any significant difference in terms of labour usage, quantity of seeds and consequently the yield obtained as compared to the non-beneficiary farmers. The accessibility of microfinance to crop farmers was determined by household and loan characteristic of the farmers. The results show that there was a significant difference in the total income, farm capital, land size, household size and education level between the two groups. While there was no significant difference in their age, marital status, farming experience and output level. Although majority of the

loan beneficiaries (70) borrowed above ₦100, 000.00, the average loan amount borrowed was ₦145, 166.67 at an average interest rate of 15.16% for 10months.

It was observed from the study that age, farm size, income, education level and household size were factors that significantly affect access to credit.And equally, age, farm size, marital status, cost of borrowing, education level and farming experience had a significant influence on the loan size.

5.2 Conclusions

Based on the findings of the study, the study revealed that food crop farmers, especially microcredit users' respondent, are yet to achieve their best, as shown by their low technical efficiency (TE) value and low output levels, meaning that credit is not administered with good agricultural practices (GAPs). It further shows that credit alone cannot engender higher technical efficiency except it goes with other complementary factors such as efficient utilization of farm inputs (GAPs), and timely disbursement of loan and sufficient loan volume- This is an indication that loan volumes may be too small for making a significant impact on crop production.

Furthermore, the results of this study show that both group of farmers are operating under decreasing return to scale which Olayide and Heady (1982) stated is characteristic of small-scale peasant farming, applicable only in the short-run. Moreover, it suggests, according to Ogundari and Ojo (2007), that, efforts should be made to expand the present scope of production to actualize theirpotential production as resources have not been fully exploited, meaning that, more output could be achieved by employing more of the variable inputs.

5.3 Recommendations

Based on the findings of the study and conclusion drawn, the following policy recommendations are made.

i. Banking policies for agricultural credit are still business oriented rather than directed towards development. So, it is imperative on the part of Federal Government to chalk out policies and programmes aimed at larger national interest rather than individual and personal gains. Thus, the Central Bank of Nigeria (CBN) through credit policies should make efforts to simplify the borrowing procedure in the terms of time-lag, acceptance of security, documentation and disbursement of loan. On the other hand, credit facility by microfinance banks should be provided on time, otherwise the delay in the completion procedure for taking loans will occur and the farmers will not get maximum profit regarding their plans.

ii. The central bank of Nigeria (CBN) should make sure that the funds mobilized for loans are effectively disbursed to the farmers through microfinance banks and at a reduced interest rate so that farmers would be able to borrow sufficient money from microfinance bank which would enable them to purchase sufficient equipment, machineries, storage facilities and farming tools for agricultural activities.Routine checks and surveillance should be placed on the microfinance banks by the CBN in order to monitor and ascertain that those laid down rules and condition for granting loan are strictly followed by the microfinance banks.

iii. Acquisition and recovery process for credit should be simple to give benefits to maximum number of farmers. Micro credit should come in package including input supply (seed, fertilizer, pesticides etc), technical know- how and

marketing. This would increase the income of the loan beneficiaries and hence repayment condition will be improved.

iv. It is recommended that Agricultural Development Project (ADP) should organize training for farmers on application of herbicides and farmers should form associations so as to pull resources together, buy farm chemicals directly from the distributors in large quantity and disburse them among themselves to prevent been exploited especially the hike in price by the middle men. Also agricultural research institutes in the state should be able to educate farmers through extension services on advantages of good agricultural practices such as utilization of improved seeds varieties, recommended seeds rates, fertilizer rates, cropping patterns, pest and diseases control and proper farm storage.

v. Additionally, there is the need to examine how, when, and what type of linkages between the non-farm and farm sectors are needed to give the desired effect on productivity. Financial organizations need to know who they are able to reach in order to broaden their clientele base; and on the other hand, it is important to know how much people borrow and by what this is determined, in order to address the demand for credit in a better way. The way forward then, is how government, the private sector and civil society organizations (including NGO's) can work together to ensure the success of microfinance and other tools of crop production efficiency.

5.4 Contribution to Knowledge

1. This study will contribute to the literature on assessment of microfinance on the technical efficiency of crop production in Niger state.

2. It was noted that major determinant of technical efficiency in crop production by the loan beneficiary farmers (labour, fertilizer, herbicide and farm capital) was underutilizedwhile seeds was over used which lead to low output level compare to the other groups. It wasfurther observed that all the input elasticities were inelastic;a one percent increase in each input results in a less thanone percent increase in output.This proves that credit without GAPs is inadequate to promote efficiency. Furthermore, it was observed that the loan beneficiary farmers used 65kg of seeds, 10kg of fertilizer, 14.72 litres of herbicide and 138 man day labour to produce 9 tonnes (grain equivalent) of food crop while their counterpart used 54kg of seeds, 8.28kg of fertilizer, 6 litres of herbicides, 120man day of labour in producing 9.27 tonnes of food crops on an hectare of land.

3. The farm specific technical distribution revealed thatnone of the farmers reached the frontier threshold.Thus, within the context of the efficient agriculturalproduction, food crop output per hectare production by loan beneficiary and non loan beneficiary farmers canstill be increased by 47.1% and 25.8% respectively with using available inputs andtechnology. Though both the loan beneficiary and non beneficiary farmers were found to have a return toscaleof 0.30 and 0.60 respectively, which implying that both groups of farmers are operating instage three of the production frontiers.

4. The findings of the study indicates that there is high interest rates charged by the microfinance and low volume of loans availed to the farmer which might have

lead to lower yield obtained by the loan beneficiaries compared to their contemporaries as the volume is too low for any meaningful crop production.

5. The distance to most of these microfinance banks, coupled with lot of bureaucracy the farmers undergoes before obtaining loan and untimely disbursement makes the farmer want to go without the loan and sometimes divert it to other use other than crop production.

