ANALYSIS OF BENEFICIARIES AND NON-BENEFICIARIES OF COMMERCIAL AGRICULTURE DEVELOPMENT PROJECT ON MAIZE COOPERATIVE GROUPS IN KANO AND KADUNA STATES OF NIGERIA

BY

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(MSc /AGRIC/4816/2012-13)

A DISSERTATION SUBMITTED TO THE SCHOOL OF POSTGRADUATE STUDIES, AHMADU BELLO UNIVERSITY, ZARIA, IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF SCIENCE DEGREE IN AGRICULTURAL EXTENSION AND RURAL SOCIOLOGY

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DECEMBER, 2015

DECLARATION

I hereby declare that this dissertation titled "**Analysis of beneficiaries and non-beneficiaries of Commercial Agriculture Development Project on Maize Cooperative Groups in Kano and Kaduna States of Nigeria**"has been written by me and it is a record of my research work. No part of this work has been presented in any previous application for another Degree or Diploma in this or any other institution. All borrowed informationhas been duly acknowledged in the text and a list of references provided.

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CERTIFICATION

This dissertation titled **'Analysis of beneficiaries and non-beneficiaries of Commercial Agriculture Development Project on Maize Cooperative Groups in Kano and Kaduna States of Nigeria',** by StephenKolade meets the regulations governing the award of the Degree of Master of Science, Ahmadu Bello University, Zaria, and is approved for its contribution to knowledge and literary presentation.

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DEDICATION

This dissertation is dedicated to the Almighty God for the grace, strength and wisdom he has granted me. I also dedicate this work to my darling wife Nkiru Stephen Kolade for being my motivator and tonic.

ACKNOWLEDGEMENTS

My deepest thanks goes to God Almighty for the gift of life, the cherisher and sustainer of the universe, for His mercy, assistance and protection especially for seeing me through this programme successfully. I specially wish to express my deep appreciation and sincere gratitude to my supervisors, namely, Prof. J. G Akpoko and Prof. M. O. Akinola for the supervisory role they played in the process of writing this dissertation-they both impacted a lot in me. I am also indebted to the HOD, Prof. Z. Abdulsalam for the regular critique of my work and the advice he has always given, it has help me produced a better work.

I will not forget to mention Dr. M. A.Damisafor his invaluable contribution to the completion of this work and I sincerely express my gratitude to the entire staff and students of the Department of Agricultural Economics and Rural Sociology, Faculty of Agriculture, Ahmadu Bello University, Zaria.

I also wish to express my sincere gratitude and appreciation to my parents and siblings; I appreciate you a lot for your encouragement and advice that have been source of inspiration all through my life.

Finally, I am appreciative of the inputs of Emmanuel Eden and my colleagues. God bless you all.

Abstract

The study was conducted to analyze the Commercial Agriculture Development Project on maize farmers in Kano and Kaduna States of Nigeria.Combinations of purposive and random sampling techniques were used for this study.The data for analysis was based on 2014/2015 cropping season and were collected through the use of a structured questionnaire administered to 140 beneficiaries and 150 non-beneficiaries; making a total of 290 respondents.Tools of analysis used were descriptive statistics, multiple regression analysis and chow test analysis. Results revealed that the mean ages of maize farmers' cooperative group beneficiaries and non-beneficiaries were 40 years. Majority (77%) and about 92% of the beneficiaries and non-beneficiaries had between 1-30 years of farming experience respectively, while about 7% and approximately 51% of maize farmers' cooperative groups' beneficiaries and non-beneficiaries respectively, do not have some formal education. It was found that the level of awareness of CADP among the beneficiaries was highest for seed treatment by (26%) and lowest for pest and diseases control by 16%. On the other hand, It was also found that the most adopted recommended practices of CADP by the beneficiaries was ridging, fertilizer application and storage, which was indicated by (23%) of the beneficiaries. The most adopted recommended practices of CADP by the non-beneficiaries was storage, which was indicated by (16%) of the non-beneficiaries.The results from the multiple regression analysis revealed that age; farm size, education, amount of credit received, household size and extension contact were the factors influencing the adoption of maize recommended production practices at 1% and 10% levels of significance.The results from chow test analysis revealed that commercial agriculture development project had significant impact on beneficiariesoutput,income, yield and level of living at 5% levels of significance.High cost of farm inputs was ranked 1st by 32% of maize farmers' cooperative groups' beneficiaries and 2nd by about 25% of non-beneficiaries as the foremost constraints in the implementation of the maize recommended production practices in the study areas.It is recommended that Government and other stakeholders should also invest in extension service in sensitizing maize farmers' cooperative groups of CADPin the study areas of production practices as this have the potential to increase the level of awareness and adoption as well as farmer's productivity and income, output and level of living.

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CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

In spite of the growing importance of oil, Nigeria has remained essentially agrarian economy, with agriculture still accounting for significant shares in Gross Domestic Product (GDP) and total exports, as well as employing the bulk of the labour force. Available data show that at independence in 1960, the contribution of agriculture to the GDP was about 60% which is typical for developing agrarian nations. However, this share declined, overtime, to only about 25% between 1975 and 1979.This was due, partly to the phenomenal growth of the mining and manufacturing sectors during the period, and partly as a result of the disincentives created by the macroeconomic environment. Similarly, the growth rate of agricultural production exhibited a downward trend during the period. Thus between 1970 and 1982, agricultural production stagnated at less than 1% annual growth rate between 2.5 to 3.0% per annum. There was a sharp decline in crop production, while food production increased marginally. Thus, domestic food supply had to be augmented through large imports. The food import bill rose from a mere 14112.88million annually during 1970-'74 to N1 964.8million in 1991.The advent of the oil boom reduced the share of agriculture in total exports to a mere 2%.Previously the world's leading producer and exporter of palm oil, Nigeria became a net importer of vegetable oils by 1976 (Murray, 1983).

These agricultural stagnationleads to the 1962-1968 development plans which was Nigeria's first national plan. Among several objectives, it emphasized the introduction of mere modern agricultural methods through farm settlements, cooperative (nucleus)

plantations, supply of improved farm implements (e.g. hydraulic hand presses for oil palm processing) and a greatly expanded agricultural extension service.Subsequently, some specialized development schemes were initiated or implemented such as; Farm settlement scheme and National Accelerated Food Production Programme (NAFPP), launched in 1972.

There were also a number of agricultural development intervention experiments notably:

i. Operation Feed the Nation, launched in 1976;

ii. River Basin and Rural Development Authorities, established in 1976;

iii. Green Revolution Programme, inaugurated in 1980; and the world bank-funded Agricultural Development Projects.

The experiment which started with world bank funding, with projects at Funtua (1974), Gusau (1974), blossomed into Ayangba (1977), Lafia (1977), Bida (1979), Ilorin (1980), Ekiti-Akoko (1981) and Oyo-North (1982) agricultural development projects. Following successful negotiations for multi-state agricultural development projects with the World Bank, each state of the country, and the federal capital, Abuja, now has one ADP. The years since the early 1960s, Nigeria has also witnessed the establishment of several agricultural research institutes and their extension research liaison services.

These agricultural research institutes and ADPs help in designing programmes in order to influence an impact on the farmer and the society and one of such programmes is the Commercial Agricultural Development Projects (CADP). Therefore, impact can be defined as the long term influence on the state of the environment surrounding an organization.

Impact of a project can be seen in relation to what the project actually do to the people who participate in them or the actual project outcomes in relation to the desired outcomes (goals). In determining the impact of a social intervention, therefore, Lunslide (1975) suggested that the goals or objectives of the organization rendering the services should be established.

1.2 Problem Statement

Commercial Agriculture Development Project(CADP) is a comprehensive five year Project developed by the Federal Ministry of Agriculture and Water Resources (FMAWR) in collaboration with the World Bank and other stakeholders: International Development Agency (IDA), State Governments and the farmer-beneficiaries otherwise called the Commodity Interest Group (CIG) (CADP Implementation manual, 2009).The Project is implemented in five States of the Federation, namely (Cross Rivers, Enugu, Kaduna, Kano and Lagos) along eight value chains. The total number of direct beneficiaries is estimated at 50 000(that is 10 000 beneficiaries per State) over a period of five years (2009-2013).Small and medium commercial farms will benefit directly, while many households will benefit indirectly through access to farm roads, energy, market opportunities and other spill-over efforts. The beneficiaries are already aggregated into informal commodity interest groups (CIGs). The Project supports three value chains per State. These are Cross Rivers (oil palm, cocoa and rice), Enugu (fruit trees, poultry and maize), Kaduna (Fruit trees, Dairy and maize), Kano (Rice, Dairy and maize) and Lagos (poultry, aquaculture and rice).

Over the last 25 years, agricultural development projects in developing countries have primarily focused on two key objectives. Firstly, continuing the increases in production/productivity of food crops to meet increasing demand for food and secondly, improving the sustainability of farming systems, by reducing the adverse impact of intensification and conserving natural resources (Gerpacio 2001; IRRI2003). Substantial resources have already been invested to achieve this by generating technologies for more sustainable agricultural intensification in developing countries (Trotter and Gordon 2000). Consequently, there were significant achievements in the improvement ofagricultural technologies. Usually, these new technologies were more effective in increasing production and productivity than existing technologies. However, many new technologies which were considered 'effective 'have not been instrumental or successful in alleviating the associated sustainability problems, due to poor dissemination and/or adoption of the technologies by target end users (Neupane *et al.,* 2002; McKemey *et al*., 2003).Better understanding of the reasons for poor adaptation and adoption of agricultural technologies, from a consideration of projects designed to implement technologies for improving sustainability, would enhance future agricultural development interventions. This is necessary to both improve the effectiveness of such projects and to save human and financial resources from being wasted in developing technologies that are not used.

In view of the above gap, therefore, this research seeks to address the following research questions:

i. what are the socio-economic characteristics of the maize farmers' beneficiaries and non-beneficiariesof CADP in the study area?

ii. what is the level of awareness and adoption of CADP by the maizefarmersin the study area?

iii. what are the factors influencing the adoption of CADP in thestudy area?

iv. What is theimpact of the project on output and income of maize farmers' beneficiaries and non-beneficiaries?

v. Whatis the impact of the project on yield and level of leaving of maize farmers'beneficiaries and non-beneficiaries?

vi. What are the constraints encountered in the implementation of the project in the studyarea?

1.3 Objective of the Study

The broad objective of the study is to identify the impact of Commercial Agriculture Development Project on maize farmers' cooperative group in North-West Agro-ecological Zone, Nigeria.

The specific objectives include to:

i. describe the socio-economic characteristics of maize farmers' beneficiaries and non-beneficiaries of CADP in the study area;

ii. identify the level of awareness and adoption of maize recommended production practicesof CADP in the study area;

iii. determine factors influencing adoption of maize recommended production practicesof CADP in the study area;

iv. evaluate the impact of the project on output and income of maize farmers'beneficiaries and non-beneficiaries in the study area;

v. evaluate the impact of the project on yield and level of leaving maize farmers'beneficiaries and non-beneficiaries in the studyand

vi. identify the constraints encountered in the implementation of the recommended production practicesof CADP in the study area.

1.4 Justification of the Study

The agricultural sector in Nigeria consists among others, production, processing and waste management of crops, livestock and fish. It has been one of the most important industries to generate income for Nigerian economy before the advent of fossil oil. In line with government efforts to further develop the agriculture industry, several high-impact agriculture projects such as Commercial Agriculture Development Project have been launched. However, Nigeria is currently facing new challenges with respect to producing new findings that will help to boost the Nigerian agriculture and food sector to a higher level.Therefore, a great deal of effort is needed to ensure that the agriculture sector can elevate the economic development of Nigeria.

Technology usage of CADP must be in line with the financial capacities of farmers, and farmers with limited financial ability will have little chances to adopt the technology. In addition, not all farmers are able to adopt technology due to small number of extension workers they have, and the fact that it comprises many measures that require a high level of knowledge from farmers.

Perhaps the most difficult single problem confronting agricultural administrators of CADP in developing countries is the implementing development programmes. Much of this can be traced to poor project preparation. Unless projects are carefully prepared in substantial detail, inefficient or even wasteful expenditure is almost sure to result-a tragic loss in nations short of capital. Yet in many countries the capacity to prepare and analyze projects

lags. Administrators, even those in important planning positions, continually underestimate the time and effort needed to prepare suitable projects. So much attention is paid to policy formulation and planning of a much broader scope that administrators often overlook the specific projects on which to spend available money and on which much development depends. Ill-conceived, hastily planned projects, virtually improvised on the spot, are too often the result.

This study on impact of Commercial Agriculture Development project on maize cooperative groups is expected to provide empirical information required to plan effective interventions for maize cooperative group farmers in the study area. The study becomes germane as this will serve as a reference material for students and stakeholders in this country on the impacts of Commercial Agriculture Development project amongst maize cooperative groups in Nigeria.

1.5 Hypotheses for the Study

The hypotheses tested in this study include:

i. There is no significant difference in the change in income between beneficiaries and non-beneficiaries of Commercial Agriculture Development Project of maize farmers in the study area.

ii. There is no significant difference in the maize yield between beneficiaries and non-beneficiaries of Commercial Agriculture Development Project of maize farmers in the study area

iii. There is no significant difference in the level of living between beneficiaries and non-beneficiaries of Commercial Agriculture Development Project on maize cooperative groups in the study area.

CHAPTER TWO

LITERATURE REVIEW

2.1 Socio-economic Characteristics of Maize Cooperative Groups

With an estimate 140 million inhabitants and a population growth of 2.5% annually, Nigeria is the most populated country in sub-Saharan Africa and the 10th most populated country in the world (NPC, 2006), approximately 49% of the population engages in agriculture as their major occupation. The agricultural sector is the mainstay of the majority of Nigerian rural poor, with over 70% of the active labour force in rural areas employed in agriculture and the sector contributing over 23% of the GDP in 2006(World Bank,2007).

In a study conducted on farmer based organizations (FBOs) in Ghana, Salifu *et al.* (2012) found that farm size is largely determined by the amount of resources available to the FBO in terms of land, farm inputs and labour. The study also revealed that of 960 FBO leaders surveyed, 70% of the group leaders were male and 30% female. Although most leadershippositions were held by men, fewer than 10% of FBOs restrict membership by agenda. Age data from the survey showed that 87% of the leaders were at least 40years old. The case studies showed that the average age of chairpersons was 57, of secretaries, 51; and of treasurers, 46 years. The most important factors in selecting a chairperson are age, socio-economic status, and the role the person played in the group's formation.

Collective organizations such as FBO are often confronted with two interrelated problems: rules on which the organization should be based; and the effective monitoring and enforcement of such rules (Stockbridge, 2003).

In another study conducted on socio-economic characteristics of maize producing households in the dry savanna of Nigeria, Bamire *et al.* (2010) shows that the age of respondents ranged from 20 to 80 years. The modal age was 50years, and about 80% of the respondents were within the age range of 21 to 60 years. The majority of the youths out-migrated to urban centers for better job opportunities.

In Africa where farming is mainly dependent on family labour, the unmarried often lack the necessary farm help operations especially in gender performed tasks. The unmarried willmore likely be dependent on hired labour and communal cooperative work (Jolly, 2008).Household size is affected by the need for manual labour. Women work alongside theirfarming husbands in the planting and harvesting of grains, root and tuber crops. Thereafter, they pound and process grains, fetch water, smoke and dry fish or bush meat (Ekong, 2003).

