FACTORS INFLUENCING ADOPTION OF RECOMMENDED CASSAVA PRODUCTION PRACTICES BY FARMERS IN BWARI AND KUJE AREA COUNCILS, ABUJA, FEDERAL CAPITAL TERRITORY

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July, 2013

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A Thesis submitted to the School of Postgraduate Studies, Ahmadu Bello University, Zaria, in partial fulfillment of the requirement for the award of degree of Masters of Science in Agricultural Extension.

Department of Agricultural Economics and Rural Sociology,
Faculty of Agriculture,
Ahmadu Bello University, Zaria

July, 2013

DECLARATION

I hereby declare that this thesis titled "**Factors Influencing Adoption of Recommended Cassava Production Practices by Farmers in Bwari and Kuje Area Councils, Federal Capital Territory "** has been written by me and it is the record of my own research work. No part of this work has been presented in any previous application for another degree or diploma at any institution. All borrowed ideas have been duly acknowledged in the text and a list of references provided.

…… ……..

Pius Mutuah BAKUT Date

CERTIFICATION

This thesis titled **"Factors Influencing Adoption of Recommended Cassava Production Practices by Farmers in Bwari and Kuje Area Councils, Federal Capital Territory"** by Pius Mutuah **BAKUT** meets the regulation governing the award of the degree of Master of Science (Agricultural Extinction) of Ahmadu Bello University, Zaria and its contribution to knowledge and literary presentation.

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DEDICATION

This thesis is dedicated to God Almighty and in honor of my late parents, Mr. & Mrs. James Madaki Bakut.

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ABSTRACT

The study was to determine the socio-economic, institutional and technological factors influencing adoption of Recommended Cassava Production Practices (RCPPs). The specific objectives were to describe the socio-economic characteristics of cassava farmers, identify the different sources of information used, assess the levels of adoption, determine the effect of socio-economic, institutional and technological factors on adoption of RCPPs, examine the effects of adoption of the recommended practices on the yield and income of farmers and identify the constraints faced by farmers in adoption of the recommended practices. The study used a multi-stage sampling procedure to select 120 registered cassava farmers. Frequencies, percentages, means, multiple regression and z – test were employed for data analyses. The results showed that majority (68%) of the respondents fell within the middle age group of 30 – 49 years with a mean age of 35 years. Majority (81%) of the respondents was literate. About 80% cultivated less than 3 hectares of farmland with a mean farm size of 3.5 hectares. The major source of information used by the respondents was radio. The coefficients of regression analysis showed that the R^2 value was 0.60 and education, farm size, credit need, membership of cooperative association, source of information, extension contact and complexity positively and significantly influenced adoption of RCPPs at 5% level of probability. Relative advantage and compatibility coefficients were both positive. Recommended planting time and recommended planting method had the highest adoption levels of 78% and 67% respectively while recommended fertilizer application rate and herbicide application rate had the lowest adoption levels. Result of the Z-test revealed that the mean yield of cassava before and after adoption were 3,832t/ha and 6,387t/ha with a differential of 67%. The mean income of farmers before and after adoption was ₦464,642.00 and ₦714,833.00 and the differential mean was 54%. The identified major constraints for low and non-adoption of some of the RCPPs were limited scale and uneven distribution of farmland, insufficient funds and complex nature of technologies to farmers. It was recommended that technology developers should develop technologies that are simple, cost effective and easily used by farmers. On the other hand, promoters of technology adoption should intensify efforts targeted at improving service delivery and promoting the adoption of RCPPs by the farmers especially the technologies that recorded low levels of adoption.

Chapter 1

INTRODUCTION

1.1 Background to the Study

Nigeria is predominantly rural in character in which more than 80% of total population lives in the rural areas (FAO, 2002). The economy is basically agrarian, with majority of the people living in squalor and very poor standard of living. Most of the farmers are subsistence small holders, farming 1.2 hectares of farmland under a traditional system characterized by low technology and production efficiency. Besides, they are also faced by problems of natural resource inputs, especially land, water, labour and management. The poverty among farm families goes beyond material deprivation to include insecurity, vulnerability, exposure to risks, shocks and stress. This poor condition of the rural communities had continued to deteriorate since independence due to severed neglect emanating from poor and inconsistent policies formulation and implementation by successive governments in Nigeria (Okozie, 2003).

In cassava production, Nigeria is rated the highest producers in terms of its volume of production (FAO, 2002). However, it occupies the 8^{th} position in terms of its productivity (kg/ha), relative to countries as Brazil, Thailand, Indonesia, Uganda, India, Ghana and Congo respectively. The reason for this is being attributed to a number of production factors, such as: the varieties cultivated and the management practices adopted. These farming practices have been revealed to be poor in Nigeria compared to such countries like Brazil, Thailand, Indonesia (FAO, 2002). The International Institute of Tropical Agriculture (IITA), Ibadan, National Root Crops Research Institute (NRCRI), Umudike Umuahia and many other research institutions have developed

appropriate cassava technology packages aimed at promoting cassava production and improvement on cassava yields.

Cassava is a versatile crop with numerous uses. Each component of the crop can be valuable to farmer. In some area the leaves may be consumed as a vegetable or dried and fed the livestock as a protein feed supplement. The stem is used as planting material while the tubers are processed for human and animal consumption. In Nigeria, cassava is produced for food especially in the form of "gari", "fufu", "lafun" and "akpu" and is exported as an industrial raw material to conserved foreign earnings. Ojuekaiye (2001), stressed that cassava can be processed into several secondary product of industrial market value such; chips, pellets, flour, alcohol and starch which are vital raw material in livestock feed industries, textile and brewery industries. Cassava production also creates employment opportunities as well as contributing to the food security status of many farming households in Nigeria.

1.2 Problem Statement

The Federal Capital Territory, Abuja is endowed with abundant fertile lands suitable for the production of cassava in commercial quantities. But the problem limiting the production of cassava in the FCT is the use of traditional methods by farmers. Traditional method in this study refers to the farmers' ways of cultivating cassava such as; close or wide spacing, shallow planting depth, and the continuous use of local varieties such as; "Nwanye" and "Dan Warri" which reduced the yield potentials. The recommended cassava production practices (RCPPs) is package aimed at improvement on cassava yield. Osuagwu (2002), stated that cassava yield can be increased by adoption of recommended practices or by expanding the land area under cassava

cultivation. The process of increasing cassava yield through modernization is depended on the extent to which farmers become aware of the existence of such recommended practices, develop interest, evaluate them, try them and become convinced of their relevance. It is only then that it can be expected that the farmers would adopt completely all the components of the recommended production practices. The study made use of eight recommended production practices. These were:

i. Recommended planting material: healthy stem cutting with 4 – 5 nodes

ii. Recommended planting time: April & June, then Aug. or September.

iii. Recommended method of planting: planting on ridges at an angle.

iv. Recommended planting depth: (5cm – 10cm)

v. Recommended plant spacing: (1m x 1m) for sole cropping

vi. Recommended fertilizer rate: (NPK 15:15:15, 4 – 8 bags per hectare)

vii. Weeding : (herbicide application)

a. Pre-emergence herbicide: Alachlor (Lasso) at 300ml/CP15 knapsack pump.

b. Selective post – emergence herbicide: Round-up at 4-5 litres per hectare.

viii. Harvesting: (cassava lifters)

Several studies (Okoosi 1990, Saito 1994 and Okozie, 2003) revealed that farmers in the study area have access to different improved cassava production practices and cassava hybrid cultivars. Thus, TMS 30572, TMS 4(2) 1425, TMS 99/2132, TMS 98/0581, NR

8032, MS6. The Federal government through the Cassava Multiplication Programme (CMP), the Root and Tuber Expansion Programme (R-TEP) and the Abuja Agricultural Development Project (ADP) have all made a lot of commitment in promoting the adoption of these recommended cassava production practices. However, in spite of all the efforts, the farmers in the study area are still practicing the traditional cassava production methods (Kuta, 2007). Consequently, the production of cassava in the study area in terms of its yield (1.2 million tones) is relatively low (BAC Annual Report, 2004). Therefore, the need to determine the factors influencing the adoption of recommended cassava production practices in the study area poses a key challenge. The research seeks to answer the following questions:

i. what are the socio-economic characteristics of cassava farmers in the study area?

ii. what are the different sources through which information reach farmers on recommended cassava production practices?

iii. what are the levels of adoption of recommended cassava production practices by farmers in the study area?

iv. what are the socio-economic, institutional and technological factors influencing the adoption of recommended cassava production practices by farmers?

v. what are the effects of adoption of recommended cassava production practices on income and yield of farmers?

vi. what are the constraints faced by farmers in the adoption of recommended cassava production practices?

1.3 Objectives of the study

The broad objective of this study was to determine the socio-economic, institutional and technological factors influencing the adoption of recommended cassava production practices by farmers in Bwari and Kuje Area Councils of Abuja. The specific objectives are to:

i. describe the socio-economic characteristics of cassava farmers in the study area;

ii. examine the different sources of information through which farmers learn about recommended cassava production practices;

iii. assess the level of adoption of the recommended cassava production practices by farmers in the study area;

iv. determine the effect of socio-economic, institutional and technological factors on the adoption of recommended cassava production practices by farmers;

v. examine the effect of adoption of recommended cassava production practices on income and yield of farmers and;

vi. identify the constraints faced by farmers in the adoption of recommended cassava production practices.

1.4 Justification of the Study

Cassava has been a stapled food crop in Nigeria for several decades (Olaniyan, 1998). However, its industrial potentials had remained unexplored until 2002 when the Federal government of Nigeria lunched the "Presidential Initiative on Cassava". Its industrial uses in the manufacturing industries such as the textile, paper and pharmaceutical industries as well as a foreign exchange earner were highlighted. This since then has brought cassava production in Nigeria to a national limelight. The finding of this study is anticipated to provide a guide to assist farmers on areas to explore to promote cassava production and improvement on cassava yield. This study and other similar research findings in the study area will provide the basis to present the strategy to policy makers and other donor agencies on ways to formulate appropriate policies for the expansion of cassava production. The result of this study will be useful to extension delivery agencies in providing information on the circumstances surrounding the poor or otherwise of adoption of recommended cassava production practices in the study area. It is also anticipated that the findings of this study will provide a feedback to research institutions on areas that demand further research work. The study will add to the existing literature in the area of cassava production as an enterprise in Nigeria. It will also create and raise public awareness on the factors influencing adoption of RCPPs in the Federal Capital Territory.

1.5 Hypotheses of the Study

The hypotheses tested in this study were:

i. There is no significant influence between farmers' socio-economic characteristics and adoption of recommended cassava production practices.

ii. Institutional factors have no significant influence on adoption of recommended cassava production practices.

iii. The technological attributes have no significant influence on adoption of recommended cassava production practices.

iv. Adoption of recommended cassava production practices has no significant influence on yield and income of farmers.

Chapter 2

LITERATURE REVIEW

2.1 Origin of Cassava and its Characteristics

Cassava (*Monihot* spp) is one of the most ancient root crops known by man. Its origin and subsequent domestication is associated with African bitter or cluster yam, Discorea dumentorum (Mabawoku, 1984). It was cultivated in the tropical America before being introduced to Africa by the Portuguese traders around the 16th century (Oni *et al.*,2004). In Nigeria, it was introduced into Warri, in the then Bendel State of Nigeria, by the Portuguese explorers in the 17th century (Lean, 1976, as cited in Yakassi, 2010). Cassava however, did not become an important crop in the Country until the end of the 19th century when processing techniques were introduced as many slaves returned home (Ogundari *et al*., 2010) Cassava is a woody shrub of the family Euphorbiacea possessing tall, thin straight stems and when fully grown, attains an average height of 1 – 2 metres although some cultivars may reach a height of 4 metres. There are many cultivars under production in Nigeria. They can be distinguished by their morphological characteristics ranging from the leaf size, colour, shapes, time to maturity and yields. Traditionally, cassava tuberous roots are a major source of carbohydrates in human diets and are processed by various methods into products utilized in diverse ways according to local customs and preferences. The main industrial use of cassava is in the manufacture of starch and alcohol by textile and paper industries. The most popular dish made from cassava in Nigeria is gari and cassava flour (IITA, 1988).

2.1.1 Trend on cassava production in the world.

The world production of cassava root was estimated to be 184 millions tonnes in 2002 (FAO, 2004). The majority of production was in Africa where 99.1 million tonnes were

grown. In Asia, 51.5 millions tonnes were grown and in Latin America and the Caribbean, 33.2 million tonnes were grown. Nigeria is the world's largest producer of cassava, but based on the statistics from the FAO of the United Nation, Thailand was the largest exporting country of dried cassava with a total of 77% of world export in 2005 (FAO, 2007).

2.1.2 Cassava production in Nigeria and its prospect

Cassava production in Nigeria was approximated to be 34 millions tonnes in 2002 by the Food and Agriculture Organizations of the United Nations (FAO) in Rome (FAO, 2004). The production in Nigeria expanded steadily since 1980 to 1992 as a result of the adoption of the improved varieties. Presently, the future of cassava production in Nigeria is rosy (IITA, 2002). The institute advanced the following reasons; its ease of cultivation, high yield per hectares, little financial outlay requirement, fair yield on poor soil, tolerance for other crops grown with it and increasing industrial use. All these combined to make it a formidable potential crop.

2.2 Socio-Economic Characteristic of Farmers on Adoption of Recommended Practices

Studies on socio-economic characteristic of farmers carried out in Nigeria have shown that there exists a close association between farmers' socio-economic characteristics and awareness of adoption of recommended farm practices. The review of the literature also finds that the status of the farmer in terms of his assets, wealth, population of the family, farm size, income, extension contact, and the exposure are among the indices that determine the acceptance and the adoption of improved farming practices. Adenji (1995), found that socio-economic factors such as age, household size, formal education, farm size income, cosmopolitanisms and community status were related to

adoption. In line with this finding, Ekong (2000), reported that cassava production is an energy consuming activity. According to him, the categories of people that are mostly involved in farming activities are the middle-age with age bracket of 30-49years. This assertion was validated by Yahaya (2002), when he reported that farmers between the ages of 20-50years are the most active age group in agricultural production. Aghamu (1993), observed that age, in correlation with farming experience, has a significant influence on the decision making process of farmers with respect to risk aversion, adoption of recommended production practices and other related decisions. Yahaya (2007), observed that it is generally believed that males are often more energetic for energy demanding activities such agricultural activities while Oladele and Kareem (2003), opined that gender pose no barrier to active involvement in farming activities. Ojuekaiya (2001), in his classification of farm size opined that farmers who cultivate farmland between 1.0-5.9 hectares are small-scale farmers. Teressa (1994), reported that the size of the farmland cultivated is a function of land available to the farmer for use and also the potential of the land. Atala (1986), found that the most important variables which influenced adoption were extension contact, farm size and hired labour while those for gross farm output were farm size, hired labour and non-farm income. Clark and Akinbode (1986), defined household size as the number of people living and eating from the same pot. Nweke (1989), found that the average household size in Africa was between 8-9 people in a household. Okunade (2006), reported that the significance of household size in agricultural production hinges on the fact that the availability of labour provided for farming activities, the total land area cultivated, the amount of farm produce retained for domestic consumption and the marketable surplus are all determined by the size and composition of the household. Kassie (2009), reported that experience is gained with number of years spent in doing an activity. He maintained that

as the years in doing agricultural activities increase among farmers, their years of experience also increase.