6. Credit access bows down to the awareness and the knowledge that the microfinance bank provides loan to its clientele. Though majority of the loan beneficiaries have one form of education or the other, they still have limited knowledge of the functionality of microfinance and how to harness benefits from it.

7. Lastly, microfinance banks are not designed for crop production but rather for adding value to agricultural produce because of many problems associated with crop production.

REFERENCES

Abdulfatah Y. (2012). Analysis of Economic Efficiency among small scale cassava farmers in Ondo North Agricultural Development Zone1, Ondo State, Nigeria. Unpublished Msc. Thesis, Department of Agricultural Economics and Extension, Bayero University Kano.68pp.

Abutu, Odoh Patrick (2014). Challenges of Agriculture in Nigeria Economy: A Bane to Food Security. *Journal of Agriculture and Veterinary Science (IOSR-JAVS)* e-ISSN: 2319-2380, p-ISSN: 2319-2372. Volume 7, Issue 5 Ver. I (May. 2014), PP 18-21 www.iosrjournals.org

Adam, G. (2007), Role of Microfinance Institutions in Actualization of MDGs. Paper delivered at the induction ceremony of Institute of Chartered Economists of Nigeria (ICEN) in Port Harcourt

Adams, S. and Bartholomew T. A (2010). Impact of Microfinance on Maize Farmers in Nkoranza (Brong Ahafo Region of Ghana). *Journal of Management Research,* 2(2):1-13

Adejuwon J.O (2005). Food Crop Production in Nigeria: Present effects of climate Variability.Climate Research, Inter-Research, Germany: 53-60.

Adereti F.O (2005). Rural Womens Access to and control over Productive Resources; Implications for Poverty Alleviation among Osun State Rural Women, Nigeria. *Journal of Human Ecology,* 18(3):225-230

Adesoji S.A and Farinde A.J(2006). Socio-economic Factors influencing yield of arable crops in Osun State, Nigeria. *Asian Journal of Plant Science,* 5:630-634

Adeyemi, K. S. (2008). Institutional reforms for efficient microfinance operations in Nigeria.Central Bank of Nigeria Bullion, 32(1), 26-34.

Ahmadu, J and G.O Alufohai (2012). Estimation of Technical Efficiency in irrigated ricefarmers in Niger State. *American-Eurasian Journal of Agriculture and Environmental Sciences*, 12(12):1610-1616

Ajewole, O.C and Folayan, J.A (2008). Stochastic Frontier Analysis of Technical Efficiency inDry Season Leaf Vegetable Production among Small Scale holders in Ekiti State, Nigeria. *Agricultural Journal,* 3(4): 252-257. ISSN:1816-9155 ©Medwell Journals

Ajibefun I. A and Daramola A. G (2004) Efficiency of micro-enterprises in the NigerianEconomy. AERC Resource Paper 134. African Economic Research Consortium, Nairobi.

Ajibefun, I. A and Daramola, A. G (1999). Measurement and source of technical inefficiency in poultry egg production in Ondo State, Nigeria. *Journal Econ. Rural Development*, 13:85–94.

Akram, W.,Z. Hussain,H. Sabir, and M. Hussain (2008). Impact of Agricultural Credit ongrowth and poverty in Pakistan (Time Series Analysis). *European Journal of Scientific Research*, 23(2), 243-251.

Alegieuno, Joe (2010). Microcredit Financing by Deposit Money Banks/Microfinance Banks and the Agricultural Sector Development in Nigeria. Central Bank of Nigeria Economic and Financial Review December 2010

Ali, M. and Chaudhry, M. A (1990). Interregional farm efficiency in Pakistan's Punjabi. A frontier production function study. *Journal of Agricultural Economics*, 41:62–73

Amaza P. S and Olayemi J. K (2000). The influence of education and extension contact on foodcrop production in Gombe state, Nigeria. *Journal of Agri-business and Rural Development* 1(1):80–92.

Amaza, P.S, Y. Bila and A. C. Iheanacho (2006). Identification of Factors that Influence
Technical Efficiency of Food Crop Production in West Africa: Empirical Evidence from Borno State, Nigeria. *Journal of Agriculture and Rural Development in the Tropics and Subtropics* .Volume 107, No. 2, pages 139–147

Ambali, O.I. Adegbite, D.A. Ayinde, I.A. and Idowu, A.O. (2012). Analysis of Production Efficiency of Food Crop Farmers of Bank of Agriculture Loan Scheme in Ogun State Nigeria. Asian Journal of Agricultural Sciences 4(6): 383-389, ISSN: 2041-3890 © Maxwell Scientific Organization, 2012 Submitted: August 04, 2012 Accepted: September 03, 2012 Published: November 25, 2012

Ambali, O. I. (2013). Microcredit and Technical Efficiency of Rural Farm Households in Egba Division of Ogun State Nigeria. *Journal of Agriculture and Sustainability*, Volume 2, Number 2, 196-211, ISSN 2201-4357

Amos,T.T (2006). Resource Use in Tilapia production among Small Scale Tilapia Farmers in the Savanna Zone of Northern Nigeria. *International Journal of Fishery*, 2(1):42-47.