The age of an individual as measured in years is believed to be capable of influencing the perception, views, interest and conduct of the person (Chianu and Tsuji, 2004). Many studies have linked innovativeness with young age (Akpoko, 2004).Erwin (2001) found that the probability of adoption of soil conservation practices was lower among older farmers because of their shorter planning horizon. Jan (2006), observed that children in the rural areas engage in economic activities from a very early age while urban children start usually later. However, the age of retirement is generally open ended since very few people have access to a formal social security system. Studies have consistently shown that there are more males of active productive age in the rural areas than females. This is a reflection of the fact that females play minimal roles in farming (Ekong, 2003).

Education improves human capital, farm management capacity and ability to understand and adopt new agricultural technologies (Bezuayehu *et al*.,2002).It is expected that better educated farmers are more likely to adopt technologies than less educated(Chianu and Tsuji,2004).Education means the acquisition of knowledge through formal or informal means.

In a study to assess the socio-economic determinants of cooperative society's access to the services of the Nigerian Agricultural Cooperative and Rural Development Bank, Agbo (2005) found that the mean value for age of cooperative societies with access was lower than thosewithout access. Members of cooperative societies with access spent more years in school than those members of cooperative without access. In areas of shareholding, asset holding, size of liability, the cooperative societies with access scored higher mean values. The study also revealed the younger a cooperative was and the nearer it was to NACRDB the better its chances of accessing the services of the bank. Furthermore, the minimum deposit required to access the N50 billion intervention funds was perceived not to have significant effect by loan beneficiaries. However, the non-beneficiaries perceived this requirement as a very serious impediment to their access. Both beneficiaries and non-beneficiaries perceived interest rate as of not serious effect on their access to this fund.

Abebaw and Haile (2013), Francescond and Heerink (2010) reported that cooperative membership in Ethiopia increases the adoption of improved agricultural technologies, especially mineral fertilizer, and the rate of commercialization.

Reviewed articles on different agricultural cooperatives in developing countries (Barham and Chitemi, 2009; Markelova *et al.*, 2009) concluded that the success of cooperatives depends on the characteristics of the groups as well as on the type of products and markets. It has alsobeen suggested that cooperatives are more successful in higher value products and less in grain and legume markets (Bernard and Spielman, 2009).Ellen VEHOFSTADT and Maerten (2012) when analyzing the impact of maize and horticulture cooperatives on farm performance separately found out that it becomes clear that positive findings are mainly driven by maize cooperative membership. While membership in maize cooperatives increases agricultural intensification, commercialization and farm income; membership in horticulture cooperatives has pronounced effect on farm performance.

2.2 Level of Awareness and Adoption of Recommended Technologies.

Significant achievements have been made in generating sustainable agricultural technologies in developing countries. Usually, these new technologies have been more effective in increasing production and productivity than existing technologies. However, many new technologies considered 'effective' have not been successful in alleviating the associated sustainability problems, due to poor adoption by targeted users. Success of any novel technical intervention should be judged on the basis of how widespread adoption is in the target area by targeted users. Therefore, farmers' adoption of technologies should be a key criterion for judging the success of any project.

In a study conducted to analyze the awareness of Sustainable Agricultural Land Management practices Among Crop Farmers in Northern Part of Taraba State, Nigeria; Simon, *et al* (2013), documented the following findings: 100% of the respondents in the

study area were aware of use of crop residue, 95.7% of the respondents were aware of intercropping and bush fallow;94.3% of the respondents was aware of planting legume crops as sustainable agricultural land management practices;59.6%,57.8% and50% of the respondents were not aware of alley cropping, liming and green manuring respectively as sustainable agricultural land management practices.The above findings imply that, there is high level of sustainable agricultural land management practices in the study area.

In a publication of International Institute of Tropical Agriculture (IITA), Ibadan, Nigeria. Abdoulaye *et al*. (2013) documented that awareness and knowledge of a technology is a prerequisite for its use and pointed out that among the promoted innovation, awareness of grating (59%) and pressing (56%) was the highest. Farmers with first-hand information from research and extension agent (participating respondents) have higher awareness and use in all introduced technologies; and increased awareness and use of improved technologies increased with how closer the respondents were to the change agents with participating farmers having highest awareness (100%) and use levels (90%) from intervention villages followed by non-participating farmers with awareness (85%) use levels (74%) from non-intervention villages; iii. the spread of information about the technologies was a collective effort.

Okoro (2008) in his publication; Awareness and use of the rapid seed yam multiplication technology by farmers in Nigeria's yam belt documented that 46% of the respondents were aware of the minisett technique while the remaining 53.4% of the respondents were not aware. Among the people who were aware of the technique, only about 22.4% of them are using it for massive production of seed yams, while the remaining 24.2% of the respondents

who are aware of technique refused to use it for various reasons .Awareness of the recommended technology in the states was highest in Imo State with 95% of the respondents. While Edo State recorded the lowest awareness level with only 6.5% of the respondents indicating awareness of the technique.

In a study conducted to look at the impact of International Institute of Tropical Agriculture's (IITA) processing research on Nigeria's staple food system. The following findings by Joyce (2010) were recorded:

i. In areas where interventions were introduced, odourless fufu, starch, and chips were becoming increasingly popular. Other products such as cassava flour and ethanol were found but in small quantities and only in the intervention villages;

ii. Cassava was the most important crop grown followed by yam, maize, and plantain/banana, among others. It occupies about 43% of the total crop land in the study area;

iv. The adoption rate for improved cassava varieties among farming households:74% in intervention villages going up to 94% among those that had attended R4D training and 65% for the other locations.

v. On the adoption of processing machines, the grater was the most important with 60% adoption in intervention communities and 76% among those that had attended R4D training. It was followed by the presser; the adoption rate for other processing machines was found to be generally.

vi. Results also indicated that adoption rate of improved cultivars was significantly greater in intervention villages, with the use of graters for processing cassava having a positive and significant influence on adoption of new varieties.

vii. There were varying levels of awareness on the different types of processing machines with many fabricators using other machines not meant for cassava processing. Graters(85%) and pressers(83%) were the most popular machines fabricated, followed by grinders/millers(59%) and fryers(41%);

viii. Half of the enterprises interviewed said they had had contact with IITA/collaborators and 41% had participated in R4D training on cassava processing in Nigeria;

ix. Adoption of cassava products, such as garri, starch, bread, high quality cassava flour(HQCF)instant fufu, odourless fufu, and broiler meal was generally low but still higher for those processors that came into contact with IITA than for those that did not. Adoption was higher for garri (70%), starch (14%), and odorless fufu(17%).

2.3 **Factors Influencing Adoption of Recommended Technologies**

According to Roger's model of innovation adoption, innovation passes through a set of stages before it is implemented by people. Individuals develop the ability to formulate attitudes, make decisions, implement and confirm whether or not innovations should be practiced.

In a study by Talukder(2012), he pointed out that an individual's adoption of innovation not only depends on individual's attitudes but also on organizational policies, approaches and actions. Organizations need to provide facilitating conditions, which include the extent and type of support provided to individuals that will influence their use of innovation. Facilitating conditions are believed to include the availability of training and provision of support.

In a number of local studies by Salleh *et al.* (2009), Hagrol Azil *et al.* (2009), Abu Samah *et al.* (2009) have agreed with findings by Truong (2008) which accentuated on factors such as education, negative perceptions, lack of capital, small land areas, ineffective infrastructure facilities, and limited capacity of extension workers as the main drivers that lead to low technology adoption. Additionally, factors such as the knowledge level of extension workers, methods of organization and management of extension programmes, and local conditions are also highlighted as the drivers for technology adoption. Based on a study conducted by Truong (2008) there are many obstacles to running a successful technology strategy. The main reasons for non-adoption of technology are weak perceptions of technology and low education of farmers, low teaching capacities, limited knowledge among extension workers, disorganization, geographical conditions, and inadequate resources and funds.

Furthermore, Truong's (2008) study suggests that technology adoption demands a great deal of land preparation, a high rate of seed germination, proper seed soaking and incubation, and maintenance of water after sowing. Technology usage must be in line with the financialcapacities of farmers, and farmers with limited financial ability will have little chances to adopt the technology. In addition, not all farmers are able to adopt technology due to the small number of extension workers they have, and the fact that it comprises many measures that require a high level of knowledge from farmers.

Fondahl (2008), identified three major barriers that impede development and implementation of new technologies:

i. Research filters that may prevent further development of an idea, if it is not expected to be cost effective;

ii. technical risk that prevents contractors from using ideas that are not fully developed; and iii. technology transfer barriers that prevent the adoption of mature, cost-effective technologies and include lack of awareness about new ideas, problems in communicating how these ideas could be effective, risk and liability involved in trying something new, difficulty in gaining approval from third parties(such as owners, designers, and regulatory authorities),and resistance to changes.

Bello *et al*.(2012) in his study; factors influencing adoption of crop-based technologies in Jenkwe Development Area of Nassarawa state, Nigeria also supported the findings of J.van den Berg that highly experienced farmers are more inclined to adoption of new technologies and that older farmers tend to be more risk averse. The successful development, dissemination, and adoption of improved technologies for smallholders depend on more than careful planning of research and the use of appropriate methodologies in extension. It depends on the timely formation of coalitions of key actors-including key farmers as well as a range of key outsiders, researchers and others-whose interests converge sufficiently that they can focus their resources and efforts on achieving change in agricultural systems, if only locally and only for a period.

Onu (2006), in his study found that young farmers between ages 18 and44 years cultivating at least 0.7ha had higher probabilities of adopting alley-farming technology than their older counterparts. Adoption decisions increase with increased contacts of farmers with extension agents working on the agro-forestry technology.

Odebode (2011) found that factors such as introduction of appropriate technological innovation and income generating activities influenced rural women in adoption of technological innovations.

2.4 Impact of Commercial Agriculture Development project on Maize Cooperative Groups

Bodnar *et al.* (2011) in a study conducted to evaluate interventions aimed at increasing food production in Asia and Africa found out that costs per beneficiary varied significantly from $2 per household per year for breeding disease-resistant crops to $3 660 per households for those receiving a milk cow and access to cooling equipment. The interventions with the best benefit-cost ratios were research interventions that reduced production losses from cassava mealy bug and cassava brown streak virus, both in Africa, and supported disease-resistant wheat breeding worldwide. A large-scale land titling project in Peru also had benefits thatexceeded project costs within one year. Good benefit-cost ratios were found in value-chain development of traditional export crops. The lowest benefit-cost ratios were found in free orsubsidized fertilizer and seed programmes in Zimbabwe and Malawi, with high recurrent annual costs. However, project costs were still lower than the costs would have been for the import of food aid in case of national food shortage.

Durbin and Brennan (2009) have estimated the benefits in terms of avoided crop losses for the 60 to 120 million farm households growing wheat in developing countries. From the review of the various studies they concluded that about 5% of the wheat production in

developing countries is saved by rust resistance. By extrapolation they estimate that this has contributed to an additional calorie consumption of 4% and a reduction of child malnourishment by 2% in developing countries.

In a United State Agency For International Development (USAID) micro report № 171(2011) for ACDI/VOCA, Lucy Creevery *et al., (2010)* documented that in Pakistan, BTV projects successfully facilitated the development of a more open and receptive environment for development of the value chain (VC). There was also an increase in trust among VC actors. There was also the opportunity to promote festivals and competitions and gave small growers the opportunity to understand and incrementally adopt needed upgrades in production and changes in marketing behavior. Producers who had access to the projects input agent network increased their earnings from maize, bean and groundnut sales by 173% on average between 2006 and 2009, compared to an increase of just 47% for non-participating producers.

In an Asian Development Bank Publication in 2013, titled Commercial Agriculture Development, the following impacts were recorded after the implementation of the projects:

i. Reduced poverty in the rural communities of 11 districts in the Eastern Development Region (EDR) of Nepal through equitable sustainable commercialization of agriculture;
ii. increased economic activities and jobs in the project area. Social inclusion activities promoted the participation of all stakeholders including the poor, disadvantaged, and women in commercial agriculture;

iii. the project directly generated employment opportunities for subsistence stakeholders by promoting high value crops production and marketing;

iv. the landless poor through skill-based training, made more employable and capable of income generation.

v. commercial stakeholders were assisted to add value to agricultural products and encouraged to adopt socially inclusive behavior to help the less advantaged.

In maize Development Strategy working document (2013-2017) the Ethiopian Agricultural Transformation Agency recorded a greater food security and increased incomes for small holder maize farmers after the interventions in the maize sector by Ethiopian ATA.

Also in a 4th global review on publication of, Aid For Trade and value chains in AGRIFOOD,OECD/WTO, Cattaneo (2013) stressed that, actions aimed at developing value chains have contributed to improve their export market intelligence, and boost their exports at the margin, with new markets and new products. They have also helped improve their productive capacity, in particular with regard to compliance with standards and competitiveness.The following impacts of activities were also recorded: better skilled workers, new jobs, poverty alleviation, improved environmental performance, higher exports,better working conditions, better infrastructure, cost savings for company, improved health among workers or local community and cost savings for consumers.

According to the World Bank (2009) the example from Peru illustrates the added value that an explicit gender focus can bring. Aside from increasing female participation in the coffee cooperatives and improving their technical capacity, the programme has helped to strengthened women's self -esteem and leadership capacity. Thus, more women are part of

the boards in mixed gender organization and are also working as extension and administrative workers. The interest by women in managing the organization has also sharply increased.

Lone Riisgaard *et al.,* (2010) in the publication: Evaluation study, Gender and value chain development documented that an internal impact assessment conducted of a UNIDO/CIDAfunded programme aimed at linking low-income, isolated Pakistani women embroiders to markets. The assessment reveals that apart from increased business skills, product quality and income, women also report increased contributions to household decision-making, self-confidence and mobility.

Oehmke *et al.,* (2012) in a USAID sponsored publication titled, ”impact of USAID-supported agricultural programmes”, noted that after implementation of development programmes aimed at ending hunger in Africa, the following impacts were observed:

i. Increases in small-holder incomes in Ethiopia, Ghana, and Rwanda;
ii. Qualitative improvement of livelihood and reduced poverty in Ghana, Rwanda and Ethiopia;
iii. Reduction in the number of months spent with insufficient food in Ethiopia.

Morris *et al.* (2010) in a publication, Adoption and impacts of improved maize production technology pointed out that, Strengthened institutional capacity by the Ghana Grains Development Project (GGDP) strengthened the capacity of the CRI and other Ghanaian institutions to carry out effective research; Better trained human capital during the life of the GGDP, thousands of Ghanaian researchers and extension officers received training and

Improved information the GGDP generated a substantial amount of information that can and is being put to good use by many different users.

"Moussiliou *et al.* (2010) in a publication titled: Local entrepreneurship, agribusiness cluster formation and the development of competitive value chains' recorded the following sustainable impacts after the implementation of the programme of Strategic Alliance Agricultural Development in Africa: In Nigeria, reports by farmers in different interactions productivity in sorghum farming have improved over the two years from less than 1 ton/ha before the cluster began to about 2 tons or more. In Burkina Faso, according to interviewed producers, maize production did not exceed 1tons/half before the project. Now, their fields render more than 3tons/ha after project implementation.

2.5 Constraints Encountered by Maize Farmers

In a paper presentation titled: The small holder dilemma by Okello (2012), in a study identified the following production level constraints and difficulties being linked to markets:

i. Declining land-labour ratio leading to decline in land- to-person ratio, disparities in the distribution of landlessness among small holder farmers;

ii. Stagnant food productivity due to low input use-limited fertilizer application, limited irrigation, lack of green revolution;

iv. Poor infrastructure and poor support services;

vi. Poorly functioning and failed markets for credit, information, technical advice and insurance;

vii. Output markets fail for smallholder farmers because they are widely scattered making produce assembly too costly, they are poorly organized and tend to trade in relatively small volumes.