2.3 Institutional Factors on Adoption of Recommended Cassava Production Practices

Farmers' response to agricultural innovations are attributable to certain institutional factors influencing adoption such as extension contact, access to credit, input delivery and sources of information. Osuagwu (2002), found a significant and positive relationship between the frequency of extension agents' visit and the adoption of improved farm practices. Also, Williams (1982), found that farmers first learn of some recommended farm practices through extension workers. Akanya (1989), found extension contact and credit facilities to be positively and significantly related to awareness, adoption and gross farm output of farmers. Camboni and Napier (1993), opined that relative economic advantage, compatibility and complexity of innovations, appropriateness of technology are major factors that could influence the acceptance and usage of a technology. Institutional variables are reported to have either positive or negative influence on adoption of improved and recommended cassava technology practices. The institutional variables to be considered in this study are extension contact, sources of information, access to credit and membership of association. These variables will be tested to determine the manner and extent to which they influence the adoption of improved cassava technology practices by farmers in both Bwari and Kuje Area Council of Abuja.

2.4 Recommended Technological Practices used by Farmers

The choice of a good variety of crop grown in a particular locality is a pre-requisite of achieving higher productivity (National Agricultural Question and Answer Services

News Letter, 2002). According to Sasakawa Global (2001), many of the IITA recommended cassava varieties are well known to be tolerant to diseases and there is no need for disease control. Olufajo (2004), reported that the introduction of new pest control reduced the time needed for application, the amount of chemical used, labour and cost. Among the recommended cassava production practices that were introduced to farmers in the study area, eight recommended practices were used for the study. The recommended cassava production practices comprises the following:

- improved cassava variety Thus, TMS 30572, TMS 4(2) 1425, TMS 99/2132, TMS 98/0581, NR 8032, MS6.
- Planting materials (Healthy stem cuttings with 4 – 5 nodes)
- Planting time – April and June, then August or September.
- Method of planting – Planting on ridges at an angle.
- Planting depths (20cm -30cm)
- plant spacing (1m x 1m)
- fertilizer application (NPK 15:15:15, 6 bags per hectare)
- weed control method (chemical weed control:
  a. pre-emergence herbicide; Alachlor (Lasso) at 300ml/CP15 knapsack pump,;
  b. Selective post – emergence herbicide; Round-up at 4-5 litres per hectare.)
- harvesting method (Mechanical: harvesters) (Sasakawa Global 2001; Olufajo, 2004).

2.4.1 Traditional cassava production practices

Two main kind of local cassava cultivars are commonly grown in West Africa: sweet cassava (*Manihot* palmata) and bitter cassava (*Manihot* utilissima). The bitter cassava contains a juice which is poisonous to human and livestock (IITA, 1984). This juice

(called hydrocyanic acid) must be extracted before the cassava is safe to eat. The commonest varieties in Nigeria are *Nwangoye*, which matures early but does not have a high yield; *Nwaiwa*, which matures late; *Okotoronwa*, which is tall and has high yield but easily destroy by strong wind; Karagba which also high yielding but prone to Cassava Mosaic Virus (CMV) and Dan Warri, which has been found particularly suitable for Northern states of Nigeria but grown at a subsistence level (IITA, 1984). According to Sasakawa Global (2001), indigenous agronomic practices of cassava production consist essentially of land preparation and cultivation, planting, manuring, weeding and harvesting.

- Land Preparation: In most rural communities, fire is set on farmland at the on-set of the dry season as cheap means of land clearing. In some other areas, simple implements may be used for land clearing and stumping. Ridges or heaps are made for planting of the cassava stem cuttings (IITA, 1984).
- Planting: Propagation is by cassava stem cuttings which may be 30–40cm with 5–7 buds, derived from both matured and immature cassava stems.
- Manuring: Virgin land is often been preferred by farmers for cassava cultivation as means of obtaining high cassava yields. In poor soils however, farm yard manure (FYM) from cattle or goats pens are gathered and applied on cassava stands as means of increasing the fertility of the soil. The quantity applied per each stand is dependent on the amount of manure available at the farmer's disposal (IITA, 1984).
- Weed control method: Manual weed control method is generally employed by traditional cassava production farmers. This is done regularly, at least 3 – 4 times using simple farm tools. The last weeding is carried out before the on-set of the dry season to prevent fire out break (IITA, 1984).

- Method of harvesting: Cassava tubers are traditionally harvested manually as soon as the cassava starts to shade the leaves while the shoots commence drying up. This is carried out when the soil is moist. Harvesting of tubers is by hand-pulling of stems. Digging implements are also used when the soil is hard especially in the dry season.

2.5 Studies on Yields of Recommended Cassava Production Practices

Nigeria is one of the world largest producers of cassava, with about 37 million tones of cassava cultivated on 2.5 hectares of land, with a national average yield of 14.8 metric tones per hectare (Olumide, 2003). However, a total output production of 38.17 million metric tones was reported to be harvested from 4.118 hectares of land with average yield of 9.271 tones per hectares (FAO, STAT, 2005). Nigeria's production accounts for 19% of the world output and 34% of Africa's output (Agwu and Anyaeche, 2007).

Research in Nigeria by International Institute of Tropical Agriculture (IITA) and National Root Crops Research Institute (NRCRI) over the years have made cassava a priority for extensive research and have developed different varieties that are resistance to major disease. These varieties give sustained yield of over 50% higher yield when compared to local varieties (Yahaya, 2007). The persistent problem of food shortage in Nigeria has led to increasing agricultural productivity, which involves the use of improved high yielding crop varieties, have been popularised among farmers through extension services of ADPs. The multiplication, distribution and adoption of TMS varieties by farmershave led to tremendous yields increase over the years. For example, between 1994 and 1998, yield increased from 31 million tones to 34 million tones (CBN, 1999) while 39 million tones was reported in 2003 (CBN, 2003).

2.6 Sources of Farm Information on Cassava Production

There are many sources of farming information available to farmers. In determining soya beans utilization and consumption patterns among rural dwellers in South Western Nigeria, Okunlola (2003), reported that farmers obtained their information principally through extension agents and radio. These sources of information cut across all the category of respondents, both literate and illiterate. Yahaya and Aina (2007), found that most of the cassava farmers (97%) have access to information from extension agents. Fadiji (2000), reported that radio communication was recognized as the most accessible and potentially useful means of disseminating information. According to him, radio has a high capacity for creating awareness of new innovations and for stimulating farmers to become more actively involved. Okoosi (1990), stated that extension agencies rely on the use of television to disseminate information to its target audience. Ikechukwu (1990), indicated that 58.4% of the farmers interviewed were aware of the television viewing centre but only 14.2% of the respondents indicated they watch programms regularly. Olumide (2003), stated that the use of internet as a medium of information dissemination was the fastest means of communication among the developed nations of the world. According to him, most institutions began by viewing the internet as a one – way broadcasting medium, they published their fact sheets on the world wide web (www) so that their clients with computers would not need to wait for several days to receive a print document by regular mail or physically travel to an extension office or university. Yahaya (2003), stated that mobile phones are the main point for access for information impoverished communities across the world. He maintained that almost all mobile phones received SMS messages which can be used to provide farmers with agricultural innovations and techniques necessary to improve productivity. Yahaya and Aina (2007), indicated that the Federal Minstry of Information in conjunction with

states Ministries of Agriculture used to organize and present cinema shows using overhead projectors for rural people using mobile cinema vans in the 1970s with the aim of providing farmers with the necessary information and also to create awareness about new innovations.

2.7 Factors Influencing the Rate of Adoption of Improved Cassava Production Practices by Farmers

Improved cassava varieties have been adopted in some parts of Nigeria. (Nweke *et al.*, 1988), observed that 80% of cassava farmlands was planted with improved varieties in 1987. In the sub humid zone of the South East Nigeria, Ezedinma (1988), estimates that 29% of cassava land was planted with improved cassava varieties. According to (Akoroda *et al.*, 1989), 59% of the farmers in Oyo State South West Nigeria within the humid zone planted the improved cassava variety of International Institute of Tropical Agriculture in 63% of their cassava land area, while about 40% of the land was allocated to improved variety in the non humid zone.

Odebode (1997), stated that in modern cassava production, the crop require very little care beyond the range of canopy closure. Okoosi (1990), study on adoption of agricultural innovations reported that there was a mass adoption of fertilizer because the application of fertilizer to plant is easier and can be managed by the rural farmers themselves within the minimum training from extension agents.

Okunade (2006), in his study, revealed that 100% of the respondents adopted improved cassava production techniques, while study by Oladele and Kareem (2003), revealed that farmer's beliefs and preferences influenced the adoption of agricultural innovation. Their study (Oladele and Kareem, 2003), revealed that 92% of the respondents adopted

improved cassava cutting due to its early maturity characteristics. Conversely, the use of fertilizer had the lowest adoption rate 30% of the respondent. The respondents reported that cassava tubers produced by the use of fertilizer deteriorates fast. Furthermore, planting distance and regular weeding had adoption rate of 83% and 90%, of the respondents. Okunade (2006), reported high adoption rate (75%) of improved plant spacing by women farmers in cassava production. This study agrees with the study of Oladele and Kareem (2003), who found a high adoption rate of plant spacing among his respondents. However, Monu and Omole (1982), noted that profit consideration on adopting innovations was found to be very crucial in explaining differential rate of adoption among women farmers. Cassava production is influenced by many factors. These factors are:

- **Agricultural Capital**: According to Anazodo (1986), agricultural capital is an essential production element used to boost productivity. It is one of the important agricultural inputs needed for agricultural production. Insufficient capital among farmers may pose a great challenge for increase in agricultural productivity. The demand of agricultural capital, exist because farmers do not have access to all the inputs required at the same time of each production cycle and therefore borrow money to acquire them (David, 1989). Anazado (1986), opined that the capital need for small scale cassava farmers is stressed by the fact agricultural development involves the adoption of recommended production practices. Agricultural production is seasonal and the corresponding income realization is such that production takes place long before income is generated. Anazado (1986), maintained that agricultural capital is needed to control price fluctuation through adequate processing and storage in order to ensure even distribution of agricultural produce through time and space. David (1989), found that one reason

for the importance attached to agricultural capital as a vehicle for rural development and transformation is the belief that lack of capital constitutes a major constraint to mass adoption of recommended production practices.

- **Labour**: Knispscheer (1980), defined labour as human beings efforts employed in production and not the human themselves which is measured in man/day or man/hour. Among the limiting factors in cassava production is high labour requirement. Hired labour (labour paid for in cash or kind) is needed in various combinations with family labour in the performance of pre-planting tasks. Saito (1994), stated that hired labours are used for certain task. The financial involvement in hired labour has been stated by (Knispscheer, 1980), who reported that labour requirement in production of cassava root and product is the most important and costly requirement. (Asinobi *et al*., 2005), study revealed that 95% of the respondents indicated high labour cost as a constraint to cassava production.

- **Fertilizer**: Dorosh (1988), defined fertilizers as any material which may be in the powder, solid, crystalline or liquid form prepared artificialline to improve soil fertility. Fertilizers contain plant nutrients which are easily soluble in soil water and hence readily absorbed by plants. (Akiroda *et al.*, 1989), found that a large potential exist for the adoption of International Institute of Tropical Agriculture cassava varieties if farmer can obtain more stems suitable for planting. Anuebuwa (1982), opined that the factor limiting improved cassava production are uneven supply of planting materials and other inputs such as fertilizer, pesticide as well as increased labour cost for ridging and marketing problem. He further states that for any increase in production level, the modern inputs must be made available to the

farmers at the right time and at affordable prices. Alabi and Alabi (2003), reported non-supply of fertilizer as a binding constraint to profit maximization of cassava production. Similarly Oladele and Kareem (2003), reported low rate of continued use of fertilizer because it was not readily available. Ojuekaiye (2001), revealed that lack of fertilizer and its high prices were responsible for the reduction of cassava production through reduced hectares. Oladele and Kareem (2003), further revealed that the use of fertilizer is the least sustained technology under cassava production due to high cost of purchase.

- **Diseases and Pest**: Diseases such as African mosaic disease, bacterial blight, anthracnose, root knot nematodes and pests like grasshopper, scale insects, wide pig, rodent and monkeys are serious problem in cassava production in Nigeria. Cassava pest can reduce tuber yield especially when planted late (Hahn, 1988). The IITA (1984), reported increasing incidence of damage due to pests and diseases. Spencer and Kainaneh (1997), in a similar vein reported that pest and diseases are the major constraints that farmers face in trying to maintain cassava's important food security role as population continues to grow while (Asinobi *et al*., 2005) noted that 91% of the respondents reported pests and diseases as a barrier to cassava production. He therefore stressed that the existence of pest and diseases is becoming alarming and requires urgency in the control and treatment.

Cassava post-harvest perishability is a universal constraint to its use both as fresh food and as raw material for processing. This negative characteristic raise the market margin, reduces products quality and condition the location and size of processing operation (Scot *et al.*, 2000).

- **Rural Infrastructure**: Another factor influencing cassava production is inadequate infrastructures. Swanson (1996), found that poor rural infrastructures have been a major factor militating against agricultural production. Banjo (1988), stated that lack of social amenities and wage employment and the unattractiveness of subsistence agriculture account for the drift of young people from rural villages to urban towns. The IITA (1990), reported the lack of necessary infrastructures such as transportation and market in cassava growing areas as a factor giving cassava producers little incentives for expansion. Omifare (1989), reported transportation in terms of availability and high cost as a militating factor to cassava production. The bulky planting materials further increase transportation costs. Adeolu (1990), reported that high moisture content of 60 – 70% increase transportation cost and make post harvest storage difficult. (Asinobi *et al.*, 2005), revealed that 100% of the farmers interviewed reported low prices for cassava products. The continuous existence of disincentives of low prices of cassava both of fresh and processed products would certainly cause or prolong the impoverishment of rural areas, often increases the rate of rural-urban migration by people seeking alternative source of income.

Cassava can be sold either fresh or in processed form in the production area or transported to the town. The hard conditions of rural roads make transportation of fresh/processed products to the market difficult (Futa, 1992). Information received from farmers revealed that most of them sleep for days in the market or delayed transportation of cassava fresh root/processed products to the market centres during the raining season due to the bad conditions of network of roads to market centres. Thus, improved access to market centres would result in rapid spread of cassava production

and possibly increased market demand (Nweke, 1999). Ojuekaiye (2001), reported that the adoption of available technologies can expand production on sustainable basis only if market can absorb the additional cassava produced at prices which acts as incentives to the producers. Furthermore, adoption of available technological packages to substantially expand cassava production would depend on expending market for cassava human staple, by processing and packaging products for delivery in good condition and at reasonable cost to non-producing centres. It would also depend on expanding markets for cassava in non-human consumption uses (Nweke e*t al.,* 1988).