Anang, B. A, T. Sipiläinen, S. Bäckman and J. Kola (2015). Factors influencing smallholder farmers' access to agricultural microcredit in Northern Ghana vol. 10(24), pp.2460-2469, 11 june,2015. DOI: 10.5897AJAR ISSN 1991-637X Copyright ©2015 http://www.academicjournals.org/AJAR

Anyanwu, C. M (2004). Microfinance Institutions in Nigeria: Policy, Practice and Practice andPotentials, Paper Presented at the G24 Workshop on constraints to Growth in Sub Saharan Africa, Pretoria, South Africa, by the Deputy Director Central Bank of Nigeria, November 29-30, 2004

Appah, Z. E, John M. S and Soreh, W (2012). An Analysis of Microfinance and Poverty Reduction in Bayelsa State of Nigeria. *Kuwait Chapter of Arabian Journal of Business and Management Review,* 1(7): 38-57

Asefa, Shumet (2012). Who is technically efficient in Crop Production in Tigray Region, Ethiopia? Stochastic Frontier Approach. *Global Advanced Research Journal of Agricultural Science* (ISSN: 2315-5094) Vol. 1(7) pp. 191-200, September, 2012Available online http://garj.org/garjas/index.htm. Copyright © 2012 Global Advanced Research Journals

Ayamaga, M., Sarpong, D. and Brempong. S. (2006). Factors Influencing the Decision to Participate in Micro-credit Programmes: An Illustration for Northern Ghana. *GhanaJournal of Development Studies,* 3(2): 57-65.

Ayanlade A,T. O Odekunle ,and O.O.I Origoomunje (2010). Impact of Climate ChangeVariability on Tuber Crops in Guinea Savannah Part of Nigeria: AGIS Approach. 2(1): 27-35

Bakhsh, K., Ahmad, B. and Hassan, S. (2006), "Food Security through increasing Technical Efficiency", *Asian Journal of Plant Science,* Vol. 5 No.6, pp. 970 – 976.

Bamisile, A. S. (2006). Developing a Long -Term Sustainable Microfinance Sector In Nigeria: The Way Forward, Washington Dc, USA October 23. 27, 2006.

Basu, A, Balvy R, Yulek, M (2004): *Microfinance in Africa*: Experience and Lessons from IMF. AN IMF Working paper.

Bateman, M. (2010). "The illusion of Poverty Reduction" Red Pepper Magazine. 44-48 Shepherdess walk, London N17 JP. Office(at)redpepper.org.uk

Binuomoto, S.O., Ajetomobi, J.O. and Ajao, A.O. (2008), "Technical Efficiency of Poultry Egg Producers in Oyo State, Nigeria", *International Journal of Poultry Science*, Vol. 7 No. 12, pp. 1227 – 1231.

Boyle, G. (2009). Be the Change: Empowering Women through Microfinance. http://www.brazencareerist.com (Accessed on 25/11/09).

Brandsma, J. and Chaouali, R. 2004, "Making microfinance work better in the Middle East and North Africa", *Report of World Bank Institute and World Bank, Middle East and North Africa Region, Finance, Private Sector, and Infrastructure Group*.

Bravo-Ureta, E. B, Boris, E. and Evenson, R.E. (1994). Efficiency in Agricultural Production. The case of peasant farmers in Eastern Paraguay. *Journal of Agricultural Economics,* 10:27–37.

Bravo-Ureta, B.E. and A.E. Pinheiro (1997). Technical, economic and allocative efficiency in peasant farming: Evidence from the Dominican Republic. *The Developing Economics,* 35(1): 48-67.

Briones, R. 2007, "Do Small Farmers Borrow Less when the Lending rate Increases? The Case of Rice Farming in the Philippines", *MPRA Paper No. 6044*

Buckley, G. (1997). Microfinance in Africa? Is it Either the Problem or the Solution? *World Development,* 25(7): 1081-1091.

Central Bank of Nigeria (2004). Microfinance Policy, Regulatory and Supervisory Framework for Nigeria. Abuja, Nigeria.

Central Bank of Nigeria (2005). Microfinance Policy, Regulatory and Supervisory Framework for Nigeria. Abuja, Nigeria.

Central Bank of Nigeria (2011). Microfinance PolicyFramework for Nigeria. Abuja, Nigeria. Revised April 29 2011. CBN Abuja, Nigeria.

Central Bank of Nigeria (2012). National Financial Inclusion. Summary Report. CBN, Abuja, 20 January 2012.

Central Bank of Nigeria (2014). Guidelines for Commercial Agriculture Credit Scheme (CACS). Central bank of Nigeria (CBN) and Federal Government of Nigeria. Development finance department Central bank of Nigeria, Abuja May14, 2014

Chavas, J. and Aliber, M (1993). An Analysis of Economic Efficiency in Agriculture: A nonparametric Approach. *Journal of Agricultural and Resource Economics,* 8(1): 1-16.

Coelli.T.J and G.E. Battese (1996). "Identification of Factors which Influence the Technicalinefficiency of Indian Farmers". *Australian Journal of agricultural Economics,* 40, No.2: 103-128.

Cooper, D. R and Schindler, P. S. (2002). Business Research Methods (8th edition). Boston McGraw-Hill Irvin.

Dahiru, M.A. and Zubair, H. (2008), Microfinance in Nigeria and the prospects of introducing its Islamic version there in the light of the selected Muslim countries experience. Munich Personal REPEC Archive. Paper N0.8287

Diagne, Aliou (1999). "Determinants of household access to and participation in formal and informal credit markets in Malawi." Food Consumption and Nutrition Division, Discussion Paper No. 67.

Dodson C. B (1997). Changing Agricultural Institutions and Markets. The Farm Credit OutlookMimeo pp. 1-25.

Enugu Forum, Policy Paper 7. Policy Challenges for Microfinance Design and Practice inNigeria. Debating Policy Options for National Development.2006. www.Microfinancegateway.com

Effiong, E.O (2005). Efficiency of Production in selected livestock enterprises in Akwa Ibom State, Nigeria. Unpublished Ph.D. Dissertation. Michael Okpara University of Agriculture, Umudike.