In a study by Roberta et *al*, (2012), he pointed out that the cost of inputs is a major concern to maize farmers, as is the timely availability of inputs with other socio-economic constraints identified as follows:

i. Lack of access to formal credit sources (government institution, cooperatives etc);

ii. Insufficient access to fair market price information;

iii. Inefficient marketing system for farm inputs and products, and;

iv. Poor infrastructure (roads, irrigation, poor harvest facilities, etc)

Obadike (2011) in a study conducted on rural farmers' problems accessing agricultural information in Nsukka Local Government area of Enugu State, Nigeria, documented the following constraints to accessing agricultural information from their community:

i. poor public relation of the extension worker

ii. Inability to read and write

iii. Poor radio and television signals

iv. Lack of rural electrification and constant power interruption in communities that have electricity supply

v. lack of access roads for every community visit of extension workers

vi. Agricultural information is not broadcast on radio and television in Nsukka dialect

vii. Lack of money to purchase newsletters, leaflets on agricultural information.

In a publication of International Institute of Tropical Agriculture (IITA),Tahirou, *et al.* (2009), in a study conducted to assess the constraint affecting production deployment of maize seed in A Drought Tolerant Maize for African (DTMA) countries of West Africa found that the factors limiting maize seed production and deployment in selected countries in West Africa especially at the regional level that seed production and poor seed policies constitute the major constraints of seed sector. Lack of financial and human resources, inadequate and unavailability of a sufficient quantity of foundation seeds constitute the problems in seed production and processing infrastructure.Major factors that constrain the establishment of Seed Company include lack of access to production credit, high initial investment costs, and lack of access to seed production processing infrastructure. Farmers' perception of yield, seed price, and prices of other inputs, weather conditions, and the effectiveness of promotional campaigns affect the demand for maize seeds. Policy-related impediments include unfavorable seed policies such as taxation, import and export restrictions, and a lengthy variety released process, and controlled seed markets (Abebe, 2010)

In the four study countries, the major limitations to the rapid dissemination of newly released varieties included the unavailability of seeds in a commercial quantity, lack of awareness of available varieties and hybrids, lack of access to credit facilities by farmers, and the high relative price of seed. Also, sometimes monopolistic distribution of seeds through a single intermediary, slow re-imbursement of seed credit sales, difficulty in getting access to other maize seed buyers, and low demand from farmers' lack of awareness were identified. The demand for improved seeds was also relatively low, due mainly to poor promotion and marketing efforts, high prices, and the inability of farmers to purchase

complementary inputs, especially fertilizer. Most rural areas are inaccessible due largely to the poor roads, which often prevent extension staff from getting to the rural communities (Baffour, 2010)

2.6 Theoretical Framework

The theoretical framework to be adopted for the study is the social change theory, the adoption and diffusion theory and the social impact assessment perspective.

2.7.0 Social Change Theory

Donohor and Palmgreens(1976) defined theory as asset of inter-related constructs, definitions and propositions that present a systematic view of phenomena by specifying relations among variables with the purpose of explaining and predicting the phenomena. On the other hand, Moore (1963) defined social change as the significant alteration of social structures including consequences and manifestations of such structures embodied in norms, values and cultural products and symbols. He stressed that essence of human life is change; development and growth are often used interchangeably to associate the dynamics of society with progress. The change could be retrogressive which refers to change in an undesirable direction or progressive meaning in a desirable direction.

However, Adekoya and Tologbonse (2005) stated that the only thing that is permanent is change because it is always taking place as everyone adjusts to one thing or the other every time. They went further to add that change can be viewed as a state of dynamism, which precludes stagnation and if well managed and directed ways implies programmes and development. Social change involves any change in values, norms, sound ideas, habits,

obligations of people or change in lifestyle, life goals chances and environment or in the composition or organization of their society. Change may occur in the replacement of ideas. In some societies, the scientific techniques of agriculture replace traditional ideas and techniques of farming (Ekong, 2003).

In Nigeria, there is a new drive for change and development through instrumentality of research-extension-farmers' linkage strategy. In this respect and with regard to this study, social change will mean the changes the maize cooperative groups undergo in the process of adopting the recommended technologies and how these technologies promote social and economic wellbeing of the cooperative groups. This theory is relevant to this study because it help to understand the changes that occur in the quality of life of individuals who imbibe superior recommended technologies.

2.7.1The Adoption and Diffusion Theory

Diffusion is defined as the process by which innovations spread to members of a social system (Rogers, 2000).This process is however, a subject which is more sociological in nature compared with adoption process. Diffusion process according to Anthony (2007) is the spread of new idea from its source of invention or creation to its ultimate user's adopters.

Daniel (2005) saw it as the process by which an innovation is adopted or gain acceptance by members of a community. Adekoya *et al*. (2005) stated that the process of diffusion is a precursor to adopt, although this does not necessarily always end in the latter. However, David and David (2000) reported that adoption diffusion is the process governing the utilization of innovation.

In another study, Frank (2005) demonstrated that farmers followed an ordered, sequential process over time, and were likely to adopt practices in sets if they offered a means of arresting declining returns per production unit. Farmers made a rational decision not to adopt practices which do not have a socio-economic advantage to them. However, a full understanding of the diffusion process requires an appreciation of the adoption processdetermined by methods and techniques of instruction used (Ekong, 2003; Anthony, 2007).

Innovation can be described as an idea, practice, technology or product perceived as new by an individual. The several characteristics of the innovation as perceived by the receiver contribute to their different rates of adoption. Adoption is the decision of the receiver to make use of the innovation provided if it is economically viable, socially desirable and technologically feasible for the individual to adopt it(Ekong,2003).

In overall, adoption by farmer might not be worthwhile unless the new practices are culturally appropriate, in agreement with self interest, respectful of tradition ,clearly beneficial and not economically risky(Garba *et al*.,2006).

Innovations have five characteristics from the farmers' point of view which affect their rate of adoption: the innovation must have relative advantage, be compatible, not complex, must be triable and should be observable to be adopted(Anthony,2007). All things being equal there exists a significant relationship between level of awareness and adoption of improved technologies. The adoption and diffusion theory is relevant to this study in the sense that it explains how individuals behave and rationalize the adoption of innovation; the different

stages of decision making which will assist any development interventionist to initiate superior technologies that will have maximum impact on individual farmers.

2.7.2 The Social Impact Assessment Perspectives

The social impact assessment perspective involves the application of the knowledge of sociology and other social sciences in attempt to predict the sociological effect of environmental alterations by development project. The theory emphasizes on the process of assessing or estimating, in advance, the social consequences that are likely to follow from specific policy actions or project development, particularly in the context of appropriate national, state, or provincial environmental policy legislation. The theory include all social and cultural consequences to human populations of any public or private actions that alters the ways in which people generally cope as members of society. Cultural impacts involve changes to the norms, values, and beliefs of individuals that guide and rationalize their cognition of themselves and their society.

In general, the social impact assessment perspective process provides description inUnderstanding, managing, and controlling change;predicting probable impacts from change strategies or development projects that are to be implemented; identifying, developing, and implementing mitigation strategies in order to minimize potential social impacts that may develop as a result of the social change; evaluating social impacts caused by earlier developments, projects, technological change, specific technology, and government policy.This theory is therefore relevant to this study in the sense that it will help in the understanding of the social realities which demonstrates the change that has taken place in commercial agriculture development.

2.7.3 The Concept of Impact Assessment on Cooperative Groups

The term impact refers to the broad, long-term economic, social and environmental effects resulting from research(IAEG,1999),while assessment is judging, appraising or determining the worth, value of quality research in terms of its relevance, effectiveness, efficiency and impact(IAEG,1999).

Impact assessment is a criteria component of agricultural research in that it helps to define priorities of research and facilitate resource allocation among programmes, guide researchers and those involved in technology transfer to have a better understanding of the new technologies are adopted and diffused into farming communities and show evidence that clients benefits from the research products(Manyong *et al*.,2001).Impact assessment is an established practice in public goods investment project and programmes such as infrastructure,health, education, transportation and urban development.

2.8 The Conceptual Model

The model for this study will explain the impact of maize recommended technologies on maize cooperative groups. The farmers' socio-economic characteristics : age, gender, marital status, education level, household size, farm size, extension contact, farming experience, amount of grant received, forms the independent variable(X) which is linked to the dependent variable by an arrow while maize cooperative groups' response to improved maize production techniques incude: ridging, seed rate, spacing, seed treatment, fertilizer application, weeding, pest and disease control and harvesting forms the dependent

variable(Y).The farmers' response to the extension service is linked to the expected outcomes by a broken arrow (- - - ->) to show spill-over effects. The outcomes of the relationship between the independent variables and dependent variables; output, income and adoption is as shown in the model below:

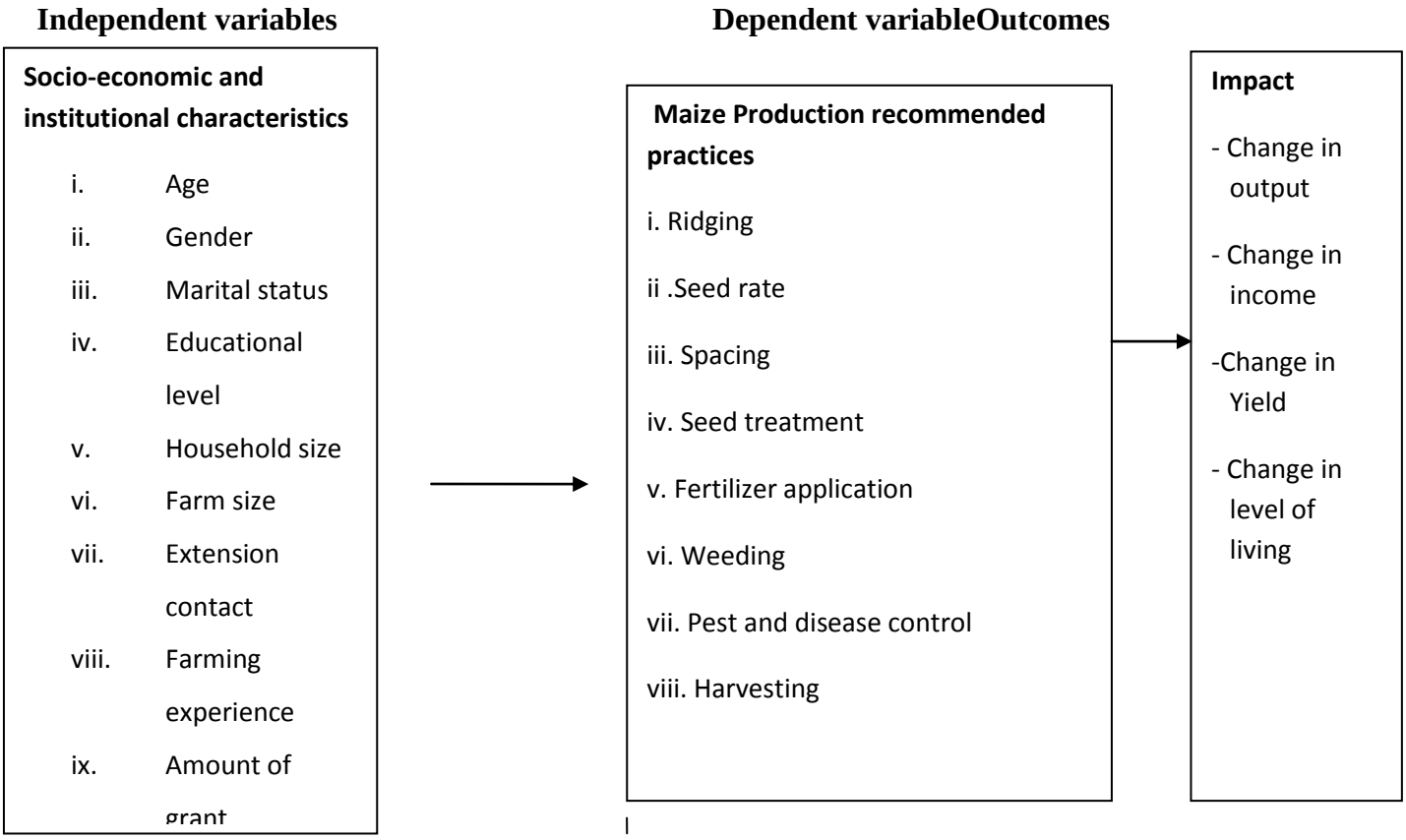


Figure 1: A Model of Impact of Commercial Agriculture Development Project on maize Cooperative groups in the study area.

CHAPTER THREE

METHODOLOGY

3.1 Description of the Study Area

This study was carried out in Kaduna and Kano State .The ecology in Kaduna State is Northern Guinea Savanna(NGS) with 600-1200mm annual rainfall. Rainfall is unimodally distributed in both ecologies. The length of growing period is 150-180 days for the NGS and 90-150 days for the Sudan Savannah (SS). Kaduna State lies between latitudes 90º04´/to 11º50´/N and longitude 6º09´/to10º41´/. (Chianu *et al*., 2004).

The State has two distinct seasons, the dry season and rainy season. The temperature is hot during the dry season and cool during the rainy season, from November to February the cold dry harmattan wind blows across the State, the Northern part of the state being, affected most. The southern part of the State enjoys heavier rainfall than the Northern part; lasting between 5-6 months in the Southern part and 4-5 months in the Northern part of the state. Generally the rains start in April and ends in October.

The state extends from tropical grassland (savannah) in the South to Sudan Savannah in the North. The Savannah region of the State covers the Southern part stretching to Gwantu, South of Kafanchan with prevailing vegetation of tall trees. The Sudan or Sahel Savannah covers the northern part of the State, stretching from Zaria down to Ikara and its environs. Kaduna State shares common borders with Kano, Katsina, Zamfara, Niger, Nasarawa,

Plateau States and Abuja the Federal Capital Territory. It has a landmass of 45,567 square kilometers, with an estimated population of 7.4million people from 2006 population census, with an annual rate increase of 3%.The State has vast expanse of fertile land growing both food and cash crops like maize, rice, cassava, ginger, potatoes, millet, groundnut, shea-nut, benni-seed and soya beans aside from animal husbandry.

The life of the people of the State has been greatly influenced by this geographical setting. The two climatic conditions in the State greatly influence activities of the people, thus the people are predominantly occupied in agriculture during the rainy season which lasts for about six months from May to October, while they engage in hunting and petty trading during the dry season (Chianu *et al*., 2004).

Kano is one of the states that make up the North-West ecological zones. It shares borders with Katsina, Jigawa, Bauchi, and Kaduna. Its main cities and towns are Kano (capital city), Rano and Wudil. Kano State lies at latitude 11^0 30'North and longititude 8^0 30'East. Its total land area of 21 276.9 square Kilometres with an estimated population of 10.7 million people from 2006 population census, with an annual rate increase of 3%. (NPS, 2006). The state is mostly populated by the Hausa and Fulani people. Hausa is its commonly spoken language. Kano has forty-four local government areas (LGAs).

Agriculture is one of the most important pillars of the state's economy with about 75% of the total working population engaged directly or indirectly in this activity. The principal

food crops cultivated are millet, cowpea, sorghum, maize and rice (for local consumption), while groundnut and cotton are produced for export and industrial purposes. During the colonial period and several years after Nigeria's independence, the groundnut produced in the state constituted one of the country's major revenue sources. Kano State is also a major producer of hides and skins, and leather tanning and decoration is one of its key industries. Kano has historically been an important trading centre (particularly in kola nuts, leather goods and cloth) and is currently the second largest industrial centre in Nigeria.