2.8 Constraints to Cassava Production

A number of constraints to the adoption of recommended cassava production practices have been identified by many researchers. Moody (1973), reported that untimely weed control and wrong application herbicides affect the growth and development of cassava tubers. Kaito (1994), revealed that 95 percent of the respondents indicated high labour cost as a major constraint to cassava production. (Akiroda *et al.,* 1989), found that a large potential exist for the adoption of improved cassava varieties if farmers can obtain more cassava stems suitable for planting. Anuebuwa (1982), opined that the factor limiting improved cassava production are uneven supply of suitable planting materials and other farm inputs such as fertilizer, herbicides, pesticides and processing facilities.

2.9 Theoretical Framework

The study was guided by the concept of social change theory, using the diffusion-adoption perspective.

2.9.2 The theory of social change

Social change in a social system can be referred to a major change in behaviour patterns, norms and values over time. Otaki (2005), viewed social change as the alteration in the social structure or its component parts over a period of time. Change involved time and space which determined the direction in which society is going from a particular sport. Ekong (2003), summed up his definition of social change as a modification in human attitudes and behaviour pattern as a result of education (such as extension activities), and alteration in social conditions as a result of changes in the policies of a social organisation, including consequences and manifestation of such changes. Social change can be planned or unplanned. Planned change is a conscious, deliberate and intended attempt to bring about the change by one or more agents (Rogers, 1995).

The adoption of recommended cassava production practices is a planned social change because FCT-ADP deliberately seeks to introduce improved varieties recommendation for the benefit of the area that falls under Southern Guinea savannah where the crops can be produced in commercial quantity due to suitability of soil and other climatic requirements favourable for the crop to thrive. The perspective will be used to explain the socio-economic characteristics of cassava farmers which will also help to determine the factors influencing adoption of cassava recommended practices by farmers. Furthermore, this perspective will also be used, to explain the introduction of improved cassava recommended production practices through different sources of information aimed at improving productivity. This new practice is proposed to be used to substitute the old ones.

2.9.2 The diffusion and adoption theory

The key area this research work seeks to address is on adoption and diffusion of agricultural innovations. Adoption according to Rogers (1995), is the decision to make full use of an innovation or technology as the best course of action available. Adoption of a new agricultural innovation or practice requires that the farm operator must be aware of the practice, become interested in it, evaluate it, try it out and then take step of adoption. Diffusion according to Daniel (1997), is the process by which an innovation is adopted or gain acceptance by members of a community. David and David (2000), in their view opined that diffusion could be interpreted as aggregate adoption. Similarly, Dorosh (1988), stated that the process of diffusion is a precursor to adoption, although this does not necessarily always end in the latter. Adoption is regarded as decision o make full use of an innovation or technology as the best course of action available. David and David (2000), further summed it up that adoption and diffusion is the processes governing the utilization of innovation. Rogers (1995), define diffusion as the process by which an innovation is communicated through certain channels over time among members of the social system. According to him, a number of factors interact to influence the diffusion of innovations. These factors are: the innovation itself, the communication channels, time and the nature of the social system into which the innovation is being introduced. Diffusion begins with actual entry of an innovation into a target system. The relevance of diffusion-adoption theory is to appreciate the understanding of individuals, social groups and inherent differences in order to proffer solution to these differences and promote the adoption of appropriate agricultural innovation so as to enhance higher productivity, income and level of living among rural farmers.

2.9.2.1 Adoption process

Adoption is about decision to continue full use of an innovation. It is a mental process through which an individual passes form first hearing of an innovation to final adoption of the innovation. Rogers and Shoemaker (1971), opined that, adoption process is affected by the following major factors such as: Socio-economic status, Personality variables and Communication behaviour, among others.

2.9.2.2 Stages of adoption

According to Rogers and Shoemaker (1971), adoption process can be classified into the following five stages namely: Awareness, Interest, Evaluation, Trial and Adoption. **Awareness**: The farmer just knows about the technology but not the full details of it. **Interest:** The farmer now seeks for more information on the technology and how it can work.

Evaluation: He compares the merit and demerits of the idea including the risk involved, comparing the effectiveness and the cost analysis.

Trial: After the evaluation, the farmer makes a trial on a small scale to see the results. **Adoption**: The last stage is acceptance and continuation of the technology on a large scale production. Similarly, the IITA (1988), reveal that the attributes of a technology as perceived by farmers determines the rate of its adoption. There are five attributes of a technology and these include: Relative Advantage, Compatibility, complexity, triability, and absorbability.

Relative Advantage: This is the degree to which a technology is perceived as better than the idea its supersede. The relative advantage is measured in economic terms but often social prestige factor, convenience and satisfaction are also of importance. The

greater the perceived relative advantage of a technology the quicker the rate of its adoption.

Compatibility: This is the degree to which a technology is perceived as consistence with the existing values, past experiences and needs of the farmers. A technology that is compactable will be adopted more rapidly than the one that is incompatible.

Complexity: It is the degree to which a technology is perceived as difficult to understand and used. Some technologies are easily understood by farmers while others are more complexed, hence can only be adopted slowly.

Triability: It is the degree to which a technology will be experimented with limited bases. A new technology that can be tried in an instalment plan will generally be adopted more quickly than a technology that is visible for trial.

Absorbability: This is the last attribute of a technology where the result of the technology is seen physically. A successful result of a technology on a demonstration plot will convince farmers to accept and adopt it (IITA 1988).

Madukwe (1991), opined that a group of farmers may be categorized according to their readiness to accept a new practice and put it into use as: Innovators, Early adopters, late adopters (Laggards) and Never Adopters.

Innovators: These are those who introduce new farming techniques into a farming community. They constitute a small proportion of the farming community. The source of their information may be through contact extension agents, the mass media or from what they have seen in another farming community.

Early Adopters: This group of farmers comes immediately after the innovators. Some of them are educated but may be conscious and would want to see the new technology

tried under local condition. They usually express their interest and willingness but under conviction by result demonstrations.

Late Adopters (Laggards): This group of farmers is the third that can accept and try a technology. The percentage of late adopters is usually very high because of their conviction from result demonstrations. Although some take a much longer period to adopt.

Never Adopters: These are the last group of farmers that will neither accept nor adopt a new technology. They do not even consider what the extension agents try to put across them. This attitude may be due to factors such as illiteracy, poverty, conservative attitude, and lack of exposure, fear of tax payment as well as fear of risk of uncertainty (IITA 1988).

2.9.3 Concept of effect

Effect is a change or changed state occurring as a direct result of action by somebody or something else. The introduction of technologies to a social system is designed to achieve certain outcome. Whether this is achieved or not would depend on changes that are noticed among the target group (Adun, 1995).

Studies by (Philip *et al*., 1990), revealed that improved farm equipment enables farmers to increase the land area under cultivation and achieve higher income. Similarly, Anazodo (1986), reported that adoption of improved farm equipment for crop production resulted in an increase in total production by improving yields, expanding the agricultural land area, increasing land use intensities and changing the nature of crop enterprises. Berry (1993), stated that income is likely to increase, especially if

production expands as a result of increases in yield per hectare and the adoption of cultural practices, which sustain soil fertility over time.

2.10 Conceptual Model

The conceptual model explains the relationship between the major concepts (independent and dependent variables) in the study. The model shown in figure 1 explains the relationship between the socio–economic characteristics of the farmers which determined their level of adoption of recommended cassava production practices. This in turn determined the cassava yield and income of the farmers. Therefore, in this model, the first arrow explains the relationship between the independent variables and the dependent variables while the dotted arrow shows the likely outcome of the relationship.

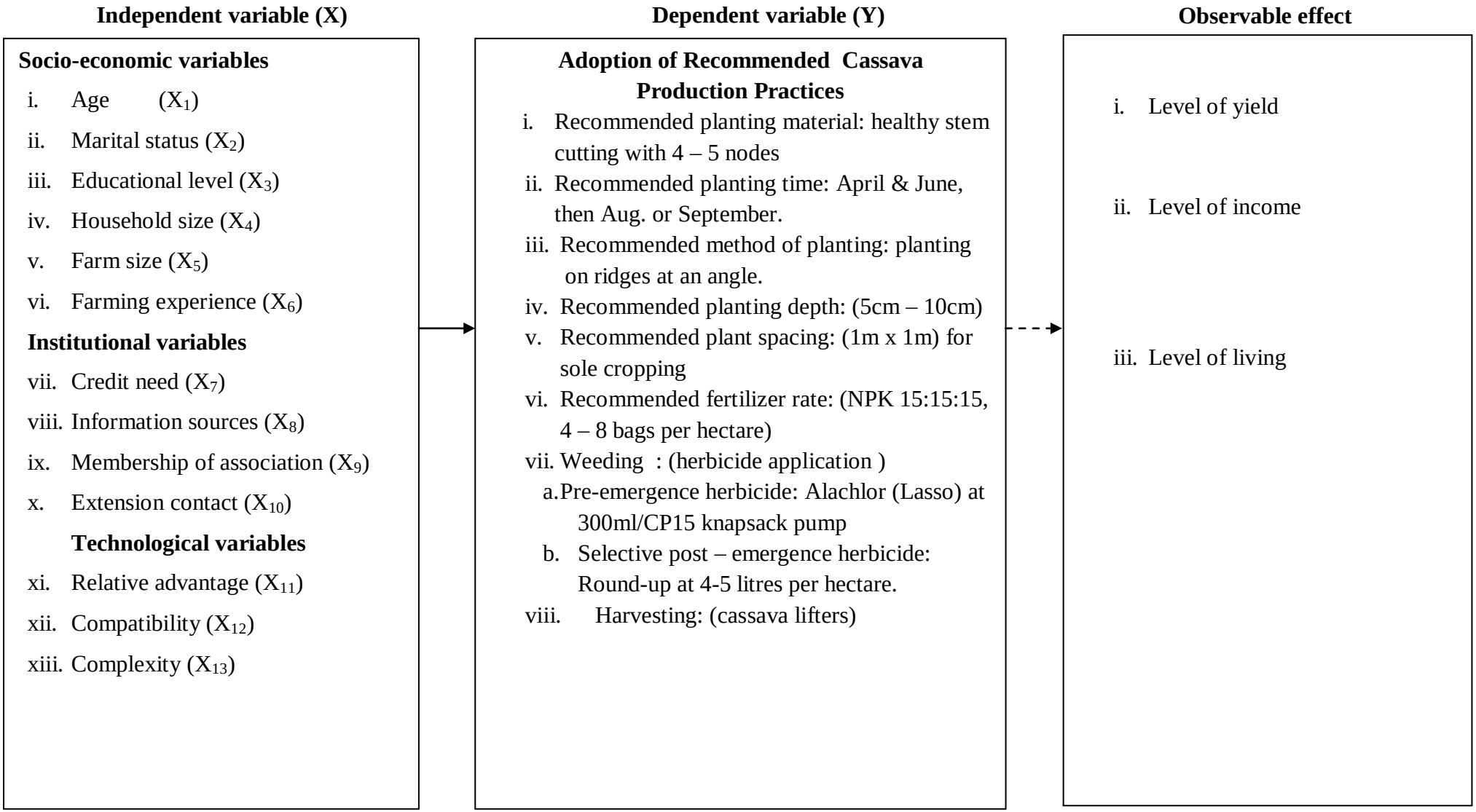


Figure 1: ***Model of Socio-economic, Institutional and Technological factors Influencing Adoption of Recommended Cassava Production Practices and Effects***

Chapter 3

METHODOLOGY

3.1 Study Area

The study was conducted in Abuja, the Federal Capital Territory. Abuja was created and carved out in 1976 from the Kaduna, Niger, Kwara and Plateau States. The FCT is centrally located, lying within the latitude $8^0$25′N and $9^0$20′N. and longitude 6^O 45'E and 7^O 39'E. Abuja has a boundary with Kaduna State to north and Kogi State to the south. It is also bounded to the east and west by Nassarawa and Niger States respectively (Figure 2).

What is referred to as Local Government Area in states are "designated Area Councils in Abuja". There are six Area Councils in Abuja namely: Abaji, Bwari, Gwagwalada, Kuje, Kwali and Abuja Municipal Area Councils. Abuja covers an area of 8,000 square kilometres with a total population of 1,899,622 in 2012. National Population Census Result (NPC, 201). The inhabitants of the area are the Gbagyi, Gwandara and Koro who are the indigenes and other ethnic groups that have moved into the capital city from all parts of the country for the administration of the federal ministries due to the relocation of Nigeria capital city from Lagos to Abuja, (AESD, 2004).

Farming is the major occupation of the majority of indigenes because the area is endowed with abundant fertile land suitable for farming activities. The crops cultivated are yam, cassava, maize, sorghum, rice, groundnut, beans and vegetables. Beside crop production, the rural communities also rear livestock such as sheep, goat, cattle and poultry birds at subsistence level.

The main vegetation of the study area is Guinea-savannah. It is a region of open natural grassland, sparse woodland and shrubs. The area is suitable for growing roots/tubers, cereals and establishment of pastures for livestock management. The soil combines both the good physical properties of sand with the good chemical properties of clay, as well as having adequate organic matter. It is easy to cultivate and sufficiently rich in plant nutrients for optimum plant growth, (AESD, 2004).

In Abuja, the durations of sunshine ranges from 6 – 8 hours per day in the southern parts and 8 – 10 hours in the northern parts from January to April/May. There is usually a steep drop to a mean of about 4 hours per day in the months of July/August due largely to increase in cloud-cover. It starts to rise again in September as a result of decrease in cloud-cover, (AESD, 2004).

Abuja like most parts of the country records its highest temperatures during the dry season months which are generally cloudless. During the dry season, the typical month of which is March, temperatures could be as high as 37^0C in the south-west and about 30^0C in the North-East. This period is characterised by high diurnal range when drops of about 17^0C may be recorded between the highest and lowest temperature in a dry. During the rainy season, temperature drops considerably as a result of dense cloud – cover. The diurnal range also drops to about 7^0C especially between July and August, (AESD, 2004).

The federal capital territory records relative humidity in the dry season of some 20% in the afternoon at higher elevations in the Northern parts. Sometimes about 30% is recorded in the extreme south of the territory especially in the areas closed to the Niger-

Benue trough. This low level of relative humidity coupled with the high afternoon temperatures account for the desiccating efforts of the dry season which is also marked by the presence of the harmattan dust-haze. During the rainy season, relative humidity in the afternoon rises every where to about 50%.