Ekunwe, P.A ,S.I Orewa, M.O Abulu, and R.A Egware (2015). Micro-Credit Access and Profitability on Crop Production in Orhionmwon Local Government Area of Edo State, Nigeria.*Journal of Applied Science and Environmental Management.* March, 2015 Vol. 19 (1) 81 - 87 Full-text Available Online at www.ajol.info and www.bioline.org.br/ja

Enwerem, V. A and Ohajianya D. O (2013). Farm Size and Technical Efficiency of Rice Farmers in Imo State, Nigeria. *Greener Journal of Agricultural Sciences,* 3(2):128-136. ISSN: 2276-7770

Erhabor, P.O. and Emokaro, C.O. (2007), "Relative Technical Efficiency of Cassava Farmers in the three Agro-Ecological Zones of Edo State, Nigeria", *Journal of Applied Science*, Vol. 7 No. 19, pp. 2818 – 2823.

Esobhawan, A.O. (2007). "Efficiency Analysis of Artisanal Fishery Production in Edo State, Nigeria. *Ph.D thesis,* Dept. of Agricultural Economics and Extension, Ambrose Alli University, Ekpoma.

Ezeh C.I (2007). Impact of Selected Rural Development Programme on Poverty Alleviation in Ikwuano LGA, Abia State, Nigeria. *African Journal of Food Agriculture, Nutrition and Development*,. Volume 7 No.5. ISSN 1684-5374

Folake, A. F (2005). Microfinance as a Policy Tool for Poverty Alleviation. A Study of thePerformance of Ten Microfinance Institutions in Nigeria. Morgan State University.

Food and Agriculture Organisation. (2011). The State of Food and Agriculture 2010-2011, FAO, Rome, Italy. http://www.fao.org/docrep/013/i2050e/i2050.pdf.

Fufa, B and R. M. Hassan, (2003). Stochastic Maize Production Technology and Production Risk Analysis in Dadar District, East Ethiopia. *Agrekon,* 42 (2), 116-128.

Girabi, F. and Mwakaje, A. E. (2013). Impact of microfinance on smallholder farm productivity in Tanzania: The case of IRAMBA DISTRICT. *Asian Economic and Financial Review,* 3(2), pp.227-242.

Ghosh, R. (2006). *Microfinance in India: A Critique.*

Gobbi S.(2005), "Microfinance and Micro enterprise development Their contribution to the economic empowerment of women" International Labor Office, Geneva.

Goldberg, N (2005). "Measuring the impact of Microfinance, taking stock of what we know" Grameen Foundation USA Publication Series. www.gfusa.com

Gorton, M. and Davidova, S. (2004). "Farm Productivity and Efficiency in the CEE Applicant Countries: a Synthesis of Results" *Agricultural Economics* 30: 1-16.

Hashemi, S and Rosenberg, R. (2006). *Does microfinance reach the poorest?* Graduating the Poorest Into Microfinance: Linking Safety Nets and Financial Services. CGAP focus Note. No.34. Washington, DC USA.

Haq, M., Hoque, M. and Pathan, S. 2008, "Regulation of Microfinance Institutions in Asia: A Comparative Analysis", *International Review of Business Research Papers*, 4(4):421-450.

Herani, G. M., Rajar, A.W. and Dhakan, A. A. 2007, "Self-Reliance Micro-Finance in Tharparkar-Sindh:Suggested Techniques", *Indus Journal of Management & Social Sciences*, 1(2):147-166.

Hossain, F (2002). Small loans, big claims. *Journal of Foreign Policy,* 12 (2):79-82.Hulme, D. (2000). Impact Assessment Methodologies for Microfinance: Theory, Experience and Better Practice. *World Development*, 28(1):79-98.

Idris N.D.M., Siwar C., Talib,. B. (2013). Determinants of Technical efficiency on pineapple farming, *American journal of applied Sciences*(AJAS).4: 426-431.

Idiong, I.C (2007). Estimation of Farm Level Technical Efficiency in Small scale Swamp Rice Production in Cross River State of Nigeria: A Stochastic Frontier Approach. *World Journal of Agricultural Science*, 3(5): 653-658.

Ifeoma, N. (2008): The role of Commercial Banks in Financing Agriculture: An Undergraduate dissertation, Department of Agricultural Economics and Extension. Federal University of Technology Yola, Nigeria.

Imonikhe, G.A (2004)."Impact of Katsina State Agricultural and Community Development on Income and Productivity of Farmers'. An unpublished ph.D Thesis, Ahmadu Bello University Zaria, Nigeria. Pp40-59

International Fund for Agricultural Development (2009). Enabling Poor Rural People to Overcome Poverty in Nigeria. IFAD via Paolo di Dono. Rome, Italy.

Irobi, N. C (2008). Microfinance and Poverty Alleviation. A Case study of Obazu Progressive Women Association. Mbiere, Imo State Nigeria. Uppsala, Dept of Economics.

Jamil, B (2008). "Microfinance as a tool for poverty alleviation in Nigeria" Paper Presented at Sensitization Workshop on Microfinance Banking in Kano State, Nigeria.

Jegede, C. A., Kehinde, J. and Akinlabi, B. H (2011). Impact of Microfinance on PovertyAlleviation in Nigeria. An Empirical Investigation; *European Journal of Humanities and Social Sciences*, 2(1): 97-111http://www.journalsbank.com/ejhss.htm ©Journalsbank®Publishing Inc.2011.

Kamau, D., Ayuo, A and Kebete P. (2014). An analysis of Credit Use and Expenditure on Agricultural Production; The Case of Uasin Gishu County of Kenya. *Journal of Economics and Sustainable Development*, ISSN 2222-1700(Paper) ISSN2222-2855(online). Vol.5 no2, 2014

Kariuki, D.K., Ritho C.N., Munei K. (2008). "Analysis of the Effect of Land Tenure on Technical Efficiency in Smallholder Crop Production in Kenya" Conference on International Research on Food Security, Natural Resource Management and Rural Development, October 7-9, University of Hohenheim.