Crop production in Kano and Kaduna is still manually done in small-scattered pieces of land with the use of implements such as hoes, cutlasses, knives and axes with very few medium and large-scale farmers that are engaged in tractor ploughing/harrowing which is visible along access roads.

3.2 Sampling Procedure and Sample Size

This study used a multistage-sampling procedure. The first stage involved a purposive selection of six (6) and four (4) Local Government Areas of Kano and Kaduna States respectively, this is becausemaize value chain activities of production, marketing and distribution activities is predominant and active in these local governments.The variation in the Local Government selection was due to higher number of Local Government Areas in Kano State than in Kaduna State. The selected local governments in Kano State are: Doguwa, Bebeji, Shanono, Gaya, Nassarawa and Kumbotsowhile in Kaduna states they are: Lere, Chikun, Kajuru and Soba. These local Governments are also predominant in CADP.In the second stage, about 10% of the respondents from the beneficiaries and non-beneficiaries of maize farmers from each of the selected LGAs were randomly selected

with the aid of lottery method from the list of registered maize cooperative groups based on the reconnaissance survey conducted in 2014 with the help of an extension staff members of the State Agricultural Development Projects as shown on Table 3.1.

In all, the survey involved a random selection of 140 beneficiaries and 140 non-beneficiaries, making a total of 280 maize farmers depicting the sample size.

Table 3.1Distribution of respondents according to membership of CADP

States	**LGAs**	**Beneficiaries**		**Non-Beneficiaries**	
		Sampling frame (10%)	Sample size	Sampling frame	Sample size (10%)
Kano	Doguwa	175	18	193	19
	Bebeji	113	11	117	11
	Shanono	121	12	129	12
	Gaya	157	16	149	14
	Nasarawa	163	16	167	16
	Kumbotso	147	15	141	14
Kaduna	Lere	170	17	174	17
	Chikun	124	12	148	14
	Kajuru	111	11	119	11
	Soba	123	12	127	12
Total		**1404**	**140**	**1464**	**140**

Source: Kano and Kaduna ADP, (2014).

3.3 Data Collection

Primary data waresourced from maize farmers' cooperative groups beneficiaries and non-beneficiaries of the Commercial Agricultural Development Project in the study area

through the use of structured questionnaire schedule.Information collected include: socio-economic characteristics of beneficiaries and non-beneficiaries of CADP such as age, education level, household size, secondary occupation, farms size, farming experience and constraints encountered in the implementation of CADP.Data were also be collected on the input-output level of the respondents comprising both beneficiaries and non-beneficiaries.

3.4 Analytical Techniques

Data collected were analyzed using descriptive statistics which include measurement of central tendencies such as frequency distribution, percentages and averages and ranking orderly to achieve objectives i, ii, and vi, while the multiple regression technique was used to achieve objective iii. The model is implicitly specified as follows:

$$Y/f(a_o+a_1X_1 +a_2X_2 +a_3 X_3+a_4 X_4+a_5 X_5+a_6 X_6+a_7X_7+a_8 X_8+a_9X_9+U)$$

Where

Y=Number of recommended technologies adopted

X_1=Age in years

X_2=Farm size (in hectares)

X_3= Education level (Number of years spent in formal education)

X_4=Marital status (dummy, 1 if married, 0, others)

X_5=Amount of grant received (In Naira)

X_6=Household size (number of persons)

X_7= Farming experience (no. of years)

X_8= Extension contact (number)

X_9= Sex (male or female)

U=Error term

a_0=constant

a_1- a_{10}=Regression co-efficient

In addition, three functional forms of the model; linear, double log, and semi-log were used to determine the equation that has the best fit. The value of the R^2 and F-test was used to evaluate the overall explanatory power of the regression model. Also the significance of the parameter estimates was evaluated by means of t-test at 1%,5% and 10% level of significance.

The Chow test was used to achieve objective iv and v. According to Dougherty (2000), Chow test statistics is often used in programme evaluation to determine whether the progamme has impact on different sub-groups of the population. The Chow test is an application of the F-distribution test; it requires the sum of squared errors from two regressions, one from each sample group and one for the pooleddata. If F-chow test is greater than the F-tabulated, then there is project impact on the beneficiaries, otherwise there is no impact.

The Chow is represented by the formula:

$$F= \frac{Rss- Rss_{1 +} Rss_{2/k}}{Rss_1+Rss_2/n1+n_2-2k}$$

Where:

Rss= Residual sum of square for pooled sample.

Rss_1= Residual sum of square for beneficiaries.

Rss_2= Residual sum of square for non- beneficiaries.

n1, n2= Total number of observations.

K= Number of parameters

3.5 Operationalizaton and Measurement of Variables.

3.5.1 Independent Variables

These are also referred to as predictor variables and the following was used in this study; age, farm size, level of education, marital status, amount of grant received, household size, farming experience and extension contact.

Socio-economic Characteristics

a. **Age**: This is the number of years of the respondent from birth. Ages of the respondent were measured by the actual years the individual has lived as given by him/her.
b. **Sex**: This is the classification of the respondents according to biological sex into male and female. It was measured by allocating 1 to male and 2 to female.
c. **Marital status:** This is a condition or state of being married or unmarried as indicated by the respondent. This will be measured thus: Married=1, Single=0
d. **Level of education:** This is the number of years a respondent has spent in formal education. Level of education was measured in terms of the number of years spent in formal education which was allocated with number of years as follows; No formal education=0, adult education = 1, primary education=2, secondary education=3, tertiary education = 4
e. **Farm size:** It was measured as estimated total area of land in hectares (ha) cultivated by a respondent.
f. **Household size:** This is the number of dependents in the respondents' house. This wasmeasured by estimating the number of people in a household.

g. **Farming experience**: This is the total number of years the respondents spend in maize farming business. It was measured by estimating the number of years the respondent has spent in the farming enterprise.

h. **Extension contact**: This is the meeting of respondents with the extension agents. It was measured by estimating the number of contacts in a year.

i. **Amount of grant received:** This is the value of the matching grant received by the respondent from the interventionist's agency to implement the recommended technology. It was measured by the total amount of money received in naira inKano and Kaduna CADP.

3.5.2 Dependent Variables

The dependent variable was adoption of recommended production practices.

Impact: Impact is the long term influence on the state of the environment surrounding the organization. Impact of a programme can be seen in relation to what the programme actually do to the people who participate in them or the actual programme outcomes in relation to the desired outcomes (goals).

Adoption: Adoption in this study is the acceptance and continuous use of recommendedpractices in maize production such as ridging, seed rate, spacing, seed treatment,weeding, fertilizer application and pest and disease control. The total number of recommended practices constitutes the respondents' total score.

Ridging: Ridges made were measured in centimeter intra row.

Planting: Time of planting was measured indicating what month of the year is planting carried out e.g. May-June.

Seed rate: The number of seeds sowed per hole was measured attaching numbers to them

Spacing: Plant spacing was measured in centimeter intra and inter row.

Seed treatment: Pesticides used in seed treatment was measured by the number of sachets of pesticides used per kilogram of seeds sown.

Fertilizer application: Fertilizer applied was measured in kilogramme per hectare.

Weeding: weeding was determined by identifying at what week(s) it is carried out before and after sowing or planting.

Pest and disease control: The pesticides used are to be measured in liters per hectare.

3.5.3: Impact

Maize output: This variable was measured as total output of maize in kg accruing to the farmer during the 2014 cropping season.

Farm income: This is the total income in naira of the respondent maize crop production. It include the amount consumed, given as gift, sold and what remain from the major crops grown in 2013 and valued at the 2013 market price.

Level of living: The standard of living of a household has many indicators. The most common is the income that is total income earned as well as consumption(expenditure).Others use social welfare to indicate household quality of life generally using the total value of livelihood assets possessed or consumed by the household, durable goods, animal etc Valuable assets such as modern houses, land and functional Tv, DVD, Radio sets and animal such as sheep, goats and poultry, etc was used to measure the level of living of the farmers, items were converted to monitory values for level of living for the members of maize cooperative groups.

Crop yield: This variable were measured as the total output of maize in kg/ha accruing to the farmer during 2014 cropping season divided by the total hectarage put into production.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1. Socio-Economic Characteristics of Maize Farmers Cooperative Groups

In this section the general socio-economic characteristics of maize farmer's cooperative groups is provided. These include age, sex, farming experience,educational level, household size, farm size, extension contact, marital status and amount of credit received.

Table 4.1:Age characteristic of beneficiary and non-beneficiary ofcommercial Agricultural development project on maize farmers

Variable Characteristic	**Beneficiaries**		**Non-beneficiaries**	
Age	**Frequency**	**Percentage (%)**	**Frequency**	**Percentages (%)**
20-29	16	11.4	13	9.3
30-39	57	40.7	62	44.3
40-49	43	30.7	36	25.7
50-59	20	14.3	24	17.1
60-69	4	2.9	3	2.1
≥ 70	0	0	2	1.4
Mean	**40**		**41**	
Standard Error	**0.770**		**0.836**	

4.1.1 Age distribution of maize farmers' beneficiaries and non-beneficiaries

Age is very important in agricultural production activities because age has a significant influence on the decision making process of farmers with respect to adoption of improved farming technologies and other production-related decisions.The result in Table 4.1 revealed that majority 83% and 79% of the beneficiaries and non-beneficiaries were between the ages of 20-49 years respectively, which is less than 50 years of age. The mean ages for beneficiaries and non-beneficiaries were 40 and 41 years respectively. This implies that, the farmers are strong, agile, and active and can participate adequately in farming

activities. The age distribution is expected to have positive influence on the respondent's participation in maize production generally, which invariably means better efficiency in production. This finding is similar to that of Adegboye (2011) who observed that youth constitute the majority of the sorghum farmers in the study area. This result is also in line with the findings of Obeta and Nwagbo (1999) who observed that youth constitute the majority of the maize farmers, and younger farmers are more flexible to new ideas and risk; hence they are expected to adopt innovations more readily than older farmers.

Table 4.2: Gender of beneficiaries and non-beneficiaries ofcommercial agriculture development project on maize farmers.

Variable Characteristic	**Beneficiaries**		**Non-beneficiaries**	
Sex	**Frequency**	**Percentage (%)**	**Frequency**	**Parentage (%)**
Male	105	75.0	113	80.7
Female	35	25.0	27	19.3

4.1.2Gender distribution of maize respondents

The result inTable 4.2 revealed that about 75% and 81% of thebeneficiaries and non-beneficiariesrespectively, were male, while about 25% and 19% beneficiaries and non-beneficiaries respectively, were female. This implies that men folk dominate the maize production in the study areas. This finding is in line with Okoche*et al.* (2012) who pointed out that 70% of the respondents were male among rural sorghum farmers in Benue state, Nigeria. Oladeji*et al*., (2013), also observed that it is generally believed that males are often more energetic and could readily be available for energy demanding jobs like farming. The low percentage of the female youth participating in commercial agricultural development

project could be attributed to the fact that females in the study area usually involved in several other activities outside farming like food vendors, hair dressing, tailoring and petty trading.

Table4.3:Farming experience of beneficiaries and non-beneficiaries of commercial agriculture development project on maize farmers.

Variable Characteristic	**Beneficiaries**		**Non-beneficiaries**	
Farming Experience	**Frequency**	**Percentage (%)**	**Frequency**	**Percentages (%)**
1-10	36	25.7	69	49.3
11-20	53	37.9	26	18.6
21-30	18	12.9	35	25.0
31-40	21	22.1	7	5.0
≥ 41	2	1.4	3	2.1
Mean	**14**		**13**	
Standard Error	**0.558**		**0.484**	

4.1.3 Distribution based on farming experience

Experience influences individuals' perception and understanding of the management requirements and consequently improve farm produce. Farming experience is another important socio-economic factor that can bring about increase in productivity.

From the result in table 4.3, it was found that majority (77%) and about 93% of the beneficiaries and non-beneficiariesrespectively, had between 1-30 years of farming experience, while about 23% and about 7% of the beneficiaries and non-beneficiaries farmers had greater than 31 years of farming experience respectively, which shows that the participants have more years of farming experience than the non-participants. The mean farming experience for participant and non-participant were 14 and 13 years respectively.

Farming experience is used as a measure of management ability, the more experience the farmer is, the more his ability to make farm decision. This result showed that most of the respondents had long years of farming experience, implying that such farmers are likely to make decisions that would increase their output and income.

This finding is in tandem with the findings of kebbeh*et al*., (2003).Also,Adebayo (2006) noted that the longer a person stays on a particular job, the better his job performance tends to be. The result suggests that job performance in maize production in CADP for beneficiaries would be better under long years of experience.

Table 4.4: Education of beneficiary and non-beneficiary of commercial agriculture development project on maize farmers

Variable Characteristic	**Beneficiaries**		**Non-beneficiaries**	
Education	**Frequency**	**Percentage (%)**	**Frequency**	**Percentages (%)**
No Education	10	7.1	71	50.7
Adult Education	32	22.9	5	3.3
Primary Education	44	31.4	25	16.7
Secondary Education	41	29.3	32	22.9
Tertiary Education	13	9.3	7	4.7
Mean	**2**		**1**	
Standard Error	**0.118**		**0.115**	

4.1.4Educational level distribution of maize farmers

Considering the educational level of the sampled respondents in the study area, it was observed that majority (90%) of the beneficiaries have one form of education or the other and just 49% of the non-beneficiaries were educated. This means that beneficiaries respondents were dominated by the educated class and mostly by those armed with

high level of education, probably that is why majority of the beneficiaries adopted the practice. The beneficiaries farmers can therefore be said to be literate since only small proportion of about 10% had no formal education as compared to about 51% of the non-beneficiaries that were illiterate. The result compares favorably with Lawal*et al.,*(2009) who observed that the level of education attended by the cocoa farmers in Oyo State to a large extent determine the strategies which he/she may use to relate with the extension officers. Also, it is in line with the findings of Amaza (2000), who found that education has a positive and significant impact on farmers' efficiency in production. Thus, literacy level will greatly influence the decision making and adoption of innovation by farmers, which may bring about increase in productivity.

Table 4.5: Household size of beneficiary and non-beneficiary of commercial agriculture development project on maize farmers

Variable Characteristic	**Beneficiaries**		**Non-beneficiaries**	
Household Size	**Frequency**	**Percentage (%)**	**Frequency**	**Percentages (%)**
1-10	127	90.7	122	87.1
11-20	11	7.9	9	6.0
21-30	1	0.7	5	3.3
≥ 31	1	0.7	4	2.7
Mean	**5**		**6**	
Standard Error	**0.107**		**0.423**	

4.1.5Household size distribution of maize farmers

The result of the study in table 4.5 revealed that majority (91%) of beneficiaries and about 80% of non-beneficiariesrespectively had between 1-10 household sizes.The mean household size for farmer's beneficiaries and non-beneficiarieshad5 and 6 household sizes

respectively. The implication is that relatively large household size may likely enhance the family labour supply on the farms, hence supporting favorably, productive capacities of the farmers already enhanced by their age. This corroborate with the findings of Adewale*et al.*, (2005) that the larger the household size, the higher the likelihood of sustainable labour efficiency on farmers' farm, given the constant labour supply.However, Ahmed (2011) argued that large household size is associated with increased household consumption expenditure which reduces the money that could be used for production purposes. According to the report of Oluwatayo*et al.*, (2008), there is a positive and significant relationship between household size and farmers' efficiency in production. However, the absolute number of people in a certain family cannot be used to justify the potential for productive farm work. This is because it can be affected by some important factors namely; age, sex and health status. Essentially, it is the composition of the household that determine labour supply for the accomplishment of farm operations.