Rainfall starts from March in the Southern parts of the territory (Abaji and parts of Kuje Area Councils) and from April in the Northern parts (Bwari Area Councils) and ends around October in the Northern parts and November in the extreme south. The duration of the rainy season therefore, varies from 240 days in the Northern parts to 290 days in the Southern parts. Because of the location of Abuja on the wind-ward side of the Jos Plateau, there is a general increase in the total amount of rainfall from the North to the South rather than the usual decrease which is the characteristics of the entire country, (AESD, 2004).

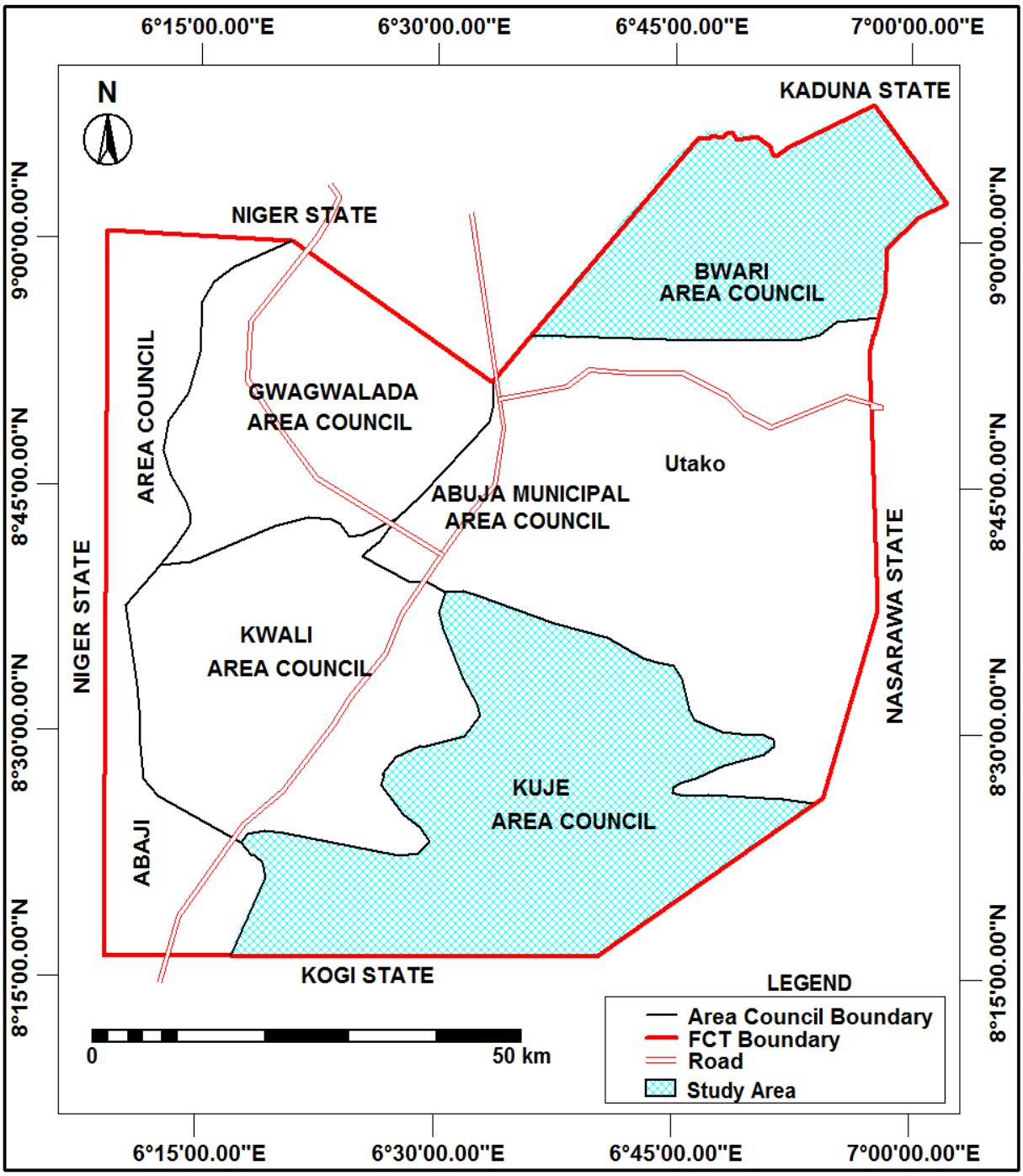


Figure 2: Map of Abuja showing the Study Area Councils (Bwari and Kuje)

3.2 Sampling Procedure and Sample Size

Bwari and Kuje Area Councils are made up of twenty-five (25) districts, representing twenty-five wards. Bwari Area council is comprised of ten (10) districts namely: Kuduru, Bwari central, Ushafa, Igu, Shere, Kawu, Npape, Biaji, Dutse-gbagi, and Galuyi. On the other hand, Kuje Area Council has fifteen districts. They include; Kwaku, Kuje, Rubochi, Gwargwada, Kujekwa, Gaube, Tukpeki, Yenche, Dibe, Agwai, Barayi, Kebi, Huni, Ukuya, and Gudunkarya.

A multi-stage sampling method was adopted in the study. Two Area Councils (Bwari and Kuje) were purposively selected in the first stage. In the second stage, two out of the ten districts (Kuduru and Igu) were randomly selected from Bwari using a table of random number technique. Three districts (Rubuchi, Gwagwalada and Gudunkarya) were also selected from the fifteenth district of Kuje giving a total of five districts. This selection was based on the intensity and concentration of farming activities particularly cassava production in the study area.

In the third stage, assigned value number of random selection method was employed to select two villages from Kuduru district (Gutau and Kuduru), three villages from Igu (Igu, Panunike and Tokolo), two villages from Rubochi (Rubochi and Kujekwa), two villages from Gwargwada (Gwargwada and Gidan Bawa) and oe village from Gudunkarya. In the forth stage, the list of farm villages and households from ward councilors revealed that a total number of registered farmers in these five districts were one thousand, two hundred (1200). This formed the sample frame for the study. In the fifth stage, one hundred and twenty (120) of the respondents that is, 10% of this

population was randomly taken because the farmers in the study area were homogeneous in their mode of operations.

Table 1: showing distribution of respondents in the study area

Area Council/Villages	Number of farmers (sample frame)	Number of respondents (10%)
Bwari Area Council		
Gutau	120	12
Kuduru	100	10
Igu	96	10
Panunike	125	13
Tokolo	136	13
Kuje Area Council		
Gwargwada	115	12
Gidan Bawa	144	14
Rubochi	130	13
Kujekwa	110	11
Gudunkarya	124	12
Total	**1,200**	**120**

3.3 **Data Collection**

Both primary and secondary information were used in the study. The primary data were collected through the use of structured questionnaire and was administered to the respondents by well trained enumerators. These helped in collecting data on the socio-economic, institutional and technological characteristics of the respondents. Interview method, informal observation and pictorial information were also gathered more appropriately as means to elicit adequate information on the study area.

Secondary information was obtained from agricultural journals, publications, books on agricultural activities, seminar papers and meeting proceedings. The internet was also explored for relevant information.

3.4 Analytical Tools

Descriptive statistics was used to analyze and interpret the data collected. This involved the measures of central tendency such as mean, frequency distribution, tables and percentages, to determine the socio-economic, institutional and technological characteristics and the level of adoption of the different improved packages by farmers. It also helped to identify the different sources of information through which farmers learned about the improved cassava production practices and the general constraints faced by farmers on adoption of recommended cassava production practices. Multiple regression analysis was explored to determine the factors influencing the adoption of recommended cassava production practices by farmers and Z-statistic was used to examine the effect of adoption of recommended cassava production practices on income and yield of the respondents.

The regression analysis is useful in estimating the contributions of each variable to the dependent variable to determine the best variable predictive of adoption by farmers and effects (Olayinde and Heady, 1982). Linear functional form was used to identify the factors that determine the adoption of the improved cassava technology and the model is specified as follows:

The explicit Linear functional form is expressed thus: $Y = a + cx$----------(1)

Where Y= output

X= variable inputs

The explicit form is expressed thus:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + b_9X_9 + b_{10}X_{10} + b_{11}X_{11} + b_{12}X_{12} + b_{13}X_{13} + e.$$----------(2)

Where:

Y = adoption (measured as the number of recommended cassava production practices adopted by the farmer out of eight practices).

X_1 = Farmers' age (years)

X_2 = Marital status (single = 1, married = 0)

X_3 = Level of education (Number of years in formal schooling)

X_4 = Household size (number in household)

X_5 = Farm size (hectares)

X_6 = Farming experience (years in cassava production)

X_7 = Credit need in 2009 – 2011 (actual amount received ₦)

X_8 = Information source (number of sources used)

X_9 = Membership of association (years of membership of co-operative associations)

X_{10} = Extension contact (number of visits in 2010 – 2011)

X_{11} = Relative advantage index (using likert-type scale of five point score: strongly agree = 5, agree = 4, undecided = 3, disagree = 2, strongly disagree = 1)

X_{12} = Compatibility index: (using likert-type scale of five point score: strongly agree = 5, agree = 4, undecided = 3, disagree = 2, strongly disagree = 1)

X_{13} = Complexity index: (using likert-type scale of five point score: strongly agree = 5, agree = 4, undecided = 3, disagree = 2, strongly disagree = 1)

$b_1 – b_{13}$ = Regression coefficients

a = constant

e = error term

Z-Statistic

The z-test model was used to compare the differences in yield and income of the farmers before and after adoption of recommended practices. This was used to achieve objective five of the study.

$$z = \frac{|\bar{X} - \mu|}{S\bar{X}}$$ ----------(3)

Where Z = calculated Z value

$\bar{X}$ = Mean of the sample

$S\bar{X}$ = Standard error of the mean

$$S = \sqrt{\frac{\sum(x_1 - \bar{x})^2}{n-1}}$$ ----------(4)

Where x_1 = individual observation

$\bar{x}$ = mean of the distribution

n = sample size

3.5 Operational Definitions and Measurement Variables

3.5.1 Independent variables

These are also called predictor variables and those that were used in this study were age, marital status, level of education, farm size, family size, farming experience accessibility to credit and information sources. Others were membership of association, extension contact and accessibility to technology. It is expected that these variables will exert influence on the adoption of the chosen technologies.

i. Socio-economic Characteristics

a. Age: The ability to learn fast and decide on certain key issues and act favourably to certain information depends on age of the individual. Young people understand faster than old people but older people have better ways of perception and think

deeply before acting. Age of the respondent was measured by the actual years the individual has lived as given by him/her.

b. Marital status: This is a condition or a state of being married or unmarried as indicated by the respondent. This was measured by score. Single = 1, Married = 0.

c. Level of Education: This is the number of years a respondent has spent schooling. Rogers and Shoemaker (1977), stressed that education is not only an important determinant of knowledge of an innovation but also an instrument for correct use of innovation for profitability. Level of education was measured in terms of the number of years of formal schooling. No formal education = 0, primary education = 6, junior secondary education =9, senior secondary education = 12, Diploma/NCE= 16 and Degree=20

d. Size of household: the size of household is an important factor in traditional agriculture because it influences to a large extent the supply of labour for immediate farm employment (Akinyemi, 1998). This was measured based on the number of people in a household.

e. Farm size: It was given as estimated total area of land in hectares cultivated by a respondent.

f. Farming experience: This refers to the number of years that a respondent has actively involved in farming operation. This was measured in years.

ii. Institutional characteristics

g. Credit need: This is the access to formal sources of credit by cassava farmers for the purpose of farming. According to Abe (1981), agricultural credit covers all loan and advances granted to farmers to finance and serve other production activities related to agriculture. This was measured in Naira as credit obtained.

h. Information sources: These are the various sources through which the respondents

i. received information about recommended cassava production practices. Effective information dissemination is very crucial in the smooth running of an enterprise (Adegeye, 1989). The source where a farmer can obtain knowledge about activities and the service it provides is important in adoption process. The source of information could be through radio, television, extension publications, newspapers and journals. This was measured by the total number of information sources the respondents used.

i. Membership of associations: In this study, it was measured by the total number of years the respondent claimed to have belonged to associations as at the time the study was conducted.

j. Extension contact: This is the frequency of visits by extension workers to the farmer. This was measured by the number of visits the farmers received in 2010 farming season. It was measured thus: No any contact = 0, once in a year = 1, twice in a year = 2, thrice in a year = 3 and four times in a year= 4

iii. Technological Attributes

k. Relative advantage: This refers to the degree to which the recommended improved technology for cassava production is seen as superior to the one it is meant to replace. This was measured using five point score as strongly agree = 5, agree = 4, undecided = 3, disagree = 2 and strongly disagree = 1.

l. Compatibility: This is the degree to which a technology is perceived as consistence with the existing values, past experience and needs of the farmers. A technology that is compatible will be adopted more rapidly than the one that is incompatible. This was measured using five point score as strongly agree = 5, agree = 4, undecided = 3, disagree = 2 and strongly disagree = 1.

m. Complexity: It is the degree to which a technology is perceived as difficult to understand and use. Some technologies are easily understand by farmers while others are more completed. A technology that is easy to understand will tend to be more readily adopted than the complex ones. This was measured using five point score as strongly agree = 5, agree = 4, undecided = 3, disagree = 2 and strongly disagree = 1.

3.5.2 Dependent variable (Y)

a. Adoption: It is regarded as decision of a farmer to make use of recommended cassava production practices on continuous and large scale basis (Akpoko, 2001). In this study, adoption refers to the use of recommended cassava production practices which constitute the dependent variable.

Adoption was measured by allotting a score to each technology a farmer adopts. There were eight recommended practices identified for this study. These are as follows: (i) Planting material (Healthy stem cutting with 4 – 5 nodes) (ii) Planting time (April and June, then August or September for zones with bimodal rainfall pattern) (iii) Methods of planting (planting on ridges at an angle) (iv) Planting depths (5cm -10cm) (v) plant spacing (1m x 1m) (vi) fertilizer application (NPK 15:15:15, 4 – 8 bags per hectare base on the level of soil fertility) (vii) weed control method (chemical weed control: a. pre-emergence herbicide; Alachlor (Lasso) at 300ml/CP15 knapsack pump,; b. Selective post – emergence herbicide; Round-up at 4-5 litres per hectare.) (viii) harvesting method (Mechanical: combine harvesters). The minimum score is 1 while the maximum score is 8. The number of technology adopted by a farmer formed a score. The adoption score for each farmer was calculated by summing up the number of practices the respondent adopted.

i. Planting material (Healthy stem cutting with 4 – 5 nodes).
ii. Planting time (April and June, then August or September).
iii. Methods of planting (planting on ridges at an angle).
iv. Planting depth – refers to the depth by which cassava stem cutting are being planted and is measured in centimeters. The recommended planting depth is 5cm-10cm.
v. Plant spacing – refers to planting of cassava stems according to the recommended (1m x 1m) spacing and is measured in centimeters.
vi. Fertilizer application – is the application of recommended dosage application (NPK 15:15:15, 4 – 8 bags per hectare base on the fertility level of the soil) or quantity fertilizer and is measured in kg/ha.
vii. Weed control method – is the act of controlling the growth of weed which is

measured by score. Manual – 0, Chemical – 1

viii. Harvesting method is the method adopted by the farmer to harvest cassava tubers and is measured by score.