Karlan .D and Zinman .J (2006). Expanding credit access: Using randomised supply decisions to estimate the impacts. *Review of Financial Studies*, 23 (1): 433-464.

Khavul, S. (2010). Microfinance: Creating Opportunities for the Poor? *Academy of Management Perspective*, p. 57.

Khan, M. A. and Rahaman, M.A (2007). Impacts of Microfinance on Living Standards, Empowerment, and Poverty Alleviation and Poor People: A Case Study on Microfinance in the Chittagong District of Bangladesh. http://www.essays.se. (Accessed on 24/11/09).

Khan, M. F (1997). Social Dimensions of Islamic Banks in Theory and Practice. Islamic Research and Training Institute, Islamic Development Bank. Manuscript.

Khandker, H. Z (1999). "Assessing the Impact of Micro-credit on Poverty and Vulnerability inBangladesh," Policy Research Working Paper 2145 (Washington, D.C.: World Bank, (1999),p. 3.

Kimuyu P. and J. Omiti (2000). "Institutional Impediments to Access to Credit by Micro andSmall Scale Enterprises in Kenya." IPAR Discussion Paper No.026/2000. IPAR. Nairobi.

Kormawa, P.M. (1999). Food demand structures and market studies for IITA mandate crops: An overview. In: Kormawa, P.M. and E. Aiyedun (Eds.), Food Demand and Market Studies in the Drier Savannah of Nigeria. Proceedings of a

Methodological and Stakeholders' Workshop, September 7-8, Kaduna, Nigeria, pp: 23-32.

Kumbhakar, S.C., Ghosh, S. and McGuckin, J.T (1991). A Generalized Production Frontier Approach for Estimating Determinants of Inefficiency in U.S. Dairy Farms. *Journal of Business and Economic Statistics,* 9: 279-86.

Kughur , Peter Gyanden (2012). The effects of herbicides on crop production and environment in Makurdi Local Government area of Benue State, Nigeria .*Journal of Sustainable Development in Africa* (Volume 14, No.4, 2012) *ISSN: 1520-5509 Clarion University of Pennsylvania, Clarion, Pennsylvania*

Lawal ,J.O., B.T Omonona,O.I.Y Ajani and O.A Oni (2009). Effects of social capital on credit access among cocoa farming households in Osun State,Nigeria. *Agricultural Journal*,4 (4)184-191.

Lee, Jeong-Dong and Hesmati, Almas (2008). Productivity, Efficiency and Economic growth in Asia-Pacific. Http://books.googlecom.ng/bo

Lindvert, M. (2006). "Sustainable Development Work and Micro Finance: A Case Study of howECLOF Ghana is Working Towards Financial Sustainability". An unpublished Thesis submitted to the Department of Social Sciences, Mid Sweden University.

Littlefield, E. (2005). Microfinance - Where We Are Now and Where We Are Headed," Microfinance speech given at the International Year of Microfinance and Georgetown University Conference on, Washington DC.

Liverpool-Tasie S, B Olaniyan, S Salau & J Sackey. (2011). *A Review of Fertilizer Policy Issues in Nigeria*. IFPRI NSSP Working Paper 0019. Abuja: IFPRI-Abuja.

Lore, M. (2007). "An Evaluation of Human Capital Factors that can Enhance Access to Credit among Retailers in Nairobi." Unpublished Project Report Submitted to United states International University-Africa. Nairobi.

Maldonedo J. (2005), "The Influence of Microfinance on the Education Decision of Rural Household Evidence from Bolivia" Universidad de Los Andes. CEDE Document No 2005-46 Bogotá Columbia.

Martínez Espiñeira R. (2006). A Box-Cox double-hurdle model of wildlife valuation: thecitizen's perspective. Ecological Economics 58(1), 192-208

Mejeha, R.O. and Nnanna, I.N. (2010). Effect of Root and Tuber Expansion Programme (RTEP) on Commercialization of Staple Food Crops in Abia State Nigeria. In: Commercial Agriculture, Banking Reform and Economic Downturn: Setting a New Agenda for Agricultural Development in Nigeria. Proceedings of the 11th Annual National Conference of National Association of Agricultural Economists (NAAE), FUT, Minna, Nov. 30 – Dec.3: 66-71.

Miller, C (2011). *Agricultural Value Chain Finance Strategy and Design*. Technical Note.Rome: Food and Agriculture Organization of the United Nations.

Microfinance Gateway (2008). Internal Operational Challenges around Rural and Agricultural Finance. CGAP/ Microfinance Gateway. 1818 H Street NW, MSN P3-300, Washington, DC 20433 USA.

Mobuogwu Maureen (2013). Rural Land and Credit access in Nigeria. Focus on land in Africa. World Resources Institute.

Moffatt, P. G (2003). Hurdle models of loan default. School of Economic and Social StudiesUniversity of East Anglia. Available on-line at http://www.crc.ems.ed.ac.uk/conference/presentations/moffat.pdf.

Mohammad, N. (1992). Anthropogenic Dimensions in Agriculture. Ashok Kumar & Concept. New Delhi: publishing company.

Mohammed, A. D. and Hassan, Z. (2009), Microfinance in Nigeria and the Prospects of Introducing and Islamic Version in the light of Selected Muslim Countries' Experience. *Review of Islamic Economics*, 13(1), pp. 115-174

Muhammad, N.K., Munir, K,Saqib, S.A, Saqib, A., Murad, A and Sobia N. (2013). The Effect of Zarai Taraqiati Bank in enhancing Farm Productivity through Agricultural credit; A Case of District Lakki Marwat, KPK-Pakistan. *Research Journal of Agriculture and Forestry Science*, Vol. 1(8)1-4, September 2013

Murdoch J. (1995), "Income Smoothing and Consumption Smoothing" *Journal of Economic Perspectives* 9(3): 103-114.