Table 4.6:Farm size of beneficiaries and non-beneficiaries of commercial agricultural development project on maize farmers.

Variables Characteristics	**Beneficiaries**		**Non-beneficiaries**	
Farm Size	**Frequency**	**Percentage (%)**	**Frequency**	**Percentages (%)**
≤1.0	0	0	24	17.1
1.1-2.9	3	2.1	57	40.7
3.0-5.9	73	52.1	50	35.7
≥6.0	64	45.7	9	6.4
Mean		**5**		**2**
Standard Error		**0.165**		**0.123**

4.1.6 Farm sizedistribution of maize cooperative groups

The size of the farm cultivated is a function of population pressure, family size and financial background of the farmers. The results in Table 4.6 shows that about 2% and about 58% of thebeneficiaries and non-beneficiariesrespectively, had farm size that ranges between ≤ 1.0-2.9 hectare, while, about 98% and 42% had farm sizes that ranges between 3.0 - ≥ 6.0 hectares respectively. The mean Farmsize of beneficiaries and non-beneficiaries were about 5 hectares and 2 hectares respectively.The minimum and maximum farm sizes for the beneficiaries are 2.8 and 12.0 while the minimum and maximum farm sizes for the non-beneficiaries are 0.2 and 7.0 respectively. Going by Ojuekaiye (2001), classification of farm size, he classified 0.1-5.9 hectares as small-scale farms, 6.0-11.9 as medium-scale farms and 12.0 and above as large-scale farms, it therefore, shows that adopters are mostly medium-scale and large-scale farmers while the non-adopters comprises of mostly small-scale farmers and a little of medium-scale farmers. This could be attributed to the large amount of grant given to the adopters because none of them financed their production from their personal savings. This will allow for meaningful investment and returns to scale on food security and productivity.

Table 4.7: Extension contact of beneficiaries and non-beneficiaries of commercial agriculture development project on maize farmers.

Variables Characteristics	**Beneficiaries**		**Non-beneficiaries**	
Extension contact	**Frequency**	**Percentage (%)**	**Frequency**	**Percentage (%)**
No contact	0	0	97	69.3
1-3	109	77.9	41	29.3
4-6	18	12.8	2	1.4
≥ 7	13	9.3	0	0
Mean	**3**		**1**	
Standard Error	**0.068**		**0.705**	

4.1.7 Extension contactsof maize cooperative groups

The ultimate aim of extension services is to enhance farmers' ability to efficiently utilize resources through the adoption of new and improved methods used in maize production instead of using traditional methods which are inefficient, resulting to low yield. The distribution of the sampled farmers based on numbers of extension visit is for adopters and non-adopters are presented in Table 4.7.

The result in Table 4.7 revealed that the beneficiaries have about 78% contact to extension services that ranges between 1-3 number of contacts, about 13% had contact of between 4-6 number of contacts while about 9% had contact of ≥ 7, while majority (69%) of the non-beneficiaries in the study area had no contact to extension service while about 31% had one form of extension services or the other that ranges between 1-5 numbers of contacts. The finding shows that beneficiaries had more extension contacts than the non-beneficiaries. This implies that extension services of the adopters enhance maize farmers' ability to efficiently utilize resources through the adoption of new and improved methods used in maize production in the study area. According to Obwona (2000), extension service is very essential to the improvement of farm productivity and efficiency among farmers. Umar, Ndanutsa and Olaleye(2009) argued that higher extension contacts would increase adoption of improved farm production technologies. They further argued that the frequency of extension contact is very essential as it guides the farmers on awareness to the adoption stage. That is why the low level of extension contact among the non-adopters results in low yield and productivity as compared to the adopters yield and output.

Table 4.8:Marital status of beneficiaries and non-beneficiaries of commercial agriculture development project on maize farmers

Variables Characteristics	**Beneficiaries**		**Non-beneficiaries**	
Marital Status	**Frequency**	**Percentage (%)**	**Frequency**	**Percentages (%)**
Married	102	72.9	105	75.0
Single	38	27.1	35	25.0

4.1.8 Marital status distribution of respondents

The analysis also revealed that about 73% and about 75% of the beneficiaries and non-beneficiaries were married, while about 27% and 25% were still single. This may contribute to the labour requirements on the farms as most of the farm operations are labour intensive (Ismailla, 2010). Thus, wives and children can serve as cheap source of labour which may lead to increase in their farm size, adoption of innovations and the overall level of farm productivity.

Table 4.9:Amount of grant of beneficiaries and non-beneficiaries of commercial agriculture development project on maize farmers.

Variables Characteristics	**Beneficiaries**		**Non-beneficiaries**	
Amount of grant	**Frequency**	**Percentage (%)**	**Frequency**	**Percentages (%)**
Personal savings	0	0	94	66.1
≤50,000	14	10.0	43	30.7
50,001-150,000	46	32.9	3	2.1
150,001-250,000	69	49.3	0	0.0
250,001-350,000	11	7.8	0	0.0

4.1.9Amount of credit received

Adequate funding is required by farmers to finance their production activities of CADP. The results presented in Table 4.9 indicate that majority (66%) of the non-beneficiariesfinanced their production from personal savings which is not mostly adequate for production activities that is why they are mainly small-scale farmers which in turn reduce their level of profit efficiency while most the beneficiaries had grant received from ₦50, 000 to ₦350,000 with the mean of ₦183,145.35. This account for the reason of high yield than the non-beneficiaries yield and also shows the contribution of enough capital to production activities.

4.2 Level of awareness of maize recommended production practices

The maize recommended production practices include ridging, planting date, seed rate, planting space, seed treatment, fertilizer application, weeding, pest and disease control,

harvesting and storage. Framers were aware of these components of recommended production practices in varying degrees.

From the result in table 4.10, it was found that the level of awareness among the beneficiaries on seed treatment was (26%) which is the highest, followed by planting date (24%) and ridging (23%) respectively. The level of awareness among thebeneficiaries was lowest for pest and diseases control and harvesting as indicated by 16% and 16% of the beneficiaries respondents respectively.

Also, the level of awareness among the non-beneficiaries on planting date, storage was (11%) for both, while seed rate, seed treatment, pest and diseases was (10%) each. The level of awareness among the non- beneficiaries was lowest for planting space, fertilizer application, weeding and harvesting by (9%) and highest for ridging by (12%). The finding is at variance with Yahaya and Olayide (2006) claim that cassava farmers in Nigeria level of awareness of associated technologies was high.

Table 4.10: Distribution of farmers according to their level of awareness ofrecommended practices

Awareness level	Beneficiaries		Non-beneficiaries	
	Frequency	Percentage	Frequency	Percentage
Ridging	90	20	84	12
Planting date	123	24	77	11
Seed rate	106	22	67	10
Planting spacing	98	21	65	9
Seed treatment	90	26	72	10
Fertilizer application	81	19	63	9
Weeding	72	18	61	9
Pest and disease control	56	16	72	10
Harvesting	50	16	63	9
Storage	116	23	80	11
Total	□ **441**		□ **704**	

□ Multiple responses

4.2.1 Level of Adoption of Recommended Maize Production Practices

The maize recommended production practices include ridging, planting date, seed rate, planting space, seed treatment, fertilizer application, weeding, pest and disease control, harvesting and storage. These components of recommended production practices were adopted by the farmers in varying degrees. Adoption in this study was based on the number of recommended practices constantly used by the respondents. The adoption level represents the number of respondents using the practices as a percentage of the total number of the respondents studied (Ojo, 2009).

The result of Table 4.11 shows that the most adopted recommended practices by the beneficiaries was ridging, fertilizer application and storage as indicated by 23% of the beneficiary's respondents. This was closely followed by planting date/seed rate and seed treatment by 21% and 19% of the beneficiaries respectively. Among the recommended practices, the ones with low adoption among the beneficiaries' respondents were harvesting, adopted by 16% of the beneficiaries; while pest and disease control was adopted by 17% of the beneficiaries.

The results indicate that high adoption of some practices like fertilizer application, seed treatment and storage may be due to the simplicity of the practices and its attribute of not requiring too much cost or labour. High adoption of recommended practices could be attributed to their financial gains as reported by Ajayi and Okunlola (2005) in which high adoption of improved root crops technologies was found to be due to the financial gains from the technologies.

However, the low adoption of the recommended practices (harvesting, pest and disease control and weeding) could be that the practices may be tedious to carry out. This is in line with the findings of Ajayi and Okunlola (2005), in which there was low adoption of agronomic aspects of root crops technologies in Ondo State.

Table 4.11: Distribution of beneficiaries' farmers according to their level of adoption of recommendedpractices

Recommended Practices	Frequency	Percentage
Ridging	90	23
Planting date	80	21
Seed rate	75	21
Planting spacing	70	20
Seed treatment	65	19
Fertilizer application	89	23
Weeding	57	18
Pest and disease control	47	17
Harvesting	43	16
Storage	94	23
Total	***355**	

*Multiple responses

4.3Factors Influencing Adoption of Maize Recommended Production Practices in the Study Area

Factors influencing adoption of maize recommended production practicesare presented in Table 4.12. The adjusted R^{-2} value was found to be 0.634, implying that the independent variables explained 63.4% of the variations in the dependent variable. The result revealed that of the eight (8) variables included in the regression model age, farm size, education, amount of credit received, household size and extension contact were the actors influencing adoption of maize recommended production practices in the study areas.

The coefficient of age was found to be positive and significant at 1% level of significance and important in influencing the adoption of recommended production practice. Older farmers are assumed to have gained knowledge and experience over time and are better able to evaluate technology information than younger farmers (Mignouna *et al.,* 2011; Kariyasa and Dewi 2011). For instance, Alexander and Van Mellor (2005) found that adoption of genetically modified maize increased with age for younger farmers as they gain experience and increase their stock of human capital but declines with age for those farmers closer to retirement.

The coefficient of farm size was found to be positive and significant at 10% level of significance and important in influencing the adoption of recommended production practice. Farm size has bearing on the capacity of farmers to adopt recommended practices. Farmers with large farm size can afford to devote part of their farms for maize production without significantly affecting the total land left for the production of the staple food crops compared to small land holders. Land size is also one of the indicators of the level of economic resources available to farmers (Ajibefun, 2006).

The coefficient of education was found to be positive and significant at 1% level of significance and important in influencing the adoption of recommended production practice. Education level of a farmer increases his ability to obtain; process and use information relevant to adoption of a new technology (Mignouna *et al*., 2011; Lavison 2013; Namara*et al*., 2013). For instance a study by Okunlola*et al.* (2011) on adoption of new technologies by fish farmers and Ajewole (2010) on adoption of organic fertilizers found that the level of education had a positive and significant influence on adoption of the technology. This is because higher education influences respondents' attitudes and

thoughts making them more open, rational and able to analyze the benefits of the new technology (Waller *et al*., 1998). This eases the introduction of a new innovation which ultimately affects the adoption process (Adebiyi&Okunlola, 2010).

The coefficient of Amount of credit received was found to be positive and significant at 10% level of significance and important in influencing the adoption of recommended production practice. Most farmers fear trying improved technologies because they do not have the necessary financial resources to adopt the technologies (Oumae*t al*., 2006; Omolehin*et al.,* 2007). This is partly explained by the fact that most agricultural technologies require complementary inputs such as fertilizers and pesticides. These complementary inputs are difficult to come by due to the cash-trapped nature of farmers (Idrisa and Ogunbameru, 2008). Amount of credit received helps farmers out of their predicaments thereby influencing them to adopt innovations. This explains why amount of credit received is often observed as an important determinant of the adoption of improved technologies (De Castro and Teixera, 2006; James *et al*., 2006).

The coefficient of Household size was found to be positive and significant at 1% level of significance and important in influencing the adoption of recommended production practice. Household size has been recognized (Bamiree*t al.,* 2002) to play a vital role in the adoption of any particular technology or farm practice. On the one hand, family provides the human labor and management inputs. This can affect the level of use of technologies in terms of quality of management decision and the availability of labor required by the technology in question. On the other hand, family size can create certain demand which may motivate the adoption of recommended practices that would increase the farmers' income as a means of meeting these demands. Furthermore, household size has the effect of

encouraging farmers to improve their earning capacity because some family members would tolerate certain levels of unfavorable conditions created by channeling family resources into investment in improved technologies. This therefore puts such families in a financially advantageous position to have more resources for investment in improved farm practices (Agbamu, 2006), including the adoption of recommended practices.

The coefficient of extension contact was found to be positive and significant at 1% level of significance and important in influencing the adoption of recommended production practice.Extension contact determines the information that farmers obtain on production activities and the application of innovations through counseling and demonstrations by extension agents. The effect of exposure to extension programmes is enormous. For instance, Onu (2006) found that farmers who had access to extension contact adopted alley farming technologies 72% greater than farmers who had no access to extension contact. This could be because increased farmers' interaction with extension personnel in the form of multiple visits by extension agents, and technical support to farmers greatly increases farmers' knowledge of available technologies and their potential benefits, hence acting as a trigger mechanism for intensive adoption. The result agree with the findings in the case of improved cassava in southwestern Nigeria (Polson and Spencer, 1991); adoption of research results and agricultural technologies among cocoa farming households in Oyo State, Nigeria (Lawal and Oluyole, 2008) and improved maize in northern Tanzania (Nkonya*et al.,* 1997).

Table 4.12: Result of the factors influencing adoption of maize recommended production practices in the study area

Variable	Coefficients	Standard Error	T –Stat
Constant	59.68265	10.41035	5.733008
Age	0.91528***	0.176445	5.18735
Farm size	1.36773*	0.775357	1.764
Education	0.538833***	0.033587	16.0429
Marital status	-6.9897	5.067345	-1.37936
Amount of grant received	3.5E-05*	1.9E-05	1.82428
Household size	0.28889***	0.034619	8.34484
Extension contact	0.73125***	0.060616	12.06365
Gender	-0.07101	3.610757	-0.01967
R Square	**0.669**		
Adjusted R Square	**0.634**		

*Asterisk indicate significance ***=1%, **=5%, and *=10%.*

4.3 Impact of Commercial Agriculture Development Project on Output of Maize Farmers' Cooperative Societies'Beneficiaries and Non-beneficiaries

The impact of commercial agriculture development project on output of maize farmers' cooperative society's beneficiaries and non-beneficiaries in the study area was achieved using chow test statistics. The Chow Test is a test that determines if the coefficients from two regression analyses are the same. However, three different linear regressions were carried out comprising of the pooled samples of beneficiaries and non-beneficiaries, and separate linear regression for beneficiaries and non-beneficiaries respectively. The residual sum of square of each of the three regressions was used to compute the chow test. The decision rule was that if Chow F-statistics is greater than that of F-table, there is impact of

commercial agriculture development project on maize production and structural differences between the beneficiaries and non-beneficiaries in terms of output, if otherwise there is no impact of commercial agriculture development project in the study area.

Table 4.13: Impact of commercial agriculture development project on output of maize farmers' cooperative society'sbeneficiaries and non-beneficiaries

Group	R^2	Residual sum of square	N	K	F-Cal	F-Tab
Pooled sample	0.156	383512900	280	10	48.214	1.91
Beneficiaries	0.291	117948000	140			
Non- beneficiaries	0.958	19724470	140			

R^2 = regression coefficient, N = numbers of observation and K = numbers of parameters

The result from Table 4.13 revealed that the Chow F calculated was 48.21, while F table value at 9 degree of freedom with sample size of 280 was 1.91 at 5% level of probability implying a significant impact of commercial agriculture development project on the maize output in the study area since the F calculated was greater than the F table.