Manual – 0, Mechanical - 1

b. Effect:

i. Increased Yield: In this study, yield is referred to as the output per unit area of production. Yield was measured in kg/ha.

ii. Farm Income: It is referred to as the total amount of money accruable to the farmer from the sales of both the cassava tubers and the cassava stem cuttings within the period of the study. Farm income was measured in Naira. (N)

iii. Level of Living: Is the level of material comfort enjoyed by farmers as a result of adopting recommended cassava production practices. According to Ekong (2003), level of living is generally used to describe the quantity and quality of goods a services consumed by an individual and his household members and also the possession of material things. Study have show that level of living is the sustainable access to resources to meet basic need such as adequate food supply, portable drinking water, good health care facilities, educational opportunities, housing and leisure time for individual participation in social functions. Level of living was measured by ownership of material things such; Cars, Buses/pickups, Motorcycles, Bicycles, Grindings Machines, Farm equipment, livestock and House utensils possession bought with money and adopted technology and converted into monetary value to serves as an index for level of living for an individual respondent.

Chapter 4

RESULTS AND DISCUSSION

This chapter deals with the presentation and discussion of the result of the study. It focuses on the findings related to the objectives of the study. The first objective of the study was to describe the socio-economic characteristics of cassava farmers.

4.1 Farmers' Socio-economic Characteristics

4.1.1 Sex of respondents

Objective one of the study was to describe the socio-economic characteristics of cassava farmers in the study area. Result presented in Table 2 reveal that 86.7% of the respondents were males while 13.3% were females. Oladele (2003), opined that gender pose no barrier to active involvement in farming activities. However, Yahaya (2007), observed that it is generally believed that males are often more energetic and could readily avail themselves for energy demanding tasks especially such as farming activities. The small proportion 13.3% of the female cassava farmers in the study area could be attributed to the fact that women are generally known to be nation-builders whose activities go beyond farming business to other activities such as petty trading and other social responsibilities.

4.1.2 Age of respondents

The age of the respondents was investigated in order to find out the age group mostly involved in cassava production. Findings revealed that three age categories of the respondents were identified namely; the young age, the middle age and the old age. The result in Table 2 reveals that 28% of the respondents were young farmers with ages

between 20-29 years. The Table also showed that 68% of the respondents fall within the middle age category with the age bracket of 30-49 years. The last category of farmers was the old age represented by 4% of the respondents. The ages between 20 – 50 years was the most active years of the respondents in cassava production. Age is very important in agricultural production and livelihood activities. Aghamu (1993), opined that age, in correlation with farming experience, has a significant influence on the decision making process of farmers with respect to risk aversion, adoption of recommended production practices and other production related decisions. This finding is in line with that of Ekong (2000), who reported that most of the respondents involved in active farming activities were below 50 years. Similarly, Yahaya (2002), validated this assertion when he reported that farmers between the ages of 20 – 50 years are the most active age group in agricultural production.

The mean age of the respondents was 42 years. This implies that young and active cassava farmers constitute the majority and provide the needed labour force for cassava production in the study area. Their relatively young age may make them more receptive to innovations unlike of the older ones who usually expect the maintenance of status quo.

4.1.3 Marital status

The result in Table 2 show that 85% of the respondents indicated that they were married, while the remaining 15% were single. The implication is that the married farmers may tend to have larger family members to feed than the single ones. It also suggests available labour force from the married respondents. There is however the danger of land fragmentation due to land acquisition by inheritance. The finding is in

line with Ojo (2009), who reported that married household farmers whose major occupation is farming achieve greater success in farming business than the single household farmers.

4.1.4 Farm size

The size of the farm cultivated is a function of land available to the farmer for use and also the potential of the land (Teressa, 1994). The result in Table 2 reveals that 80% of the respondents cultivated farm size of between 1-2.9 hectares. The findings also showed that 15% of the respondents cultivated a farm size of between 3-4.9 hectares, while 5% of the respondents cultivated a farms size greater than 5 hectares. The mean farm size cultivated by the respondents was 2.8 hectares. According to Ojuekaiye's (2001), classification of farm size of 0.1 - 5.9 hectares as small farms implies in this study that all the respondents were small scale farmers. Small farm size may affect the quantities of cassava tubers produced which in turn affect the food security status of the farmers.

4.1.5 Household size

Clark and Akinbode (1986), defined household size as the number of people living and eating from the same pot. The size and composition of the household is an important variable in agricultural production because it suggest available labour force or pressure on land. Findings indicated that 33.3% of the respondents had 1 – 5 people in their families, 55% and 10% had 6 – 10 people and 11 – 15 people respectively. The result further revealed that 1.7% of the respondent had more than 15 people in their families (Table 2). The average household size of the respondent was 8 people. This finding agrees with that of Nweke (1989), who reported that the average household size in

Africa is between 8 and 9 people in a household. The large number in a household can be a motivation to the adoption of recommended cassava production practices because of the possibility of the respondent to provide the needed family labour for cassava production.

4.1.6 Farming experience

Experience is gained with number of years spent on farming (Kassie, 2009). Since the major occupation of the respondents was farming, the length of time in farming can be linked with the experiences of the farmers. As the years in cassava farming increase among the farmers, their years of experience also increase. On the variable relating to farming experience, Table 2 indicates that 55.8% of the respondents had been in cassava farming for less than 10 years. 24.2% and 12.5% of the respondents reported to have been in cassava farming between 10 – 20 years and 21 – 30 years respectively. Only 7.5% of the respondents revealed to have been in cassava production between 31 – 40 years.

4.1.7 Educational status

Education is generally believed to affect farmers ability to view and comprehend ways of doing things to improve their living conditions. Data in Table 2 reveal that 19.2% of the respondents had no formal education while 48.3%, 28.3% and 4.2% had primary, secondary and tertiary education respectively. The implication of education in agricultural production according to Anon (1987), is that, education is one of the socio – economic variable that greatly affect farmers decision to accept and adopt modern farm technologies thereby sustaining a virile farming population. Since a sum total (80.83%) of the respondents had formal education, their formal education status is likely to

translate and enhance adoption of recommended cassava production practices in both Bwari and Kuje Area Council of Abuja.

Table 2: Distribution of respondents by their socio – economic characteristics (n = 120)

Variable	Freq.	Percentage	Mean	Standard Deviation	Standard Error
Sex					
Male	104	86.67			
Female	16	13.33		5.68	0.232
Age					
20 – 29	33	27.50			
30 – 49	81	67.50			
> 50	06	5.00	35	4.97	0.22
Marital Status					
Married	102	85.00			
Single	18	15.00		5.42	0.23
Farm size					
1.0 – 2.9	97	80.83			
3.0 – 4.9	18	15.00			
> 5.0	05	4.17	3.5	0.2	0.01
Household size					
1 – 5	40	33.33			
6 – 10	66	55.00			
> 15	05	1.67	8	0.95	0.8
Farming experience					
< 10	67	55.83			
10 – 20	29	24.17			
21 – 30	15	12.50			
31 – 40	09	7.50	25	2.04	0.102
Level of Education					
No. formal education	23	19.17			
Primary education	58	48.33			
Secondary education	34	28.33		3.51	
Tertiary education	05	4.17			0.212
Total	**120**	**100**			

Methods of land ownership

Findings revealed that the respondents acquired land for cassava production through different means. The result in figure 3 shows that the predominant method of land acquisition is through inheritance as indicated by 55% of the respondents. This was followed by leasehold with 28% of the respondents. The result is in cognizance with

Alabi (2003), who found that the most widely and genuine system of land ownership in West Africa is by inheritance. He observed that the secured tenured land arrangement (inheritance, purchase and gift) placed land users at a most disadvantage state because land owners would neither use nor release land to farmers who may want to use them.

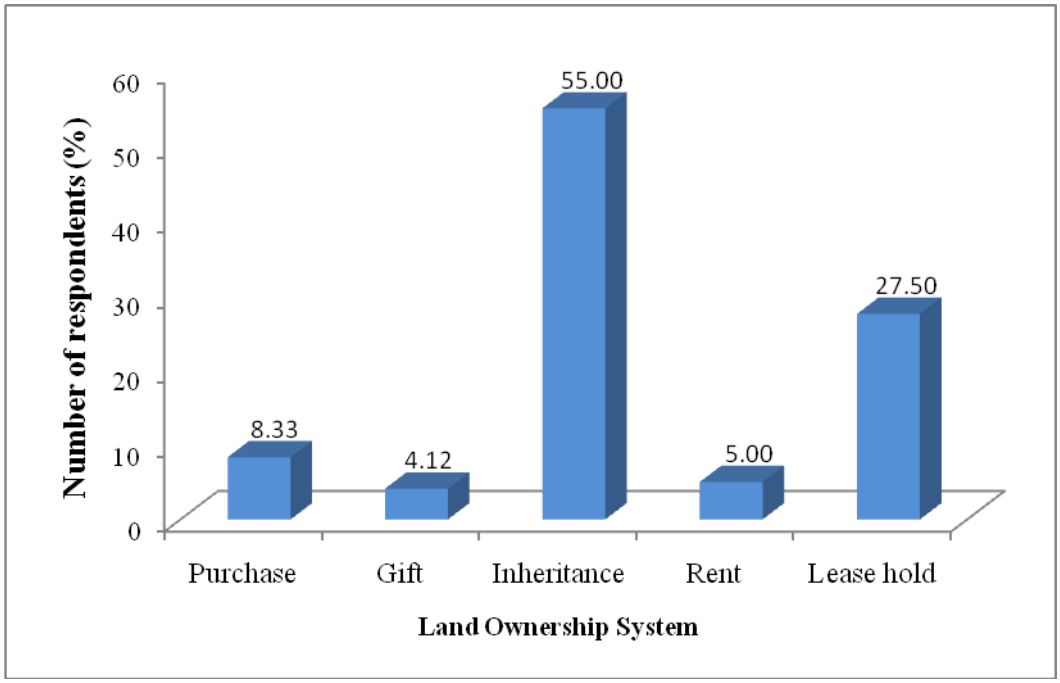


Figure 3: Bar chart distribution of respondents according to land ownership system

According to Fabyans (1999), the method of ownership and control of land is significant in a study because the distribution of resources particularly agricultural land influence farmers' adoption of recommended production practices. In this study land was more of family asset as majority of the respondents owned land through inheritance. The right to use land in the study area was flexible as members of the communities were willing to lease out their land to other members for farming activities. It also suggests that there was group cohesiveness among members of the different communities in the study area.

4.2 Institutional Variables

4.2.1 Extension contact with farmers

Result presented in Table 3 indicated that 87% of the respondents had no contacts with extension agents during the growing season. The finding is in contrast with that of Ezedinma (1989), who found that 61% of his farmers had between 3-4 contacts with extension agents in a growing season. The inference of extension contact on the study is that frequent contacts between farmers and extension agents create more awareness and reduces difficulty in the adoption process. This implies that there was poor extension visits in the study area compared with ideal numbers of visits (26 numbers of visits per annum). According to Training and Visit (T & V) extension system, an extension agent should meet with farmers at least forth-nightly. This suggests the reason for low adoption of recommended cassava production practices by farmers in study area.

4.2.2 Membership of association

Findings revealed that 69% of the respondents were not members of any cooperative association. Only 30.83% of the respondents were in different cooperatives associations. It was also found that cassava farmer did not spend the same numbers of years in such cooperatives organization. It is expected that the respondents with high number of years in cooperatives associations would influences their farming activities positively.

Table 3: Distribution of the respondents according to extension contact and membership of association

Variable	Frequency	Mean	Percentage
Extension contact			
Yes	16		13.33
No	104		86.67
Number of visits in a year (n=16)			
Once	12		10.00
Twice	03		2.05
Thrice	01	5.00	0.83
Membership of cooperative association			
Yes	37		30.83
No	83		69.17
Years of membership of association (n=37)			
1 – 5	23		19.17
6 – 10	10		10.33
11 – 15	04	12.00	3.33

4.2.3 Credit need

Capital is an important factor of production. Small-scale farmers residing in rural communities are known to be at disadvantage in terms of getting free and direct access to many sources of credit facilities to meet their capital need in farming (Dorosh,1988).

Result presented in Table 4 indicated that only 37 % of the respondents had access to credit facilities for adoption of recommended cassava production practices. Findings also revealed that the mean credit need of the respondents was N88,750.00. Among the credit beneficiaries 55 % and 25 % of the respondents obtained credit cash in the range of N10,000 – N30,000 and N31,000 – N50,000 respectively. Only 11 % of the respondents received cash of more than N50,000.

The low percentage of credit beneficiaries in the study was in agreement with David (1989), who noted that small-scale farmers are not always able to obtain formal credit

due to lengthy and cumbersome administrative procedures, high interest rate and stringent conditions which are too difficult to fulfill. He maintained that there was also lop side distribution of the little that was made available in favor of large-scale producers that can provide collateral security. Anazodo (1986), supported this assertion when he reported that the low acquisition of credit loans by farmers was stressed by the fact that agricultural production is seasonal and the corresponding income realization is such that production takes place long before income is generated. He observed that most of the farmers (75%) sell their agricultural produce at local markets or farm-gate markets without making substantial profit that would aid them expand their production base in the next cropping season. In agreement with the above authors, Yahaya (2003), found that large scale producers satisfy all the necessary conditions provided for loan procurement and obtain agricultural loans which are later diverted for non-agricultural purposes at the expense of small-scale farmers who can only produce for domestic consumption.

Table 4: Distribution of respondents according to access to credit, credit need and amount of credit received

Variable	Mean	Frequency	Percentage
Credit need of respondent(₦)			
20,000 – 50,000.00	35,000.00	25	20.83
51,000 – 100,000.00	75,500.00	80	66.67
101,000 – 120,000.00	110,500.00	10	8.33
121,000 – 150,000.00	135,500.00	05	4.17
Average credit need of respondents ₦88,750.00			
Accessibility to credit			
Accessible		44	36.67
Not accessible		76	63.33
Amount of credit received (n=44) ₦			
< 10,000.00	10,000.00	04	9.08
10,000.00-30,000.00	20,000.00	24	54.55
31,000.00 – 50,000.00	40,500.00	11	25.00
51,000.00 – 100,000.00	75,500.00	03	6.82
101,000.00 – 150,000.00	125,500.00	02	4.55
Average credit received = ₦54,300.00			

4.2.4 Sources of information on recommended cassava production practices

The second objective was to examine the different sources of information through which farmers learn about recommended cassava production Practices. Rural farmers have various ways of obtaining information required for agricultural practices. Before an innovation can be adopted, farmers must know, understand and act on this information. Investigation into the various sources of information on recommended cassava production practices is thus crucial to adoption process (Fadiji, 2000). This study sought to know the source and degree or reliability of information on recommended cassava production practices among the respondents. Result as presented in Figure 4 indicated that 57.9% of the respondents' source of information was the radio, followed by television as indicated by 25% of the respondents. This finding is in consonance with Fadiji (2000), who reported that radio as channel of communication

was recognized as the most accessible and potentially useful means of disseminating information. Radio has a high capacity for creating awareness of innovations and for stimulating farmers to become more actively involved. Other sources of information of the respondents such as extension agent and friends/neighbours, had 4% and 7.9% respectively. The last sources of information were the opinion leaders/village heads, (1.2%), printed media and research institutes with 2% in each case of the respondent.