Mustapha A and Salihu. A (2015). Determinants of Technical Efficiency of Maize/Cowpea Intercropping Among Women Farmers in Gombe State, Nigeria.*Journal of Agriculture and Sustainability*, Volume 7, Number 2, 2015, 245-258, ISSN 2201-4357

National Population Commission (NPC), (2006). Official Census Figures. NPC, Abuja, Nigeria

Ndubueze-Ogaraku, M. E and Ekine, D. I (2015). Application of the Stochastic Production Frontier Function Model to Cassava Production in the Floodplain Area of Rivers State, *Nigeria. Journal of Biology, Agriculture and Healthcare*, Vol.5, No.4, 2015. www.iiste.org, ISSN 2224-3208 (Paper) ISSN 2225-093X (Online)

Niger State Government Gazette (2009). The A.B.C of S.M.E and Microfinance In Niger State. Governor's office.

Nguyen, C. (2007). Determinants of Credit Participation and its Impact on Household Consumption: Evidence from Rural Vietnam. Paper presented at the 3rd Leicester PhDConference on Economics, England.

Njoku, J.E and M.A.C.A Odii (1991). Determinants of Loan repayment under the special emergency loan scheme(SCALS) in Nigeria. A case study of Imo State. In African Review of Money, Finance and banking. FIN Africa Italy

Nosiru, M.O(2010).Microcredits and Agricultural Productivity inOgun State, Nigeria.*World Journal of Agricultural Science*,6(3): 290-296.IDOSI Publications.

Nwanyanwu, O. J. (2011). Microfinance in Nigeria: Problems and Prospects. *African Research Review*, 5(2), 87-103.

Nwaru, J.C. (2005). Determinants of Farm and off-farm Incomes and Savings of Food Crop farmers in Imo State, Nigeria: Implication for Poverty Alleviation. *Nigerian Agricultural Journal.* 36:26-42.

Odoemenem, I. U and C.P.O, Obinne (2010). Assessing the Factors Influencing the Utilization of Improved Cereal Crop Production Technologies by Small Scale Farmers InNigeria. *Indian Journal of Science and Technology*. 3(1), pp. 180 – 183.

Ogundari, K. and Ojo, S.O (2007). Economic Efficiency of Small Scale Food Crop Productionin Nigeria: A Stochastic Frontier Approach. *Journal of Social Science*, 14(2): 123-130.

Ogundele, F.O. and Okoruwa, V.O. (2004). A Comparative Analysis of Technical Efficiency between Traditional and Improved Rice Variety Farmers in Nigeria. *African Journal of Economic Policy*, 11(1): 91-108.

Okoye,B.C, Onyenweaku, C.E., Ukoha, O.O., Asumugha, G.N and Aniedu, O.C (2008). "Determinant of Labour Productivity on Smallholder cocoyam farms in Anambra State, Nigeria." *Scientific Research and Essay*. 3(11):559-561

Okon, U. E, A.A Enete and N.E Bassey(2010). Technical Efficiency and its Determinants in Garden Egg (Solanum Spp) Production In Uyo Metropolis, Akwa Ibom State, Nigeria. Field Actions Science Report. Special Issue 1. Urban Agriculture.http://factsreports.revues. org/458

Okurut, Francis Nathan (2006). "Access to credit by the poor in South Africa: Evidence from Household Survey Data 1995 and 2000." Stellenbosch economic working papers: 13/2006.

Olagunju, F. I. (2007) Impact of Credit Use on Resource Productivity of Sweet Potatoes Farmers in Osun-State, Nigeria. Journal of Social Science, 14(2): 175-178 Kamla-Raj 2007

Olaitan M.A (2006) "Finance for Small and Medium Scale Enterprises in Nigeria"

*Journal of International Farm Managemen*t, Volume 3 No 2 January

Olanipekun , A.A and Kuponiyi, F.A (2010). The Contribution of Livelihood Diversification to rural households in Ogbomoso Agricultural Zone of Oyo State, Nigeria. *Nigerian Journal of Rural Sociology*, Volume 11, No 2. December 2010.

Olawuyi, S.O., Olapade-Ogunwole, F., Fabiyi Y.L and Ganiyu M.O. (2010). Effects of Micro-finance Bank Credit Scheme on Crop Farmers' Revenue in Ogbomoso South L.G.A of Oyo State. Proceedings of the 11th Annual Conference of National Association of Agricultural Economists (NAAE). University of Benin. Nov. 30th – Dec.3rd.

Olayide, S.O. and Heady, E.O. (1982). Introduction to Agricultural Economics. Ibadan University Press, Nigeria.

Olomola A.S and Gyimah-Brempong, K (2014). Loan demand and rationing among Small Scale farmers in Nigeria. IFPRI Discusion paper 01403 December 2014.

Olukunle, Oni Timothy (2013) Challenges and Prospects of Agriculture in Nigeria: The Way Forward. *Journal of Economics and Sustainable Development*, www.iiste.org .ISSN 2222-1700 (Paper) ISSN 2222-2855 (Online) Vol.4, No.16, 2013.

Omeh, N.G. (2006). Determinants of Commercialization of Cassava Production in Abia State, Nigeria. An unpublished undergraduateProject submitted to the Department of Agricultural Economics,Michael Okpara University of Agriculture, Umudike.

Onaolapo and Oladejo (2011): Impact of Cooperative Financing on MDGS of Poverty Eradication; Lesson from Nigeria. *Research Journal of Finance and Accounting*, Volume 2, No11.