4.4.1 Impact of Commercial Agriculture Development Project on Income of Maize Farmers' Cooperative Society's Beneficiaries and Non-beneficiaries

The impact of commercial agriculture development project on the income of maize farmers' cooperative society's beneficiaries and non-beneficiaries in the study area was achieved using chow test statistics. The Chow Test is a test that determines if the coefficients from two regression analyses are the same. However, three different linear regressions were carried out comprising of the pooled samples of beneficiaries and non-beneficiaries, and separate linear regression for beneficiaries and non-beneficiaries respectively. The residual sum of square of each of the three regressions was used to

compute the chow test. The decision rule was that if Chow F-statistics is greater than that of F-table, there is impact of commercial agriculture development project on maize production and structural differences between the beneficiaries and non-beneficiaries in terms of income, if otherwise there is no impact of commercial agriculture development project in the study area.

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Table 4.14:Impact of commercial agriculture development project on income of maize farmers' cooperative society's beneficiaries and non-beneficiaries

Group	R^2	Residual sum of square	N	K	F-Cal	F-Tab
Pooled sample	0.466	990894000000	280	10	23.492	1.91
Beneficiaries	0.263	528683800000	140			
Non-beneficiaries	0.887	1180000000	140			

R^2 = regression coefficient, N = numbers of observation and K = numbers of parameters

The result from Table 4.14 revealed that the Chow F calculated was 23.49, while F table value at 9 degree of freedom with sample size of 280 was 1.91 at 5% level of probability implying a significant impact of commercial agriculture development project on the maize income in the study area since the F calculated was greater than the F table.

4.4.2 Test of hypothesis i

The null hypothesis (H_o) which stated that there is no significant difference in the change in income between beneficiaries and non-beneficiaries of CADP in the study area was tested using the result of a t-test presented in Table 4.15. From the result in the table 4.15, it was found that the average income of beneficiaries and non-beneficiaries were ₦76, 308.37 and ₦38, 6342.22 respectively. The calculated t-value was 12.01 and exceeds the critical value

(t-critical two tail) of 1.97, therefore $H_o$is rejected at 5% level of significance. Therefore, the result of the analysis indicates that there is difference between the income of beneficiaries and non-beneficiaries of CADP in the study area.

Table 4.15: t-test result of change in income of CADP of maize beneficiaries and non-beneficiaries.

Variable	Beneficiaries	Non-Beneficiaries
Mean	76308.37	386342.22
Standard deviation	768017560.4	35311617946
Observations	140	140
Pearson Correlation	0.054	
Hypothesized Mean Difference	0	
Df	139	
t Stat	12.01	
P(T<=t) one-tail	2.45	
t Critical one-tail	1.65	
P(T<=t) two-tail	4.90	
t Critical two-tail	1.97*	

*P<0.05

4.5.0 Impact of Commercial Agriculture Development Project on Yield of Maize Farmers' Cooperative Society'sBeneficiaries and Non-beneficiaries

The impact ofcommercial agriculture development project on the maize yield of the beneficiaries and non-beneficiaries in the study area was achieved using chow test statistics. The Chow Test is a test that determines if the coefficients from two regression analyses are the same. However, three different linear regressions were carried out comprising of the pooled samples of beneficiaries and non-beneficiaries, and separate linear regression for beneficiaries and non-beneficiaries respectively. The residual sum of square of each of the three regressions was used to compute the chow test. The decision rule was that if Chow F-statistics is greater than that of F-table, there is impact of commercial

agriculture development project on maize production and structural differences between the beneficiaries and non-beneficiaries in terms of maize yield, if otherwise there is no impact of commercial agriculture development project in the study area.

Table 4.16: Impact of commercial agriculture development project on yield of maize farmers' cooperative society's beneficiaries and non-beneficiaries

Group	R^2	Residual sum of square	N	K	F-Cal	F-Tab
Pooled sample	0.123	16748740	280	10	15.332	1.91
Beneficiaries	0.348	7413310	140			
Non-beneficiaries	0.965	3269360	140			

R^2 = regression coefficient, N = numbers of observation and K = numbers of parameters

Therefore, the result from Table 4.16 revealed that the Chow F calculated was 15.33, while F table value at 9 degree of freedom with sample size of 280 was 1.91 at 5% level of probability implying a significant impact of commercial agriculture development project on the maize yield in the study area since the F calculated was greater than the F table.

4.5.1 Test of hypothesis ii

The null hypothesis (H_o) which stated that there is no significant difference in the yield between beneficiaries and non-beneficiaries of CADP in the study area was tested using the result of a t-test presented in Table 4.17. It was found out that the mean yield of beneficiaries and non-beneficiaries were 2672.180and 2320.526 respectively. The calculated t-value was 2.0 and exceeds the critical value (t-critical two tail) of 1.97, therefore $H_o$is rejected at 5% level of significance. Therefore, the result of the analysis indicates that there is significant difference between the yield of beneficiaries and non-beneficiaries of CADP in the study area.

Table 4.17: t-test result of yield of CADP of maize beneficiaries and non- beneficiaries.

Variable	Beneficiaries	Non-Beneficiaries
Mean	2672.180	2320.526
Standard deviation	1796451	715615.2
Observations	140	140
Pearson Correlation	0.04	
Hypothesized Mean Difference	0	
Df	139	
t Stat	2.00**	
P(T<=t) one-tail	0.0629	
t Critical one-tail	1.655	
P(T<=t) two-tail	0.0175	
t Critical two-tail	1.976	

*P<0.05

4.5.3Impact of commercial agriculture development Project on the level of living of maize farmers' cooperative society's beneficiaries and non-beneficiaries

The impact of commercial agriculture development on the level of living of the beneficiaries and non-beneficiaries in the study area was achieved using chow test statistics. Assets were used as proxy for level of living. The Chow Test is a test that determines if the coefficients from two regression analyses are the same. However, three different linear regressions were carried out comprising of the pooled samples ofbeneficiaries and non-beneficiaries, and separate linear regression for beneficiaries and non-beneficiaries respectively. The residual sum of square of each of the three regressions was used to compute the chow test. The decision rule was that if Chow F-statistics is greater than that ofF-table, there is impact of commercial agriculture development project on maize production and structural differences between the beneficiaries and non-

beneficiaries in terms of level of living, if otherwise there is no impact of commercial agriculture development project in the study area.

Table 4.18: Impact of commercial agriculture development Project on the level of livingof maizefarmers' cooperative society's beneficiaries and non-beneficiaries

Group	R^2	Residual sum of square	N	K	F-Cal	F-Tab
Pooled sample	0.105	162054700000000	280	10	23.503	1.91
Beneficiaries	0.135	81418360000000	140			
Non-beneficiaries	0.263	5220000000000	140			

R^2 = regression coefficient, N = numbers of observation and K = numbers of parameters

The result from Table 4.18 revealed that the Chow F calculated was 23.50, while F table value at 9 degree of freedom with sample size of 280 was 1.91 at 5% level of probability implying a significant impact of commercial agriculture development project on the level of living in the study area since the F calculated was greater than the F table.

4.5.4 Test of hypothesis iii

The null hypothesis (H_o) which stated that there is no significant difference in the level of living between beneficiaries and non-beneficiaries of CADP in the study area was tested using the result of a t-test presented in Table 4.19. The calculated t-value was 21.3 and exceeds the critical value (t-critical two tail) of 1.97, therefore $H_o$is rejected at 10% level of significance. Therefore, the result of the analysis indicates that there is significant difference between the level of living of beneficiaries and non-beneficiaries of CADP in the study area.

Table 4.19: t-test result of level of living of CADP of maize beneficiaries and non-beneficiaries.

Variable	Beneficiaries	Non-Beneficiaries
Mean	21575.45	14350.54
Standard deviation	1250000000	1120000000
Observations	140	140
Pearson Correlation	0.036	
Hypothesized Mean Difference	0	
Df	139	
t Stat	21.30**	
P(T<=t) one-tail	0.093	
t Critical one-tail	1.345	
P(T<=t) two-tail	0.0165	
t Critical two-tail	1.97	

*P<0.10

4.6Constraints Encountered in the Implementation of CADP inMaize Production in the Study Areas.

It was found that maize farmers in the study area faced some constraints in their attempt to produce maize and adopt the practices and theseproblems were ranked according to their severity as stated by both the beneficiaries and non-beneficiaries farmers in the study area and as shown in Table 4.20.

The result in table 4.20revealed that about 32% and 25% ranked high cost of inputs as 1st and 2nd for beneficiaries and non-beneficiaries the major constraints respectively. According to the respondents fertilizer is made available when farmers are far into the production period, sometimes at the middle of the raining season and family labour was predominant in the study area and that is why sometimes there is acute shortage of labour during the production period. The findings support that of Abdullahi, (2005) whom pointed

out that access to inputs, capital and credit were among the major problems encountered by programme participating farmers.

About 32% of the non-beneficiaries said inadequate capital to expand their production was the major constraints faced in the study area as was ranked 1st. This affects maize production of most especially the non-adopter because the meager savings the farmers might have made or the funds generated from relatives and personal savngs is not sufficient to satisfy various activities in their production. Credit is a very strong factor that is needed to acquire or develop any enterprise; its availability could determine the extent of production capacity. This agrees with findings of Ani*et al*., (2010) who noted that access to micro-credit could have prospect in improving the productivity.

The second most serious problem faced by the beneficiaries was the lack of land ownership by about 27% of the respondents. It was discovered that some adopters that got the grant have to rent land apart from the normal small hectares that they have in order to increase their production because majority of both the beneficiaries and non-beneficiaries have their own land sizes of less than 4 hectares, while lack of the land ownership was a little problem to the non-beneficiaries as indicated by just about 5% and rank 6th. This can be seen in the sizes of land hectares own by the non-beneficiaries as their mean farm size is 3.

Farmers perceived that unavailability/inadequate storage facilities ranked 3rd and 4th by about 15% and 9% of the beneficiaries and non-beneficiaries respectively.About 11% and 17% of the beneficiaries and non-beneficiaries ranked pest and diseases as the 4th and 3rd constraints respectively. This problem could be associated with poor varieties of maize seed

that are being used by the farmers which is susceptible to pest and disease infestation. Also poor cultural practice could also be the reason why farmers faced this problem in the study area. This is why lack of improved seeds was ranked 6th and 7th constraints by about 5% and 3% of the beneficiaries and non-beneficiaries respectively.

It was also found that lack of extension service visits was a problem as indicated by about 4% and 8% and ranked 7th and 5th by the beneficiaries and non-beneficiariesrespectively.

This finding agrees with that of Hyun, (2008) and Tekana*et al.*, (2011) who observed that high cost of farm inputs, inadequate capital, poor access to loan, high interest rate charged, illiteracy level and government interference were among the constraints faced by members of cooperative societies.

Table 4.20: Constraints faced by beneficiaries and non-beneficiariesof commercial agricultural development project

Constraints	**Beneficiaries**			**Non-Beneficiaries**		
	Frequency	Percentage	Rank	Frequency	Percentage	Rank
High Cost of Farm Inputs	117	32.4	1st	101	24.8	2nd
Lack of landownership	96	26.6	2nd	19	4.7	6th
Inadequate storage facilities	54	14.9	3rd	38	9.3	4th
Pest and diseases	38	10.5	4th	69	16.9	3rd
Inadequate access to improved seeds	17	4.7	6th	14	3.4	7th
Insufficient extension agents visits	13	3.6	7th	34	8.4	5th
Inadequate capital	26	7.2	5th	132	32.4	1st
Total	***361**			***407**		

*Multiple responses

CHAPTER FIVE

SUMMARY, CONCLUSION, CONTRIBUTION TO KNOWLEDGE AND RECOMMENDATIONS

5.1 Summary

This study was designed to analyze the impact of commercial agriculture development Project on maize farmers' cooperative groups in Kano and Kaduna Agro-ecological Zone, Nigeria.A multistage-sampling procedure was used. The first stage involved a purposive selection of six (6) and four (4) local government areas of Kano and Kaduna States, respectively. The second stage involveda random selection of 10% of the respondents from the beneficiaries and non-beneficiaries of maize cooperative groups from each of the selected LGAs from the list of registered maize cooperative groups with the help of an extension staff member of the States. The data for analysis was based on 2014/2015 cropping season and were collected through the use of a structured questionnaires and were analyzed using descriptive statistics such as frequency distribution, percentage and mean, multiple regression analysis and chow test analysis.

The socio-economic characteristics of the respondents revealed that the mean ages of maize farmers' cooperative group beneficiaries and non-beneficiaries were 40 and 41 years respectively. Majority 75% and 81% of thebeneficiaries and non-beneficiaries were male, while approximately 25% and 19% were female,majority (77%) and about 93% of the beneficiaries and non-beneficiaries had between 1-30 years of farming experience respectively, while about7% and approximately (51%) of maize farmers' cooperative group beneficiaries and non-beneficiaries did have some formal education especially primary, secondary and tertiary. The mean household size for maize farmer's cooperative

group beneficiaries and non-beneficiarieshad5 and 6household sizes respectively. The mean farmsize of maize farmers' cooperative groups' beneficiaries and non-beneficiaries were about 5 hectares and 3 hectares, respectively.

It was found that the level of awareness among the beneficiaries was lowest for pest and diseases and harvesting by 16% and highest seed treatment date by 14%. Whereas, the level of awareness among the non-beneficiaries was lowest for planting space, fertilizer application, weeding and harvesting by (9%) and highest for ridging by (12%).

It was also found that the most adopted recommended practices by the beneficiaries was ridging, fertilizer application and storage, which was indicated by (23%) of the beneficiaries on each of the recommended practices. While, the least adoption among the respondents was harvesting, this was indicated by 16% of the beneficiaries.

The results from the multiple regression analysis revealed that age, farm size, education, amount of credit received, household size and extension contact were the factors influencing the adoption of maize recommended production practices at 1% and 10% levels of significance.

The results from the chow test analysis revealed that commercial agriculture development project had a positive impact on output,income, yield and level of living of beneficiaries since the F-calculated is greater than the F-tabulated and significant at 5%, based on this the null hypotheses was rejected while the alternate accepted.

High cost of farm inputs and inadequate capital was ranked as the foremost constraints faced by maize farmers' cooperative group beneficiaries and non-beneficiaries in the study areas.The result of the analysis revealed that the non-beneficiaries mentioned pest and disease, insufficient extension agents visits as constraints they faced as members more than the beneficiaries. On the other hand, the beneficiaries mentioned lack of land ownership, inadequate storage facilities and inadequate access to improved seeds as constraints they faced as members more than the non-beneficiaries.

5.2 Conclusion

Commercial agriculture developments projects have been able to achieve some of its stated objectives.The study had shown that maize farmers' cooperative groups in the study area were aware and had adopted the use of maize recommended production practices at different levels. However, the level of awareness and adoption of maize recommended practices (overall awareness and adoption) were generally low. Though, the project has contributed positively and significantly on the output, income, yield and level of living of benefittingmaize cooperative groups in the study areas. It can also be concluded that the beneficiaries in commercial agriculture development project had a higher output, income, yield and better level of living than non-beneficiaries. There is however, more room for improvement in output, income, yield and level of living of the farmers in the study area.