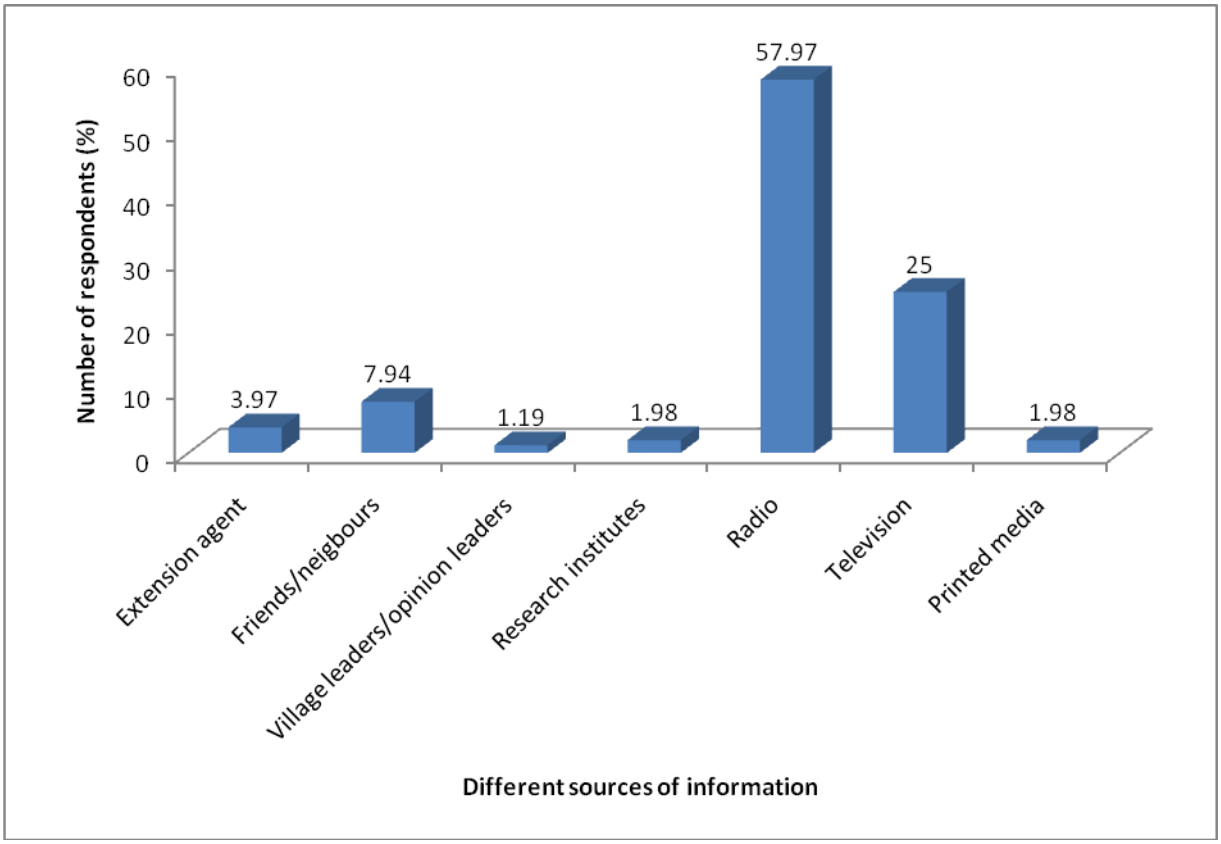
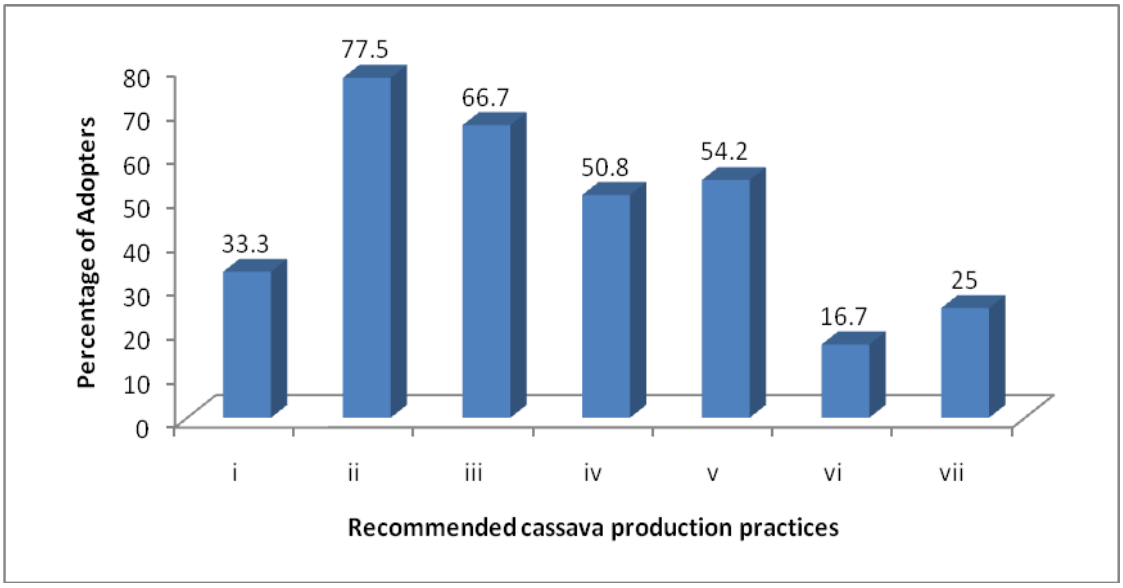


Figure 4: Distribution of the respondents according to sources of information on recommended cassava production practices

4.3 Levels of Adoption of Recommended Cassava Production Practices

The third objective was to access the levels of adoption of the recommended cassava production practices. Result in Figure 5 show the bar-chart on the rates of adoption of the recommended cassava production practices by the respondents. Findings reveal that

33.3% of the respondents adopted planting of healthy cassava stem cutting with 4 – 5 nodes, 77.5% adopted planting time – April and June, then August or September for zones with bimodal rainfall pattern while 66.7% adopted planting on ridges at an angle, 54.2% adopted plant spacing of 1m x 1m for sole cropping and 50.5% adopted planting depth of 5cm – 10cm respectively. The least of the recommended cassava production practices with low adoption level were herbicides application with 25.0% of the respondents and fertilizer application with 16.7% of the respondents. The recommended cassava harvester (lifter) recorded zero adoption level. The result was found to be relevant with that of Okunade (2006), who obtained a zero adoption rates of mechanical grater due to the high cost of the machine. Also, the result had similarities with that of Teresa (1997), found that the high cost of farm inputs like tractor, fertilizer and herbicides were influential to adoption of striga resistance maize technology on large scale basis. The adoption of recommended planting material and method of planting were relatively high, this implies that farmers in the study area attached relative advantage to the technologies in adoption of recommended cassava production practices. On the other hand, adoption of recommended fertilizer application rate was relatively low which may be attributed to the fact that the technology requires a knowledge base in the application of fertilizer rate. It was also found that none of the respondents adopted cassava lifters, this may be because of the cost and the technical knowledge required in the use of the technology.



Legend

i. Recommended planting material (healthy cassava stem cutting with 4 – 5 nodes).
ii. Recommended planting time.
iii. Recommended method of planting
iv. Recommended planting depth
v. Recommended plant spacing
vi. Recommended fertilizer rate
vii. Weeding (herbicide application)
viii. Harvesting (cassava lifters)

Figure 5: Bar chart distribution of respondents according to level of adoption

4.4 Socio- economic, Institutional and Technological Factors Influencing the Adoption of Recommended Cassava Production Practices by Farmers

The fourth objective was to determine socio- economic, institutional and technological factors influencing the adoption of recommended cassava production practices by farmers.

Multiple regression analysis was used to achieve this objective. Based on the values of the standard error estimates, the number of significant variables and conformity of the sign of the coefficient of independent variables, the result of linear was chosen and used for discussion.

Hypothesis 1:

It was hypothesized that there is no significant influence between farmers' socio-economic characteristics and adoption of recommended cassava production practices.

The socio-economic characteristic were; sex, age, marital status, farm-size, household-size, farming experiences and education. Result as presented in Table 5 show that education was found to be positively and significantly influential to adoption of recommended cassava practices with regression coefficient of 0.173 at 5% level of probability. This implies that education was positively related to adoption of the recommended cassava production practices. The implication of this is that, adoption of the recommended cassava production practices would increase with attainment of higher levels of education by the farmers. The result was consistent with the report of Teressa (1997) who noted that the higher the level of education a farmer attains, the better the chances of understanding and adoption of a technology. However, the result disagreed with Cramt and Nelson (1998) who found education not to be important in explaining adoption. They explained that whether an individual has formal education or not, it has no relationship with his or her adoption behaviour.

The coefficient (0.325), obtained for farm size was positive and significant at 1 % level of probability. This suggests that the larger the farm size of the farmers the greater the influence on adoption of the recommended cassava production practices. It means that farmers with large farms adopt the recommended production practices at a faster rate compared to those with smaller farms. Age of the respondents was not significantly influential on adoption of the recommended cassava production practices. This variable was negative which implies that the adoption of the recommended cassava production practice would decrease with an increase in the age of the farmer. The null hypothesis was accepted as there was no strong significant influence between the socio-economic and adoption. That is, only two (education and farm-size) out six socio-economic characteristics had significant influence on adoption.

Table 5: Effects of socio-economic, institutional and technological variables on adoption

Variable	Coefficient	Standard error	T - value
Intercept	4.213***	1.510	2.790
Socio – economic variables			
Age	-0.025NS	0.027	-0.945
Marital status	-0.193NS	0.423	-0.455
Education	0.173**	0.076	2.291
Household size	0.035NS	0.057	0.616
Farming experience	0.063	0.134	0.468
Farm size	0.325***	0.042	9.772
Institutional variables			
Credit need	0.772***	0.859	4.390
Sources of information	0.024***	0.038	4.390
Membership of association	0.062**	0.035	1.815
Extension contact	0.315***	0.024	13.368
Technological variables			
Relative advantage	0.012	0.043	0.272
Complexity	0.165**	0.080	2.063
Compatibility	0.062	0.087	0.721

***P<0.01; **P<0.05
NS = Not significant
R = 0.75,
R^2 = 0.60,
F value = 5.77***

Hypothesis 2:

It was hypothesized that institutional factors have no significant influence on adoption of recommended cassava production practices. The institutional variables considered were; credit need, source of information, membership of cooperative association and extension contact. Results in Table 5 revealed that source of information was found to be positively and significantly influential to adoption of recommended cassava production practices with regression coefficient 0.024 at 1% level of probability. This means that the decision of the farmers to adopt the recommended cassava production practices in the study area was influenced by their access to information. Information can create awareness on the possible benefits of the recommended practices which in turn motivates the farmers to use the recommended practices (Fadiji, 2000). The coefficient (0.062) for membership of associations was positive and significant at 5%

level of probability. Membership of association can provide means of interaction with other farmers and this can also provide avenue or forum through which innovation can be diffused among farmers. According to Oboh *et al.* (2006), membership of associations was found to be a strong determinant of adoption of cassava technologies in Benue State. The coefficient (0.315), for contact with extension agents was positive and significant at 1% level of probability. This suggests that adoption of recommended cassava production practices by farmers in the study area increased as contact with the extension agents and farmers become more frequent.

Access to credit had a positive coefficient (0.772) and also significant at 1% level of probability. The positive coefficient suggests that the adoption of recommended cassava production practices increases as farmers have sufficient capital for the procurement of farm inputs. Access to credit could therefore, increase the adoption of improved practices of the cassava farmers. Therefore, the null hypothesis was rejected because all the institutional factors were positively and significantly influential on adoption.

Hypothesis 3:

It was hypothesized that technological attributes have no significant influence on adoption of recommended cassava production practices: The technological attributes considered in the study were Relative advantage, Complexity and Compatibility. The coefficient (0.165), obtained for complexity was found to be positive and significant at 5% level of probability. The coefficients for both Relative Advantage and Compatibility (0.012 and 0.062) were all positive even though they had no influence on adoption. This

suggests that the more superior a technology to the existing one to the farmer, the more its influence on adoption.

Therefore, the null hypothesis was accepted because two out of the three variables had no significant influence on adoption.

4.5 Effect of adoption of recommended cassava production practices on yield and income using the z-analysis

4.5.1 Effect on yield and income

The fifth objective was to examine the effect of adoption of recommended cassava production practices on yield and income.

Hypothesis 4:

It was hypothesized that adoption of recommended cassava production practices has no effect on yield and income. The results in Table 6 showed the effect of adoption on the output and income of the respondents before and after the adoption of recommended cassava practices. The average yield was estimated to be 3832.4t/ha before the adoption of recommended cassava practices and 6387.33t/ha after the adoption with a differential percentage of 67%. The minimum yield before and after the adoption of recommended cassava practices were 1800 and 3000t/ha respectively. The maximum yield before and after the adoption of recommended practices were 9330 and 15550t/ha respectively. The z- calculated was 21.25 above the z-critical of 1.96 at 1% level of probability. This implies that there was significant difference between the yield of cassava farmers before and after the adoption of recommended cassava production practices. The results revealed that the yield of farmers after adoption of the cassava recommended practices was higher than yield before adoption. The result further showed that, the average

income was N464641.67 before the adoption of recommended cassava practices and N714833.00 after the adoption of recommended cassava practices. The minimum income before and after the adoption of cassava recommended practices were N260,000 and N400,000 respectively. The maximum income before and after the adoption of recommended practices were N1222000 and N1880000 and the differential mean percentage was 54%. The z- calculated was 5.38 and this was significant at 1% level of probability. These findings revealed that the income of farmers after adoption of the cassava recommended practices was higher than income before adoption.

The result was consistent with the report of Anazodo (1986), who reported that adoption of improved farm practices resulted in an increase in total production by improving yields and income. The mean percentages for both yield and income were higher and this implied that the adoption of cassava recommended practices had significant influence on the yield and income of the cassava farmers. Therefore the null hypothesis was rejected because adoption of recommended cassava production practices had influence on both yield and income of the farmers.