Onu, J. K., Amaza, P.S and Okunmadewa, F.Y (2000). Determinants of Cotton Production and Economic Efficiency. *African Journal of Business and Economic Research*1:234–240.

Onubuogo,G.C and Onyeneke R.U (2012). Market Orientation of Root and Tuber crops Production in Imo State, Nigeria. *Agricultural Science Research Journal*, Vol. 2(5); pp206-216

Onyenweaku, C.E. and Effiong, E.O. (2005). Technical Efficiency in Pig Production in Akwalbom State, Nigeria. *International Journal of Agricultural and Rural Development*, 6: 51-57.

Onyenweaku C. E and Nwaru, J. C (2005). Application of Stochastic Frontier Production Function to the measurement of Technical Efficiency in Food Production in Imo state, Nigeria. *Nigeria Agricultural Journal*36:1-2.

Onyenweaku, C.E., Igwe, K.C and Mbanasor, J.A. (2005). Application of a Stochastic Frontier Production Function to the measurement of Technical Efficiency in

Yam Production in Nasarawa State, Nigeria. *Journal of Sustainable Tropical Agricultural Resources,* 13: 20-25.

Owusu–Sekyere J.D., Alhassan, M and Nyarko, B.K (2011). Assessment of Climate Shift andCrop Yields in the Cape Coast Area in the Central Region of Ghana. APRN J. Agric. and Biol. Sci., 6(2): 10-16

Pedrosa, Jose and Quy-Toan Do (2008). How does geographic distance affect credit marketaccess in Niger? Policy Research Working Paper Series 4772. The World Bank.

Priya, M (2006). The Effects of Microfinance Program Participation on Income and Income Inequality: Evidence from Ghana. http://cniss.wustl.edu/publications (Accessed on 15/11/09).

Rahim, A. R. A. and Rahman, A. 2007, "Islamic Microfinance: A Missing Component in Islamic Banking", *Kyoto Bulletin of Islamic Area Studies,* 1(2):38-53

Rahji, M. A. Y; and S. A. Fakayode (2009). A Multinomial Logit analysis of Agricultural Credit Rationing by Commercial Banks in Nigeria. *International Research Journal of Finance and Economics* 24, 91. www.eurojournals.com/finance

Rahman, S (2003). "Profit Efficiency among Bangladeshi Rice Farmers." *Food Policy,* 28:487-503.

Rahman, S. A and Umar, H. S (2009). Measurement of Technical Efficiency and its Determinants in Crop production in Lafia Local Government Area of Nasarawa State, Nigeria.*Journal of Tropical Agriculture, Food, Environment and Extension,* 8(2): 90 – 96.

Ray, S (1988). Data Envelopement Analysis, Non discretionary Inputs and Efficiency: AnAlternative Interpretation. *Socio- Economic Planning Science journal,* 22: 167- 176.

Rogaly, B (1996). Microfinance Evangelism, Destitute Women, and the Hard Selling of aNew Antipoverty Formula. *Development in Practice,* 6, 100-112.

Sanusi, W. A and Adedeji, I. A. (2010). "A Probit Analysis of Accessibility of Small-ScaleFarmers to Formal Source of Credit in Ogbomosho Zone, Oyo State, Nigeria." *Agricultural Tropica et Subtropica* 43 (1): 49–53.

Sebopetji T.O and Belete, A. (2009). An Application of Probit Analysis to Factors AffectingSmall-Scale Farmers' Decision to take Credit: A Case Study of Greater Letabo Local Municipality in South Africa. *Africa Journal of Agricultural Research*, 4(8):718-723.

Sekhon, M.A., Mahal,A.K., Kaur, M and Sidhu, M.S (2010). Technical Efficiency in Crop Production: A Region-wise analysis. *Agricultural Economics Research Review,* Vol. 23, July-Dec 2010, pp.367-374

Sen, A.K. (1964) Size of holding and productivity, *The Economic Weekly*, **16** (17-18): 777-778.

Sharif, N. R and Dar, A (1996). An Empirical Study of the Patterns and Sources of TechnicalInefficiency in Traditional and HYV Rice Cultivation in Bangladesh. *Journal of Development studies,* 32, 612-629.

Soludo, C. C (2008). Framework for Public Private Partnership in Microfinancing in Nigeria.Being a Keynote Address by the Governor of Central Bank of Nigeria at the International Microfinance Conference and Annual Microfinance/Entrepreneurship Awards, Abuja, Nigeria, January 17 -18, 2008 UNDP's document on Development of a sustainable pro-poor financial sector Phase II MicroStart Nigeria.www.uncdf.org accessed on 12/01/2008

Standish, B (2000) *Economics: Principles and Practice*. South Africa: Pearson Education.pp. 13–15. ISBN 978-1-86891-069-4.

Tadesse, B. and Krishnamoorthy, S (1997). Technical Efficiency of Paddy farmers of TamilNadu: An Analysis based onFarm and Ecological Zone.*Journal of Agricultural Economics* 16:185-192.

Tanko,L., Baba, K.M and Adeniji, O. B (2011). Analysis of the Competitiveness of Mono-crop and mixed crop enterprises in farming system of smallholder farmers in Niger State, Nigeria. *International Journal of AgriScience*, 1(6):344-355

Tenaw, S.K.M., Islam, Z and Parviainen, T (2009). Effects of Land Tenure and Property rightson agricultural productivity in Ethiopia, Namibia and Bangladesh. University of Helsinki Department of Economics and Management Discussion Papers no 33 Helsinki 2009.

The Montpellier panel (2013). Sustainable Intensification: A New Paradigm for African Agriculture, London. www.ag4impact.org.