5.3 Contribution to knowledge

i. It was found that only 17% of the beneficiaries were awareof maize recommended production practices on only planting date, while approximately 26% of the beneficiaries were aware of maize recommended production practices on only seed treatment. This indicates that the level of awareness of the recommended practices among farmers is low.

ii. It was found that 23% of the beneficiaries adopted maize recommended production practices on (ridging, fertilizer application and storage) as the highest while approximately 16%of the beneficiaries adopted maize recommended production practices on only harvest and 17% on pest and diseases control. This indicates that the level of adoption of the recommended production practices amongbeneficiaries farmers is low.

iii. The results from the multiple regression analysis revealed that age (1%), farm size (10%), education (1%), amount of credit received (10%), household size (1%) and extension contact (1%) were the factors influencing the adoption of maize recommended production practices in the study areas.

iv. Chow test results on output, yield, income and level of living of beneficiaries and non-beneficiaries had a significant difference at 5% level. The results indicate that the project had a positive impact on beneficiaries output, yield, income and level of living. This means that commercial agriculture development project is an effective tool for improving the respondents' level of living.

5.3 Recommendations

Based on the findings, the following recommendations are made:

i. Government and other stakeholders need to also invest in extension service in sensitizing maize farmers' cooperative groups in the study areas of production practices as this have the potential to increase the level of awareness and adoption as well as farmer's productivity and income, output and level of living.

ii. The factors influencing the adoption of maize recommended production practices in the study areas wereage, farm size, education, amount of credit received, household size and extension contact. These call for policies from the government aimed at encouraging new entrants especially the youths to cultivate maize and the experienced ones to remain in farming.

iii. Majority of the maize farmers' cooperative group non-beneficiaries mentioned inadequate capital as the foremost constraints encountered in the implementation of the recommended practices. Since cooperative societies and banks cannot provide the entire needed fund for the production of maize, farmers should be encouraged to diversify their livelihood activities by engaging in non-farming activities in order to augment farm family income and thereby increase productivity.

iv. Majority of the maize farmers' cooperative group beneficiaries mentioned high cost of farm inputs as the foremost constraints encountered in the implementation of the recommended practices.The cooperative groups could link –up the farmers with sources of quality input for bulk purchase. This will enable the groups to buy inputs at factory cost thereby helping to reduce cost of production.

v. Most of the maize farmers' cooperative group beneficiaries mentioned lack of landownership as part of the constraints encountered in the implementation of the recommended practices. To address the land fragmentation problem, government can acquire large expanse of land and lease out to maize farmers at reduced rate. This approach would enhance access to land and reduces the land rental value. The abandoned lands of the defunct River Basin development Authorities lying idle in most States of the federation can serve this purpose. The Land Use Act of 1990 in Nigeria should be reviewed to facilitate access to land by landless peasantry who produce bulk of the agricultural produce.

REFERENCES

Adebiyi, S. andOkunlola, J. (2010). Factors Affecting Adoption of Cocoa Rehabilitation Techniques in Oyo State of Nigeria; Proceedings of the 18TH Annual Congress ofthe Nigerian RuralSociological Association of Nigeria. FUTA. Akure, Nigeria.

Agbamu, J.U. (2006). Essentials of Agricultural Communication in Nigeria. First Edition, Malthouse Press Limited.Lagos, Nigeria, Pp. 47-81.

Ahmed, N. 2011. Capture to Culture: Community Based Dead River Culture in Northern Bangladesh. *World Aquaculture.* 42(1):44–49.

Ajayi, M.T. and Okunlola, J.O. (2005). Impact of Agricultural Extension Services on adoption of Root Crops Technologies in Ondo State, Nigeria. *South Africa Journal of Agricultural Extension,* 34(3):180-185.

Ajayi, R. and Onuche, L. B. (2005). Extension Implication of Change in Production Cost In consumption Pattern of Cassava and its Production Under Democratic Economy in Dekina Local Government Area of Kogi State In *Journal of Agricultural Extension. Agricultural Extension Society of Nigeria (AESON),* 8:41-49.

Ajewole, O.C. (2010). Farmer's Response to Adoption of Commercially Available Organic Fertilizers in Oyo State, Nigeria. *African Journal of Agricultural Research,* 5(18): 2497- 2503.

Ajibefun, I.A. (2006). Linking Socio-Economic and Policy Variables to Technical Efficiency of Traditional Agricultural production: Empirical Evidence from Nigeria. Paper Presented at International Association of Agricultural Economists' Conference, Gold Coast, Australia, August12th-26th.

Alexander, C., & Van Mellor, T. (2005). Determinants of Corn Rootworm Resistant Corn Adoption in Indiana. *AgBioForum*, *8*(4), 197-204

Bamire, A.S., Fabiyi,Y.L. and Manyong, B. (2002). Adoption pattern of Fertilizer Technology Among Farmers in theEcological Zones of Southwestern Nigeria: a Tobit Analysis. *Australian Journal of Agricultural Research,* 5: 901-910.

Abebaw, D. & Haile, M.G. (2013).The Impact of Cooperatives on Agricultural Technology Adoption: Empirical evidence from Ethiopia. Food policy, 38:82-91

Abdullahi, J. A. Effects ofSassakawa Global 200 on Small Scale Maize Farmers in Kaduna State, Nigeria. Unpublished M.SC Thesis, Department of Agricultural Economics and Rural Sociology, Ahmadu Bello University, Zaria.

Adedoya, A. E., Tolongbonse (2005). Adoption and Diffusion of Innovations in S. F. Adedugun (ED). Agricultural Extension in Nigeria.pp 28-37

Adegboye, M.A. (2011). Evaluation of Farmers' Response to Extension Services on Ginger Production in Kagarko LGA of Kaduna State. Scientific Research and Essay 6(6):1166-1171

Adewale JG, Oladejo JA, Ogunniyi LT (2005). Economic Contribution of Farm Children to Agricultural Production in Nigeria: A Case Study ofEkiti State *ournal of SoialScience*10(2): 149 – 152

Advisory Service Manual on Maize Value Chain (2012).Kaduna State Commercial Agriculture Development Project Maize Series 1

Abdoulaye, T., Sanago, D., Langyintuo, A., Bamire, S.A. &Olanrewaju, A. (2009).Assessingthe Constraints Affecting Production and Deployment of Maize Seed in DTMACountries of West Africa. IITA, Ibadan, Nigeria.40pp.

Amaza, P.S. (2000) Resource Use Efficiency in Food Crop Production in Gombe State, Nigeria.UnpublishedPh.DThesis, Department of Agricultural Economics, University of Ibadan.

Anthony, F. *et al.*,(2007). Technology Adoption and Performance Impact in Innovations Dormain, Industrial Management and Data Systems. Vol. 112 issi 5, pp 748-765

Ani, D.P., Umeh, J.C., andWeye, E.A. (2013): Profitability and Economic Efficiency of Groundnut Production in Benue state, Nigeria. *African journal of food, Agriculture, Nutrition and Development.* 13 (4):118

Association Cooperatives Development International/Voluntaries Oversies Cooperation (2013).*Kenya maize Development Programme Value Chain and Market System*
Adam, S., Rebecca, L.F., Meagan, K. &Shashidhara K. (2012). Performance of Farmer- Based Organizations in Ghana. Transforming Agriculture Conference: Discussion Note No.007

Alidou, M., Lem, M., Schrader, T., &Zeeuw, F. (2006).Local Entrepreneurship, Agribusiness Cluster Formation and the Development of Competitive Value Chains-Evaluation of the Strategic Alliance for Agricultural Development in Africa (SAADA programme)2006-2009. In: Sunil, S., &Anupam (2010) Agro-based clusters: A tool for Competitiveness of Indian Agriculture in the ERA of globalization. Global Journal of Finance and Management.ISSN0975-6477Vol.6,No.8(2014),pp713-718.Retrieved from http://ripublication.com

Arua,E.O.(2004).Comparative Cooperative System. Unpublished Mimeograph. Department of Agricultural Economics, UNN, Nsukka.

Asian Development Bank (2013).Commercial Agriculture Development in Nepal. Project DataSheet. Retrieved from http://www.ad.org/projects/34308-022/main

Assefa, T.(2007).”Revitalizing Market-Oriented Agricultural Cooperatives in Ethiopia: A Case Study Conducted in Cooperation with USAID’s Cooperative Development Programme.

Bamire, A.S., Abdoulaye, T., Sanogo, D. &Langyintuo A. (2010) .Characterization of Maize Producing Households in the Dry Savanna of Nigeria. Country Report-Nigeria: IITAIbadan, Nigeria 46pp.

Barham, J.,Chitemi, C. (2009).Collective Action Initiatives to Improve Marketing Performance: Lessons from Farmer Groups in Tanzania.34 (1), 53-59.In: Ellen, V. &Miet, M. (2013).Cooperative Membership and Agricultural Performance: Evidence from Rwanda .Department Of Earth and Environmental Sciences, University of Leuven.Belgium.

Barret, C. (2008).Small Holder Market Participation Concepts and Evidence from Eastern andSouthern Africa Food policy, 33 (4):299-317

Bernard, T. &Spielman D.J. (2009).”Reaching the rural Poor through Rural Producer Organizations? A Study of Agricultural Marketing Cooperatives in Ethiopia”. Food Policy (34):60-69.

Calvin M. & Linda J. (2010).Agricultural Value Chain Finance, Tools and Lessons. Food and Agriculture Organization of the United Nations & Practical Action Publishing.

Cattaneo, O. &Mirou dot S. (2013),”From Global Value Chains to Global Development chains:An Analysis of Recent Changes in Trade Patterns and Development Paradigms”. In: Organization For Economic Cooperation and Development-World Trade Organization (2013), Aid for Trade and Value Chains in Agrifood: 4th global review.

Creevey, L., Elizabeth, D., & Elizabeth, F. (2011).Outreach, Outcomes and Sustainability in Value Chain Projects. SAID AMAP micro report .In; Elizabeth G.D.(2012).Facilitating Systematic Change in Value Chains: Lessons learned for Strengthening Country Systems. USAID micro report.

Daniel, B. A. and Samuel, T., (2010). A Hollistic Approach to Technical Vocational Skills Development Policy and Government Reform; the Case of Ghana

De Castro, E.R. and Teixera, B.C. (2006). Agricultural Credit Interest Equalization Policy: A Growth Subsidy? Paper Presented at the International Association of Agricultural Economists’ Conference, Gold Cost, Australia, August 12th-18th.

Dublin, H.J., Brennan, J.P. (2009).Combating Stem Leaf Rust of Wheat: Historical P erspective, Impacts, and Lessons Learned. In: IOB (2011) Improving food Security. A Systematic Review of the Impact of Interventions in Agricultural ProductionMinistry Foreign Affairs, Den Haag.

Ebonyi,V. andJimoh, O.B.(2002).Cooperative Movements: A Way out of Poverty. Lagos, Longman publishers.

Ekong, E.E. (2003).Rural Sociology: An Introduction and Analysis of Rural Nigeria. Dove Education Publisher, Uyo, Nigeria.

Ellen, V.&Miet, M. (2012).Cooperative Membership and Agricultural Performance: Evidence From Rwanda .Division of Bio-economics, University of Leuven. Retrieved from Ellen.verhofstadt@ees.kueuven.be

Festus, A. &Sand, C. (2010).Socio-economic Determinant of Cooperative Societies' Access to the Services of the Nigerian Agricultural Cooperative and Rural Development Bank. *The Journal offield actions vol.4*

Gibson, R. (2005).The Role of Cooperative in Community Economic Development; RID Working paper.

Hall, B. and Khan, B. (2002) Adoption of New Technology. New Economy Handbook.

Hyun, H. (2008). Has Inflation Hurt the Poor? Regional Analysis in the Phillippines, ADB.

Ismailla U, Gana AS, Tswanya NM, Dogara D 2010. Cereals Production in Nigeria: Constraints and Opportunities for Betterment.*African Journal of Agricultural Research*, 5(12):1341-1350. Retrieved September 1st, 2012 from < http://www.academic Journals.org./AJAR

Ibitoye, S.J. (2012).Survey of the Performance of Agricultural Cooperative Societies in KogiState,Nigeria.Europian Scientific journal October edition Vol.8 No.24 ISBN 1857-7881.

ICA (2010).International Cooperative Alliance. Retrieved October 1, 2011 from http//www.ica.coop/.ss

Ito, J.,Bao, Su(2012).Distributional Effects of agricultural cooperatives in China: Exclusion of Smallholders and Potential Gains on Participation. Food Policy 37(6).700-709.In: Ellen, V. &Miet, M. (2012).Cooperative Membership and Agricultural Performance: Evidence from Rwanda.

James, F.O., Dave D., Weatherspoon, C.B., & Arthur, M.(2010).Impacts of USAID-Supported Agricultural Programmes: Programmatic Lessons Learned. U.S. Agency for International Development. Washington DC.

Joseph, N., Jimmy, P., Peter, M., Dickens, N., George, M., Gospel, O., & Mel, O(2013) Integrated Sriga Management in Africa Project Constraints and Opportunities of maize Production in Western Kenya: a Baseline Assessment of Striga extent, Severity, and Control Technologies. Integrated Sriga Management in Africa (ISMA) 34pp

Julius, O (2012).The smallholder Dilemma. In: University of Nairobi (2012).Regional Workshop on an Integrated Policy Approach to Commercializing Smallholder Maize Production in Eastern Africa.

Kariyasa, K., Dewi, A. (2011).Analysis of Factors Affecting Adoption of Integrated Crop Management Farmer Field School (Icm-Ffs) in Swampy Areas. *International Journal of Food and Agricultural Economics* 1(2): Pp. 29-38

Lawal, J.O. and Oluyole, K.A. (2008). Factors influencing the adoption of research results and agricultural technologies among cocoa farming households in Oyo state, Nigeria. *International Journal of Sustainable Crop Production*, 3(5): 10-12.

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: 184-191

Lavison, R. (2013). Factors Influencing the Adoption of Organic Fertilizers in Vegetable Production in Accra, Msc Thesis, Accra Ghana.

Lone, R., Anna Maria, E.F., Stefano, P. (2010).Evaluation study: Gender and Value Chain Development. The Danish Institute for International Studies (DHS), Denmark

Meike, W. & Manfred, Z. (2006).Do Farmers Benefit from Participating in Specialty Markets and Cooperatives: The Case of Coffee marketing in Costa Rica. Institute of Rural Development, University of Gottingen, Waldweg 26, 37073 Gottingen, Germany.

Michael S. (2003).Farmer Organizations for Market Access: An International Review. Centre For Development and Poverty Reduction, Department of Agricultural Sciences, Imperial College London, Wye, Ashford, Kent.

Michael, L.M., Robert T., &Dankyi (2010).Adoption and impacts of improved maize Production Technology: A case study of the Ghana Grains Development Agency. Economics Programme Paper 99-01

Mignouna, B., Manyong, M., Rusike, J., Mutabazi, S., &Senkondo, M. (2011). Determinants of Adopting Imazapyr-Resistant Maize Technology and its Impact on Household Income in Western Kenya: *AgBioforum*, 14(3), 158-163.

Moore, W. (1963).In: Diara, T.D. (2010). Factors an Influencing Women Famers' Participation in Agricultural Extension Programme in Sirokorola Local GovernmentArea of Mali. A seminar paper 16pp.

Murray, G.C. "Management Strategies for Cooperative Control in British Agricultural Cooperatives….Part 1."Agricultural Administration 14(1983b):81-94.In: John M. Staatz (1983).The Structural Characteristics of Farmer Cooperatives and their Behavioral Consequences.