Table 6: Effect of the adoption of improved cassava recommended practices on output and income

Variable	Before	After	Difference	Differential %(2011)
Output (t/ha)				
Mean	3832.4	6387.33	2554.93	67%
Maximum	9330	15550	6220	
Minimum	1800	3000	1200	
Standard deviation	180.31	300.51	120.2	
z- calculated	21.25***			
z- critical	1.96			
Income (Naira)				
Mean	464,641.67	714,833.33	250191.66	54%
Maximum	1,222,000.00	1,880,000.00	658000	
Minimum	260,000.00	400,000.00	140000	
Standard Deviation	199,622	307,111.9	107489.9	
10,748,900.00				
z- calculated	5.38***			
z- critical	1.96			

*** P<0.01

4.5.2. Level of living

Findings in Table 7 revealed that there was no increase in the amount of money spent on cookers after adoption of recommended production practices. The results indicated that there was increased in the amount of money spent on grinding machines, livestock, televisions, radios and telephones. The amount of money spent on motorcycles, cars, sprayers, houses, cushion chairs and generators after adoption doubled the amount spent on items above. However, the money spent on the purchase of bicycles decreased after adoption. This implied that the farmers had money that could afford them motorcycles for their comfort. The purchase of most household properties after the adoption of the recommended practices improved greatly. This showed changes in the respondents' level of living. According to Isah (2009), money generated from adoption of recommended rice practices was use to purchase more household properties by the respondent is in agreement with the findings above.

Table 7: Distribution of money spent on household properties by respondent before and after adoption

Household Properties	Average amount spent before adoption	Average amount spent after adoption	Difference	Differential %
Bicycles	3,166.67	2,375.00	-791.67	-33.33
Motor cycles	7,500.00	23,333.33	15,833.33	211.11
Cars	8,750.00	24,500.00	15,750.00	180.00
Grinding machines	2,500.00	4,950.00	2,450.00	98.00
Livestock	7,950.00	14,400.00	6,450.00	81.13
Sprayers	800.00	2,933.33	2,133.33	266.66
Houses	11,666.67	45,500.00	33,833.33	290.00
Cushion chairs	1,500.00	4,216.67	2,716.67	181.11
Cookers	500.00	500.00	0	0
Televisions	3,800.00	5,366.67	1,566.67	41.22
Radios	1,470.00	7,908.33	6,792.67	85.87
Generators	825.00	2,933.33	2,108.33	255.55
Telephone sets	2,650.00	3,266.67	616.67	23.27
Total	**52,399.17**	**135,745.00**	**83,345.83**	

4.6 Constraints to Adoption of Recommended Cassava Production Practices by Farmers

The sixth objective of the study was to identify the major constraints faced by farmers in the adoption of recommended cassava production practices. The result presented in Table 8 showed the ranking of the constraints faced by the respondents on adoption of recommended cassava production practices. Scarcity of farmlands with 77.50% of the respondents ranked first constraint; followed by insufficient extension agents with 27.50% of the respondents. Insufficient capital with 15.83% of the respondents ranked third and on the forth position was high cost of farm inputs with 8.33% of the respondents. Lack of access roads and storage/marketing problems ranked firth and sixth with 7.50% of the respondents each. The problem cassava pests/diseases and poor information network ranked seventh and eighth with 6.67% of the respondents respectively.

Table 8: General constraints faced by farmers on adoption of recommended cassava production practices

Constraints	**Frequency**	**Percentage**	**Ranking**
Limited scale and uneven distribution	93	77.50	1
Insufficient extension agents	33	27.50	2
Insufficient capital	19	15.83	3
High cost of farm inputs and affordability	10	8.33	4
Lack of access roads	9	7.50	5
Processing, storage and marketing problems	9	7.50	6
Problems of root/tuber pests and diseases	8	6.67	7
Poor information network.	8	6.67	8

Chapter 5

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

The broad objective of the study was to identify the factors influencing adoption of recommended cassava production practices by farmers in Bwari and Kuje Area Councils of Abuja. A multi-stage sampling procedure was used in the study. Random sampling method was used to select ten villages from the study area. These villages were Gutau, Kuduru, Igu, Panunike, Tokolo, Gwargwada, Gidan-Bawa, Rubochi, Kujekwa and Gudunkarya. A sample size was 120 respondents which were randomly selected and data were collected from the farmers in 2011 from 2010 cropping season. Descriptive statistics, multiple regression analysis and z-statistic were used to analyze the data.

The first objective of the study was to describe the socio-economic characteristics of cassava farmers in the study area. Result in Table 2 revealed that 86% of the respondents were in their active age of between (20-49 years).The respondents had large household size with a mean household size of 8 people. Majority of the respondents were small-scale farmers with fragmented farm holdings. About 81% of the respondents had formal education and 85% of the respondents were married. About 63% of the respondents had no access to credit whereas the average credit needs of the respondents was N88,750.00. About 87% of the respondents had no contact with the extension agents in 2010 cropping season and only 31% 0f the respondents were in different cooperative associations

The second objective of the study was to examine the different sources of information through which the farmers learn about the recommended cassava production practices. Result in Figure 3 indicated that 58% of the farmers obtain information through radio which was followed by television with 25% of the respondents.

The third objective of the study was to access the levels of adoption of the recommended cassava production practices by farmers in the study area. Results as presented in Figure 5 indicated that recommended planting time had the highest adoption level with 78% of the respondents. This was followed by recommended planting method with 67% of the respondents. Adoption of recommended fertilizer application rates and herbicide application rates were relatively low with 25% and 17% of the respondents respectively. The recommended cassava harvester (lifter) recorded zero adoption level. This may be attributed to the high cost of the technology.

The forth objective was to determine the socio-economic, institutional and technological factors on adoption of recommended cassava production practices. The result of the multiple regression analysis was used to achieve this objective. Result in Table 5 revealed that the R value was 0.75 and the R^2 value was 0.60. Result further showed that seven out of the thirteen independent variables used in the model were significantly influential on adoption at 5% level of probability. These variables were; education, farm-size, credit need, extension contact, membership of cooperative association source of information and complexity. The result also indicated that the coefficients for age and marital status (-0.025 and -0.193) were all negative. This implies that adoption of recommended cassava production practices would decrease with and increase with age of respondent.

The fifth objective was to examine the effect of adoption of recommended production practices on yield and income of farmers. The z-statistic was used to achieved this objective. Result in Table 6 indicated that the minimum and maximum yields before and after adoption were 3832.4t/ha and 6387.3t/ha respectively. The differential percentage of yield was 67%. Similarly, the mean income of the farmers before and after adoption were N464,642.00 and N714,833.00 with a differential mean income of 54%. The table revealed that both the yield and income of farmers after adoption were higher than what was obtainable before the adoption of the recommended cassava production practices. This implies that a adoption of the recommended cassava production practices had influence on the yield and income of farmers.

The sixth of the objective was to indentify the constraints to adoption of the recommended cassava production practices. Table 7 showed the ranking of the constraints faced by farmers in adopting the recommended cassava production practices. The constraints were; Scarcity of farmland (1), Insufficient extension agents (2),Insufficient capital (3), High cost of farm inputs(4),Lack of access roads (5), Processing, storage and marketing problems (6), Problems of root/tuber pests and diseases(7), Poor information network(8).

5.2 Conclusions

The broad objective of this study was to identify the socio-economic, institutional and technological factors influencing the adoption of recommended cassava production practices by farmers in the study area. The results of the finding revealed that majority of the respondents were small skill farmers and most whom were not members of any cooperative associations. It also discovered in the study that there was poor extension

contact and the inference for this was that, there was no proper awareness created for the potential benefits of recommended cassava production practices among the farmers in the area.

The result supported the other alternative hypothesis of the study that settle socio-economic characteristic, institutional factors and technological attributes significantly the adoption of recommended cassava production practices. This implies that education, farm-size, credit need, information source, membership of cooperative association, extension contact and complexity were important factors to consider in the adoption of recommended cassava production practices by farmers in the study area. This suggests that any extension strategy for cassava farmers, aimed at high level of innovation adoption should consider the roles of these factors. The result also reveal the contribution of each independent variable to adoption of recommended cassava production practices with an R^2 value of 0.60 which implied that all the variable together, explained about 60% of the variability in adoption of recommended cassava production practices in the study area.

Result indicated that used of recommended planting time, recommended planting method, recommended planting depth and recommended plant spacing had the highest adoption level. This implied that these four technologies had a relative advantage to the farmers than the other technologies adopted. The result revealed that adoption of recommended cassava production practices increased the yield and income of the farmers. This implied that if the farmers appropriately adopt the recommended cassava production practices, there is the tendency of earning more money which will assist in

meeting up with the family needs and consequently, an improvement in their level of living.

Cassava farmers in the study area encountered scarcity of farmland and this suggests their inability ton expand the current level of cassava production. Inadequate funds was also noted as a limiting factor on adoption of recommended cassava production practices among the farmers. It means that the farmer did not have enough money to buy the necessary farm input as revealed in the zero adoption of cassava lifter by the farmers.

5.3 Recommendations

Based on the results of the study, the following recommendations were proffered as means to encourage the adoption of the recommended cassava production practices in the study area.

i. Radio was found as the main source of information therefore, ADPs should improve the adoption of recommended cassava practices through intensifying their promotional activities by allocating more air time to the radio farmer programme. Also, farmers should be encouraged to explore other available source of information such as television and active participation in the activities of co-operative associations for more awareness on the use of RCPPs.

ii. Findings revealed that extension services had a positive and significant influence on Adoption of Recommended Cassava Production Practices and majority of the farmers had no contact with extension agents in the 2010 cropping season. It was recommended that extension agents should be encouraged by way of providing

better remunerations in order to improve on their work in terms of extension coverage and facilitation skills on the right usage of the RCPPs.

iii. Results also indicated that majority of the respondents were not members of co-operative associations and membership of co-operative associations was positive and significant at 5% level of probability on adoption of recommended cassava production practices. Therefore, it was recommended that farmers should be encouraged by ADPs and the NGOs to organize themselves into cooperative associations on various farm inputs. This would ensure maximum benefits of higher adoption of recommended cassava production practices in the study area.

iv. Findings showed that many cassava farmers had no access to credit and those that had access to it were faced with the challenges of collateral and high interest rates. Therefore, it was recommended that the Central Bank of Nigeria should review policies on agricultural loans with the aim of enabling farmers obtain loans from commercial and agricultural banks with ease and at minimal interest rates. In addition, farmers should be advised to organize themselves into credit relieving societies to take care of their financial needs to augment their personal savings.

v. Findings revealed that the adoption of recommended fertilizer application rate, herbicide application rate and the use of cassava lifter were relatively low. This could be attributed to complex nature of the technologies to the farmers. Therefore, it was recommended that technology developers should develop technologies that are simple, cost effective and easily used by farmers. On the other hand, promoters of technology adoption should intensify efforts targeted at

improving service delivery and promoting the adoption of RCPPs by the farmers especially the technologies that recorded low levels of adoption.

vi. Results showed that adoption of RCPPs had positive and significant effects on yield and income of farmers, but there was low level of adoption of the technologies. This could be attributed to the high cost of the technologies. Hence it was recommended that the technologies should be made available to the farmers at the right time and at affordable prices by the agencies involved.

vii. Result also indicated that farmers' major constraint on adoption of recommended cassava production practices was limited scale and uneven distribution of farmlands. Hence, it was recommended that appropriate technologies that would suit the fragmented nature of farmland should be developed by research institutes.

REFERENCES

Adekoya, S. F. and Tologogbonse, E. B. (2005). Adoption and Diffusion of Innovations. In Adedoyin, F. S. (ed), Agricultural Extenstion in Nigeria, published by Agricultural and Rural Development Training Institute (ARMTI) Ilorin, Kwara State, Nigeria: 29-37.

Adeniji, O.B. (1995). The impact of mass media on adoption of agricultural innovation in Kaduna State. Unpublished M.Sc. Thesis, Department of Agricultural Economics and Rural Sociology, Ahmadu Bello University, Zaria.

Adeolu, B. A. (1990). The Economic of Cassava Production, Processing In Oyo North Area Of Oyo state, M.Sc Thesis, Department Of Agricultural Extension, Obafemi Awolowo University, Ile Ife, Osun State.

Adun, F.N. (1995). Economic Appraisal of Garri Processing Technology in Oyo and Osun States. Unpublished M.Phil. Thesis, Department of Agricultural Economics, University of Ibadan, Nigeria.

Agbamu, J.U. (1993). "Analysis of farmers' characteristics associated with adoption of soil management innovation in Ikorodu LGA of Lagos State". *The Nigerian Journal of Rural Extension and Development:* 1 (2): 57 – 67.

Agwu, A. E. and Anyaeche, C. L. (2007). Adoption of Improved Cassava Varieties in Six Rural Communities in Anambra State, Nigeria. *Journal of Biotechnology,* 6(2): 89-98.

Ajaiyi, A.R. (1996). An evaluation of the socio-economic impact of the Ondo State Ekiti-Akoko Agricultural Development project on the rural farmers. Unpublished Ph.D Dissertation, Department of Agricultural Extension, University of Nigeria Nsukka.

Akanya, B. A. (1989). Impact of Agricultural extension programme on farm production and standard of living of the farmers: A case study of Borno State. Unpublished M.Sc. Thesis. Ahmadu Bello University, Zaria, Nigeria.

Akoroda, M. O. Gebremeskei, T and Oyinola, A. E. (1989). "Impact of IITA cassava Varieties In Oyo State, Nigeria, 1975–1985" *Tropical Agriculture* 66(2): 113-120.

Akpoko, J. G. (2001). Factors Associated with Adoption of Recommended Poultry, Management Practices in Sabon-Gari and Giwa Local Government Area of Kaduna State. *The Nigerian Journal of Rural Extension*, 13(2): .130 – 140.

Alabi, O. O. and Alabi, O. A. (2003). Profit Maximization of Cassava Production Using Traditional Technology: Linear Programming Approach. *Savannah Journal of Science and Agriculture* 2:14.

Anazodo, U.G.N. (1986). "Agricultural Mechanization as A Catalyst For Rural Development". *Journal of Agricultural Mechanization in Asia, Africa and Latin America* 17(3): 47-50.

Anon, I. (1987). Modernization of Agriculture in Development Countries. *A Science Education Journal* 2(2): 16 – 18.

Anuebuwa, F.O. and Eluagu, E. U. (1982). "Cassava Mealybug/Green Spidermite Infestation and The Demand For Food Grains In Nigeria. A Case study of Anambra State". *In NAFPP National Cassava Workshop.* 6th Umudike, Nigeria. *Proceedings National Root Crops Research Institute,* National Cassava Centre: 123-133.

Atala, T.K. (1984). The Relationship of Socio-Economic factors in Agricultural Innovation and Utilization of Information services in Two Nigeria Villages; *Nigeria Journal of Agricultural Extension*: 2 (1 & 2): 1-10. November, 2004.