Tijjani, A. A. (2006). Analysis of the technical efficiency of rice farms in Ijesha Land of Osun State, Nigeria. *Agrekon,* 45(2): pp 126-135.

Toritseju Begho and O'raye Dicta Ogisi (2014) Bayes Approach to the Estimation of TechnicalEfficiency and Returns to Scale in Agriculture:A Case of Nigeria. *Asian Journal of Agricultural Extension,Economics & Sociology3(4): 275-284, 2014; Article no. AJAEES.2014.4.002.* SCIENCEDOMAIN *international*www.sciencedomain.org

Tzouvelekas, V., Pantzios, C. J and Fotopoulos, C (2001). "Technical Efficiency of Alternative Farming Systems: The case of Greek organic and conventional Olive-growing farming." *Food Policy,* 26: 549-569.

United Nations Capital Development fund [UNCDF]. (2009). Enabling Poor Rural People toOvercome Poverty in Ghana. United Nations, New York.

Wadud, A. and White, B (2002). Farm household efficiency in Bangladesh; A Comparison ofStochastic Frontier and DEA methods. *Applied Economics,* 32, 1665-1678.

Wiklund, J and Shepherd, D. (2003). Knowledge-based Resources, Entrepreneurial Orientationand Performance of Small and Medium Sized Businesses. *Strategic ManagementJournal. 24*:1307-1314

Win, S.S., Kitchaicharoen J. and Chaovanopoopho Y. (2007). An Empirical Study of Efficiency of Groundnut Production in Central Myanmar; A Stochastic Frontier Analysis.

Yang, J., Wang, H.,Jin, S.,Chen, K.Z., Reidinger, J and Chao, P. (2014) . Migration, Local off Farm Employment and Agricultural Production Efficiency: Evidence from China. IFPRI Discussion paper 1338. Washington DC; International Food Policy Research Institute (IFPRI) http://ebrary.ifpri.org/cdm/ref/collection/p15738coll2/id/128117.

Zeller, Manfred (1993). "Participation of Rural Households in Informal and Formal Credit Markets in Madagascar." Washington, D.C.: IFPRI.

Zeller, Manfred (1994). Determinants of Credit Rationing: A Study of Informal Lenders andFormal Credit Groups in Madagascar. *World Development. 22 (12)*: 1895–1907.

APPENDIX

DEPARTMENT OF AGRICULTURAL ECONOMICS & RURAL SOCIOLOGY
FACULTY OF AGRICULTURE,
AHMADU BELLO UNIVERSITY ZARIA, NIGERIA.

RESEARCH QUESTIONNAIRE

SECTION A

1. Name of respondent……
2. Local Govt/ district …….
3. Village ……..
4. Age…….
5. Sex ; male ( ) female ( )
6. Marital status ; married ( ) single ( )
7. If married, number of people in the household……
8. Level of education
    a. Not literate at all
    b. Islamic school
    c. Primary school
    d. Secondary school
    e. Tertiary institution
9. Main occupation
    a. Farming
    b. Petty trading
    c. Civil service
    d. Agricultural marketing

e. Others

(specify)…….

10. Land tenure
    a. Hired
    b. Borrowed
    c. Inherited
    d. Purchased
11. If your land is not owned by you, how much do you pay to either hire or purchase it? .....
12. If hired/borrowed, what is the length of your hired/borrowed capability? .....
13. What is your source of capital
    a. Bank
    b. Cooperative
    c. Owned
    d. Borrowed from informal source
    e. Others

    (specify)……..

SECTION B

14. How long have you been farming? .....
15. What kind of crops do you grow? .....
16. How many hectares do you devote to crop farming……

17. How many hectares do you devote to cash crop farming? …….....

18. How many tones/kg of crop did you harvest

    a. Maize

    b. Rice

    c. Yams

    d. Others……

19. How much did you obtain after sales of produce? .....

20. What are the inputs you used for this season cultivation……

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21. What quantity of seeds did you use? ……..

22. What quantity of herbicide did you use? .....

23. What amount of labour did you use? .....

24. What type of fertilizer did you use?

    a. Chemical fertilizer

    b. Organic (animal dung)

25. What quantity of fertilizer did you use? …….

26. What was your total sale of the output? .....

27. How much is the lease price of land per hectare (N)…….

28. How much is the price of labour for man-day (N) ……..

29. How much is price of seeds per kilogram (N) ……

30. What is price of fertilizer per kilogram (N) ……

31. How much is price of herbicides (N) ……

32. How much of capital was invested (N) ……

33. What amount of yield did you get (kg/ha) …….

SECTION C

34. Is there a microfinance institution in your area? .....

35. Who introduced you to microfinance? .....

36. If extension officer, how many visits do you receive from them……..

37. If no, where do you access a microfinance institution? .....

38. How close is a microfinance bank to you? .....

39. Do you enjoy micro credit from the microfinance? .....

40. If yes, how easy do you access credit?

41. If no, what are the difficulties encountered while accessing microcredit?.....

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42. How long have you been enjoying micro credit? .....

43. What is the quantity do you enjoy? ……

44. How often do you enjoy microcredit?.....a seasonal, semi-annually, monthly, yearly

45. What are the cost incurred in obtaining micro credit?……

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46. What are the conditions required in order to obtain microcredit?

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47. How much did of microcredit did you obtain for this growing season?.....

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48. How much did you dedicate for arable crop cultivation?.....

49. How much did you dedicate for cash crop cultivation? .....

50. How much did you pay as interest? .....

51. What is the duration of payment? .....

52. Is it instalment or wholesome? .....

53. If instalment, how many instalments did u make?.....

54. What are the problems you encounter in order to obtain micro-credit?

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55. What encumbrances do you encounter when obtaining micro credits?

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56. What problems do you encounter in crop production?

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