Namara, E., Weligamage, P., Barker, R. (2003). *Prospects for Adopting System of Rice Intensification in Sri Lanka: A Socioeconomic Assessment.* Research Report 75.Colombo, Sri Lanka: International Water Management Institute.

Nkonya, E., Schroeder, T. and Norman, D. (1997). Factors Affecting the Adoption of Improved Maize Seed and Fertilizer in Northern Tanzania. *Journal of Agricultural Economics*, 48(1): 1-12.

Nnenna, A.O. (2011).Rural farmers' Problems Accessing Agricultural Information: A case Study of Nsukka Local Government Area of Enugu State, Nsukka Local Government Area of Enugu State, Nigeria. Library Philosophy and Practice UNN, Nsukka.

Obwona, M. (2000). Determinants of Technical Efficiency Differentials Among Small and Medium scale Farmers in Uganda: A case of Tobacco Growers. Final Research Report Presented at a Biennial Workshop, Nairobi, Kenya.

Ojo, H.I. (2009). Analysis of Factors Influencing Women Adoption of Improved Cassava Production Technologies in Mopamuro Local Government Area, KogiState.UnpublishedM.Sc Thesis, Department of Agricultural Economics and Rural Sociology, Ahmadu Bello University, Zaria.

Obeta , M.E and Nwagbo, E.C. (1991). The Adoption of Agricultural Innovations in Nigeria: A Caes Study of an Improved IITA Cassava Technology Package in Anambra State. In Olukosi, J.O. Ogungbile, A.O and Kalu, B.A (Eds) Appropriate Agricultural Technology for Resource –poor Farmers. Proceedings of the National Farming Systems Research Network Workshop , held in Calabar, Cross River, Nigeria, August 14^{th}-16^{th} .

Ojuekaiye, E. O. (2001). Economic Analysis of Cassava Production in Three Local Government Areas of Kogi State. Unpublished M.Sc Thesis, Department of Agricultural economics and Rural Sociology, ABU, Zaria.

Okunlola, O., Oludare, O. and Akinwalere, B. (2011). Adoption of new technologies by fish farmersin Akure, Ondo state, Nigeria.*Journal of Agricultural Technology*, 7(6):1539-1548

Omolehin, R. A., Ogunfiditimi, T. O. and Adeniji, O. B. (2007). Factors influencing the Adoption of Chemical Pest Control in Cowpea Production Among Rural Farmers in Makarfi Local Government area of Kaduna State, Nigeria.*Journal of Agricultural Extension*, 10: 81-91.

Onu, D.O. (2006). Socio-economic Factors Influencing Farmers' Adoption of Alley Farming Technology Under Intensified Agriculture in Imo state, Nigeria. *The Philippine Agricultural Scientist*, 89(2): 45-52

Ouma, J.O., De Groot, H. and Owuor, G. (2006). Determinants of improved maize seed and Fertilizer use in Kenya: Policy Implication. Paper Presented at the International Association of Agricultural Economists' Conference, Gold Cost andAustralia, August 12^{th}-18^{th}.

Oladiebo, J.O andFajuyigbe, A.A. (2007). Technical efficiency of Women Upland RiceFarmers in Osun state, Nigeria. *Journal of human ecology*, 22(2):93-100.

Oluwatayo, A.B. Sekumade O., &Adesoji, S.A. (2008). Resource Use Efficiency of MaizeFarmers in Rural Nigeria: Evidence from Ekiti State, Nigeria. *World Journal ofAgricultural Science*, 4(1):91-99.

Okwoche, V.A., Chukwui, B.P. and Asegwa, O.C (2012). Agricultural Information Utilization among Rural Sorghum Farmers in Benue State of Nigeria. Retrieved from http://www.europeajournalofsciencetificresearch.com

Olaniyi, O.A., Adewale, J.G.(2012)."Information on Maize Production Among Rural Youth: A Solution for Sustainable Food security in Nigeria". Library Philosophy and Practice *(ejournal).Paper721*.Retrieved from http//digitalcommons.uni.edu/libphilprac/721

Onojah, D.A., Aduba, J.J. &Oladunni, O.A. (2013).Relationship Between Farmers' Socio-Economic Characteristics and Maize Production in Nigeria: The chasm. *Global Journal of Current Research vol*.1 No.4 2013.pp124-131.

Onuoha, E. (2002).A critique of the Drafts of Cooperative Policy for Nigeria. *Nigerian Journal of Cooperative studies*,2(1):10-17

Ostrom, E. (1991).”Rational Choice Theory & Institutional Analysis: Toward Complementarity.”The American Political Science Review (March 1991), 85(1), pg237-243.

Pinder, C. & Wood, D. (2003).Socio-economic impact of Commercial Agriculture on Rural Poor & Other Vulnerable Groups. A Working Document for International Development-Zambia.

Pingali, P.,Bigot, Y. &Binswinger, H.P. (1987). Agricultural Mechanization and the Evolution of Farming Systems in Sub-Saharan Africa. Baltimore, Maryland: Johns Hopkins University Press.

Pingali,P.L., & Pandey, S.(2001).Meeting World Maize Needs : Technological Opportunities and Priorities for the Public Sector: In Roberta, V.G., Jocelyn, D.L., Romeo, V.L., Emma, I.D. (2004).Maize in the Philippines, Production Systems, Constraints andResearch Priorities. Mexico. D.I. CIMMYT.

Polson, R.A and Spencer, D.S.C., 1991. The Technology Adoption Process in Subsistence Agriculture: the Case of Cassava in South Western Nigeria. *Agricultural Systems, 36: 65-77.*

Project Implementation Manual (2009).Commercial Agriculture Development Project, Federal Ministry of Agriculture and water Resources.

Ralph, E.H. & William, D.A. (2011).Development at the Urban Fringe and Beyond: Impacts on Agriculture and Rural land. Economic Research service, U.S. Department of Agriculture. Agricultural Economic Report No.803

Risgaard, L., Bolwig, S., Matose, F., Ponte S., du Toit, A. &Halberg, N. (2008).”A Strategic Framework and Toolbox for Action Research with Small Producers in Value Chains”, DHS working paper (2008):17

Risgaard, L., Fibla, A.M.E., Ponte, S. (2010).Gender and Value Chain Development. The Danish Institute for International studies.

Roberta, V.*G.*, Jocelyn,D.L.,Romeo,V.L.,Emma ,I.D.(2004).Maize in the Philippines, Production systems, constraints and Research priorities. Mexico. D.I.: CIMMYT

Tekana, S.S. and Oladele, O.I. (2011). Impact analysis of Taung Irrigation Scheme on Household Welfare Among farmer s in the Nor th-West province, South Africa. *Journal of Human Ecology*, 36(1): 69-77.

Thomas, W, G., Charles, A. K. (2002).Problems and Issues Facing Farmer Cooperative U.S. Department, Rural Business Cooperative Services. Research Report 192

Thomas, W., Fanaye, T., & Marie-Katherine, W. (2013).Women's Participation in Agricultural Cooperatives in Ethiopia. International Food Policy Research Institution Essp working paper 57.

Umar, S. I., Ndanitsa, M. A. and Olaleye, S. R.(2009). Adoption of Improved Rice Production Technologies Among Youth Farmers in Gbako Local Government Area, Niger State. *Journal of Agricultural Extension,* 13 (1): 1-8

United Nations Industrial DevelopmetOrganizations(1999),*"Integrated Training Programme for Women Entrepreneurship Developmentinthe food Processing Sector inTanzanian* π", Report of the Evaluation Mission,UNIDO Tanzania.

Upton, M. (1979). Farm Management in Africa, the Principles of Production and Planning Oxford University Press, London, U.K. In: Bamire, A.S., Abdoulaye, T. Sanogo,D. &Langyintuo A.(2010).Characterization of Maize Producing Households in the dry Savanna of Nigeria. Country report-Nigeria: IITA-Ibadan ,Nigeria 46pp .

Waller, B., Hoy, W., Henderson, L., Stinner, B., Welty, C. (1998). Matching Innovation with Potential Users: A Case Study of Potato IPM practices. *Agricultural Ecosystem and Environment*, 70: 203-215

World Bank (2009).Awakening Africa's Sleeping Giant: Prospects for Commercial Agriculture In the Guinea Savanna Zone and Beyond World Bank. Retrieved from http://openknowledge.worldbank.org/handle/10986/2640

World Bank, FAO & IFAD (2009).Gender in Agriculture source book. World Bank, Washington D.C.

WorldBank(2009).Nigeria: sustaining the momentum for Reform. Document of the World bank. Report No.46816-NG.

Yahaya, M. K and Olayide, R. B. (2006). "Perceived Efficiency of Indigenous Media in Agricultural Information Dissemination in IhilaLocal Government Area of Anambra State" *Nigerian Journal of Rural Sociology,* 5 (1 & 2): 30 – 36.

Zaltman, M.A. (1978).Role of Land Administration in Agricultural Development.In: JonadabC. (2006), Factors Influencing Agricultural Land use Conflict in Ohaji Area of Imo State. Unpublished Thesis, Ahmadu Bello University,Zaria.Nigeria.

Zusman, P."GroupChoice in an Agricultural Marketing Cooperatives. *Canadian Journal ofEconomics*-15(1982):220-34.In john M.S. (1983).The Structural Characteristics of Farmer Cooperatives and their Behavioral Consequences.

APPENDIX

QUESTIONNAIRE SCHEDULE

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

IMPACT OF COMMERCIAL AGRICULTURE DEVELOPMENT PROJECT ON MAIZE COOPERATIVE GROUPS IN KADUNA AND KANO STATES OF NIGERIA.

Sir/Madam,
You are humbly requested to respond with all honesty to this questionnaire. All information provided by you will be treated with utmost confidentiality.

SECTION A: BACKGROUND INFORMATION (BENEFICIARY AND NON-BENEFICIARY)

1. Name of Farmer/Cooperative …….....

2. State……

3. Local Government Area…….

4. Tick the category you belong to; Beneficiary [ ] Non-Beneficiary [ ]

SECTION B: SOCIO-ECONOMIC CHARACTERISTICS AND INSTITUTIONAL FACTORS

5. Age of Respondent……. (years)

6. Sex of Respondent…… (a) male [ ] (b) Female [ ]

7. Marital Status (a) Married [ ] (b) Female [ ]

8. (Household Size (All the number of the people depending on you for living)……

9. Hired labour used on maize farm ;……(number)

10a.What is the size of your maize farm land……. (hectares)

b.Kindly indicate the ownership type of the land you cultivate?

i. Purchased [ ] ii. Leased [ ] iii. Inheritance [ ] iv. Rent [ ] v. Pledge [ ] vi. Loan

[ ]vii. Gift [ ] viii. Government allocation [ ]

11. What is the highest level of Education obtained?

(a) No Formal Education [ ] (b) adult education [ ] (b) Primary school Education [ ](c) Secondary SchoolEducation [ ] (d) Tertiary Education [ ]

12. Major occupation of the respondent

(a) Farming only [ ] (b) Civil servant and farming [ ] (c) Business man and farming [ ](d) Others (specify)…….

13. What type of farm enterprise do you practice?

(a) Mono cropping (maize only) [ ] (b) Mixed cropping [ ] (List crop mixture)

(i)…… (ii)…… (iii)……

14. Do you have access to credit facilities (a) Yes [ ] (b) No [ ]

15. If yes, give amount of credit received from 2009-2012: ……Naira

16. What are your other sources of funds apart credit facilities from 2009-2012?

(a) Personal saving [ ]. Amount……..Naira

(b) Family members [ ]. Amount…….Naira

(c) Gifts from philanthropists [ ]. Amount…….Naira

17. Are you a member of any cooperative society? Yes [ ] No [ ]

18. If yes, give the number of years you have been an active member ……years.

19. What are the benefits derived as a member of Cooperative societies?

(a)…….

(b)…….

20. Have you been visited by extension agents within the period of 2009-2012?

Yes[ ] No[ ]

21. If yes, give number of extension contacts within the period of 2009- 2012
(number)……

SECTION C: LEVEL AND RATE OF ADOPTION OF MAIZE PRODUCTION TECHNOLOGY (BENEFICIARIES ONLY)

22. Below is a list of 10 recommended technological packages associated with adoption of maize production technologypractices. Please indicate which package or packages you adopt:

TECHNOLOGICAL PACKAGES	TICK AS APPROPRIATE PLEASE
1.Ridging: 75cm-90cm Intra row	
2.Planting: 15thMay-30thJune	
3.Seed rate i.17Kg-20Kg for 1plant per hole(Hand planting) ii.34Kg -40Kg for 2 plants per hole(Hand planting)	
4.Spacing: Between rows: 75cm-90cm Between plants: i.20cm-25cm for 1plant per stand ii. 30cm-40cm for 2 plants per stand	
5.Seed treatment: i. Dress seed with Apron plus(1 sachet to 2Kg of seeds) ii. Dress with Apron star at 1 sachet/4kg of seeds	
6.Fertilizer Application: i. Apply 120-150Kg of Nitrogen, 60Kg of phosphorus and 60Kg of potassium per hectare ii. Apply half of nitrogen and all of the phosphorus and potassium at planting. iii. The 2nd half of nitrogen is applied 4-5weeks after planting	

7.Weeding; i. Hand weeding 2-3 weeks after sowing and second weeding at 6 weeks after planting. ii. Chemical control: use Primextra 500FW/ Babamaize 550FW(Any at 5 litres/ha pre-emergence) and stamp 500EC at 4litres/ha pre-emergence not later than 2days after planting	
8.Pest and Disease Control: i. stem borers use furadan ii. Termite: Apply dieldrin or aldrex T. iii. Use birds scarers	
9.Harvesting; Remove cobs from stalk and sundry before threshing	
10.Storage: store in drums, jute bags and plastic containers and treats with any of these: Actellic 2% dust; Actellic 25Ec or photoxin	

23. Which year did you commence the practice of the maize production technology.....

24 .How did you get in contact with the technologies? …….

(a) KADP extension agents [ ] (b) Friends [ ] (c) Cooperative society [ ] (d) Radio

(e) Television [ ] (f) Printed materials [ ] (g) others [ ]

25. In your opinion what are the advantages of adopting the maize production technologies

(a)……

(b)……

(c)……

26. Do you use any of the following soil management practices on your farm land?

Yes [ ], No [ ]

27. If yes, please indicate the soil management practices used:

(a) Green manuring [ ] (b) Mulching [ ] (c) Crop rotation [ ] (d) Bush fallowing [ ]

(e) Others specify (i)…… (ii)……

SECTION D: MAIZE PRODUCTION TECHNOLOGY

28. What is your Farm size for maize production technologies in …… (Hectares)

29. What was your average output of maize before the adoption of maize production technologies… 100Kg/bag from an equivalent farm size of your maize production.

30. What were the estimated price of 100Kg/bag of maize before the adoption of the maize production technologies.....

31. What was the output from the adoption of the maize production technologies in 2010 …….. of 100Kg/bag from the farm size given in question 28.

32. What was the highest price of 100Kg/bag of maize in your area…… Naira.

33. Has the production of maize from the adoption of maize production technologies improved your standard of living in terms of property acquisition? Yes [ ] No [ ].

34. If yes, please list the types of property acquired:

a. ……..
b. ……
c. ……
d. ……

SECTION E: CONSTRAINTS TO MAIZE PRODUCTION TECHNOLOGIES

35. What are the Constraints Faced by Maize farmers cooperative groups?

S/no	Constraints
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

52. Suggest possible solution to the constraints you encountered as a member

……

……

……

……

……

Thank you for your cooperation,

Stephen, KOLADE