Atala, T.K. (1986), The Role and impact of extension agents in Kaduna state of Nigeria. Ph.D. Thesis, Ames, Iowa; Iowa State University, U.S.A

Asinobi, C. O. Ndimantang, B. and Nwajiuba, C. U. (2005). Cassava Production, Processing Trends and Constraints in Ohaji-Egbema Local Government Area Of Imo State. Available at: www.csus.edu/org/ccapcr/document/archires/2005/confrence proceeding: 1-16.

Bennet, C. F. (1990). Cooperative Extension Roles and Relationship for New Era Washington DC` National Technical Information Service: 28 –32. (http:/www.ifad.org/evaluation/publichtml/eksyst/doc/prj/region/pal/ghana/ghrtip.htm. 2/17/2006

Berry, S. S. (1993). Socio-economic Aspect of Cassava Cultivation And Use In Africa: Implication For The Development Of Appropriate Technology. *India Journal of Extension Education* xviii: 30-33.

Bwari Area Council Federal Capital Territory (2004). Agricultural Department Annual Report.

Bwari Area Council Federal Capital Territory (2009). Metrological Department Annual Report.

Camboni, S.M. and Napier, T. L. (1993). Factors affecting use of Conservation Farming Practices in East Central Ohio. *Journal of Agriculture, Ecosystems and Environment:* 2 (3): 16 – 20.

Central Bank of Nigeria (CBN), (1999). Statistical bulletin And Statement of Accounts, CBN, Abuja.

Central Bank of Nigeria (CBN), (2003). Annual Report and Statement of Accounts, CBN, Abuja.

Chinkwendu, D.O., J.O., Omotoyo, A.M., Yusif, J.O. and Omenesa, Z.E. (1997). *Evaluation of the effectiveness of extension communication channels in disseminating information on improved practices to farmers in Nigeria.* A research report sponsored by the National Agricultural Research Project (NAP), National Agricultural Extension and Research Liaison Services (NAERLS), A.B.U., Zaria.

Clark, R.C and Akinbode I.A. (1986). Factors Associated with the Adoption of Three Farm Practices in Western State of Nigeria. Research Bulletin No 1. Faculty of Agriculture, Obafemi Awolowo University. Ile Ife

Cramt, R. A. and Nelson, R.A. (1998).*Investigating constraints to the adoption of recommended soil conservation technology in the Philippines*. In F.W.T. Penning de Vries, F. Agus, and J. Kerr (eds). Soil Erosion at Multiple Scales. CAB International: Wallingford, UK.

David, S. A. and David U. A. (2000). Rural societies and agricultural development. *Journal of Agricultural Extension* :2 (14): 2-6.

David, S. A. (1989). Constraints and Adoption of Root and Tuber Crops in Rural Farming Communities of Ogun State, Nigeria. Journal of Agricultural Research, 2(1): 34 – 35.

Dejanvy, A. (1973). A Socio-economic Model Of Induced Innovation for Argentine Agricultural Development. In Adeniji, O B. (2002). Adoption of Improved Technologies For Cotton Production By Farmers In Katsina State, Nigeria. Unpublished Ph.D Thesis, Department of Agricultural Economics and Rural Sociology, Ahmadu Bello University, Zaria, Nigeria.

Demont, M. Marthijs E. and Tollens, E. (2003). Impact Of New Technologies On Agricultural Production System. The Cases of Agricultural Biotechnology And Automatic Milking. Paper prepared for presentation at the first conference of the Belgische Vereninging voor, Landbouweconomic, brussel. Oct.24.

Dorosh, P. (1988). The Economic of root and tuber crops in Africa. RCMP research Monograph No. 1. Ibadan Nigeria IITA.

Ekong, E.E. (1988). Rural Sociology: An Introduction and Analysis of Rural Nigeria. Jumak Publishers Ltd, Ibadan: 253.

Ezedinma, C. J. (1989). "Impact of Some Improved practices on Cassava In Anambra State of Nigeria." Cassava-based Cropping System Research – Extension II, contributions from the second annual meeting of the collaborative Group in cassava – based cropping system research, International institute of Tropical Agriculture, Ibadan, Nigeria. 159-170.

Fabyans M.O. (1999). Cereal Crop Management In The Tropics, Hinad: Japan, Australia Bureau of Agriculture Polices.

Fadiji, T. O. (2000). Sources and Utilization of Extension Information among Farmers of Improved Maize Verieties In Two Villages Of Kaduna State. Unpublished M.Sc Thesis, Department of Agricultural Economics and Rural Sociology Ahmadu Bello University, Zaria.

Federal Capital Territory Agricultural Extension Service Division (2004). Agricultural Department Annual Report.

Federal Ministry of Agriculture And Natural Resources (FAMNR) (1997). Nigeria Agricultural Statstics (Time Series Data). Department Of Planning, Research and Statistics, Abuja, Nigeria.

Food and Agriculture Organization (1992). Tropical Root Crop Production in Developing Countries, Situation and prospect of the World Economy. FAO. Rome, Italy.

Food and Agriculture Organization (2002). Issue and opportunities for agricultural development in the second millennium and beyond. The food and agriculture Organization Of The United Nations (FAO). Rome, Italy.

Food and Agriculture Organization (2007). Available at: www.fao.htp/faostat.fao.org/faostat/access retrieved on August 7th, 2007.

Food Agriculture Organization (2004). Production of Cassava: FAO Quarterly Bulletin of Statistics, Rome.

Futa, M. T. (1992). Structural Adjustment Programme and Their Implication For Agricultural Development In Africa. Invited Paper Presented at the International Symposium on "Sustainable Food production In Sub-Saharan Africa" held at the International Institute of Tropical Africa, Ibadan Nigeria.

Hahn, S. K. (1988). Constraints on Cassava And Yam Research And Production In Africa. In: The use of Biotechnology for the Improvement of Cassava, Yam and Plantain in Africa. Contributors form a meeting of Africa Research Institutions, IITA Meeting Report Series, IITA, Ibadan.

Hartmans, E.H. (1982). Training and visit (T&S) system of extension. Proceedings of the 5th training and visit system of extension on adoption group meeting. U.S.A: 5 – 14.

Ikechukwu, G. E. (1990). Technology Transfer to small Holders for Increased Agricultural Productivities: A Case Study of Fertilizer Application in Bauchi Local Government Area, Bauchi State, Nigeria. *Journal of Agricultural Extension:* 5(1&2): 39-46.

International Institute of Tropical Agriculture (IITA, 1984). Annual Report, Ibadan, Nigeria.

International Institute of Tropical Agriculture (IITA, 1988). Strategic Plan 1989 – 2000. IITA Ibadan, Nigeria.

Isah, A. (2009). Impact Assessment of National Fadama Development Programme Phase II on the Income of the Beneficiaries In Kaduna State. Unpublished M.Sc. Thesis, Department Of Agricultural Economics and Rural Sociology, Ahmadu Bello University, Zaria.

Kassie, A. S. (2009). Sociology. Concepts and Themes. An Introduction (Third edition) Crethil Publishers, Ibadan, Nigeria.

Kuta, F. A. (2009). Dynamics of technology adoption in rural-based cassava production enterprise in North-central, Nigeria. *International journal of Agricultural Economics and Rural Development*:4(2): 17-22

Mabawoku, C. A. (1984). Adoption of Improved Farm Practices: A choice under Certainty. *Indian Journal of Extension Education*. 22(3): 6 – 15.

McNamara, R. S. (1990). African Development Crisis, Agricultural Stagnation, Population Explosion and Environmental Degradation. Address to African Leadership forum, Lagos, Nigeria. June 21.

Madukwe. M.C. (1991). Evaluation of School to Land Programme in Anambra State. *Nigeria Journal of Rural Extension and Development*: (1): 33 – 40.

Marill, A. I. (1980). The Role of Technology in Rural Development Of Less Develop Countries. Mimeo paper for International Development. Washington D.C.

Monu, E. D. and Omole, M. M. (1982). "Sources of Farm Information Among Nigerian Cocoa Farmers". *Agricultural Administration*: 9 (2): 81 – 99.

Moody, K. (1973). Weed Control in cassava. Proceedings of the third Nigerian weed science group meeting, IAR, Samaru Zaria: 13-22.

National Agricultural Questions and Answers Service Quarterly News Letter. Dec. 2002. NEARLS/ABU, Zaria, Nigeria.

National Agricultural Extension and Research Liaison Services (NAERLS). (2000). Evaluation of the Extent of adoption and impact of Improved technologies on the Production of Maize, Rice, Cassava and Soya Beans and farmers' Income. A Research report conducted by NAERLS. Ahmadu Bello University, Zaria. December, 2000: 1 – 50.

National Population Commission (NPC), 2007. Production Year Book, 2006 Census Result.

Njoku, J. E. (1991) Factors Influencing Adoption of Improved Oil Palm Production Technologies by Small Holders in Imo State Of Nigeria. In Olukosi J. O. Ogungbile, A. O. And Kudu, B. A. (Eds) (1991) Appropriate Agricultural Technologies for Resources Poor Farmers, National Farming System Research Network: 207 – 208.

Norabhoompipat, T. (1982). Structure of Technology. A Model for Rural Development Tokyo: 1: 79.

Norman, D. W. Beeden, P. Pryor, D. H. Kroeker, W. J. Hays H. M and Hulzinga, B. (1976). The Feasibility of Improved Sole Crop Cotton Production Technology For The
Small Scale Farmer in the Northern Guinea Savanna Zone of Nigeria. Samaru Miscellaneous Paper No. 61 IAR Samaru, Zaria, Nigeria.

Nweke, F.I. Ezumah, H. C. and. Spencer, D.S.C. (1988). "Cropping Systems And Agroeconomic Performance of Improved Cassava In A Humid Forest Ecosystem". RCMD Research Monograph No.2 Resource and Crop Management Programme, International Institute of Tropical Agriculture, Ibadan, Nigeria. In Collective Study Of Cassava In Africa (COSCA) Working Paper: 15: 2.

Nweke, F.I. Ikpi, A and Ezumah, H. C. (1989). Economic Factors of Cassava in Africa With Special Reference to Cassava In proceeding of the International Experts Group Meeting on Exchange of Technologies for Cassava Processing Equipment and Food Products. IITA, Ibadan, Nigeria. April 13th – 19th: 88.

Nweke, F.I. and Enete A. A. (1999). Gender Surprises In Food production, Processing And Marketing With Emphasis On Cassava In Africa COCSA working paper No. 19, IITA, Ibadan, Nigeria.

Nweke, F.I. and. Spencer, D.S.C. (1995). Future prospect for cassava root yields in Sub-Sahara Africa. *Outlook on Agriculture:* 24(1): 35 – 42.

Oboh, V. U., Aye G. C and Hydande, A. (2006). Socio-economic Determinants of Farmers' Adoption Of Improved Cassava Varieties In Olu Local Government Area of Benue State Proceedngs of 20th Annual National Conference of Farm Management Association Of Nigeria: 478 – 482.

Odebode, S. O. (1997). Appropriate technology For rural Women In The Processing of Cassava And Soyabean In Oyo State. Unpublished M.Sc Thesis Department of Agricultural Extension, University of Ibadan, Nigeria.

Odjii, M. A. (2003). Effects Of Improved Technologies on Gender Productivity in Cassava Production. *Journal of Agriculture and Social Research (JASR:*. 3.(1): 78 – 89.

Odoemenem, I U. and Obinne, C. P. O. (2010). Assessing The Factors Influencing he Utilization of Improved Cereal Crop Production Technologies by Small Scale Farmers In Nigeria Indian Journal of Science And Technology: 3(1): 180 – 183.

Ogundari, K. and Brummer, B.(2010). Estimating technical efficiency, input substitution and complimentary effects using Output Distance Function: A study of cassava production in Nigeria. Contributed paper presented at the Joint 3rd African Association of Agricultural Economics (AAAE) and 48th Agricultural Economists Association of South-Africa (AEASA) conference, Cape Town, South-Africa September, 19th – 23rd 2010: 28-29.

Ojuekaiye, E. O. (2001). Economic Analysis Analysis Of Cassava Production in Three Local Government Area f Kogi State Unpublished M.Sc Thesis, Department of Agricultural Economics and Rural Sociology, Ahmadu Bello University, Zaria, Nigeria.

Okoosi, G. A. A. (1990). Adoption of Agricultural technological Innovation by Rural Women in Kwara State. Unpublished M.Sc Thesis, Department of Agricultural Extension, Obafemi Awolowo University, Ile Ife, Osun State, Nigeria.

Okozie, C. (2003). Women And Commercialisation of Agriculture: Implication for Household Food security. Paper presented at the 18th annual conference of Farm Management Association of Nigeria (FAMAAN). Held at University of Calabar Nov.24th – 8th::.5 – 7.

Okunade, E. O. (2006). Factors Influencing Adoption Of Improved Farm Practices Among Women Farmers In Oyo State. *Journal of Human Ecolog:*. 19(1): 45 – 49.

Okunlola, O.J. (2003). Determinants of Soya Bean Utilization and Consumption Patterns among Rural Dwellers in South Western Nigeria; 2nd International Workshop on Food – based approaches for a healthy Nutrition. Ouagadougou 25 – 28 Nov. 2003.

Oladele, I. O. and Kareem, A. I. (2003). Adoption Rate and Continued Use of Selected Arable Crop Technologies Among farmers In Oyo State. *Journal of Food Agriculture and Environment*: (3 & 4): 291 – 294.

Olaniyan, o. F. (1998). Adoption of Improved Cassava Varieties by Women Farmers in Rural Areas Of Oke-Ogun, Oyo State. Unpublished M. Phil Thesis Department of Agricultural Extension, Obafemi Awolowo University, Ile Ife, Osun State, Nigeria.

Olayide, S. O. and Heady, E. O. (1982). Introduction to Agricultural Production Economics. Ibadan University Press, University of Ibadan, Ibadan, Nigeria: 25-30.

Olufajo, O.O.(2004).Cassava Production Guide. Department of Agronomy, Institute for Agricultural Research, Ahmadu Bello University, Zaria.

Olumide, O. T. (2003). Strategies for Sustainable Development Of cassava Based Industries in Osun State. Available at: www.osunstate.gov.ng/Summit/PROSE/

Oluwemimo, O. (1998). Women In Agriculture In Nigerian Women In Society and Development. Dotun publishing house, Ibadan, Oyo State: 61 – 67.

Omifare, B. O. (1989). An Economic Analysis of Cassava Processing Enterprise in Ekiti North Local Government of Ondo state. Unpublished M. Sc. Thesis, Department of Agricultural Economic, Obafemi Awolowo University, Ile Ife, Osun State.

Onazi, O. C. (1973). "Comparative Analysis of the Training Needs of Potential Agricultural Extension Workers and Principal problems Of Extension in

Northern State of Nigeria." Unpublished Ph.D. Dissertation, Kansas State University, P.Hsburys, Kansas.

Oni, K. C. and Eneh, M. C. C. (2004). Strategies for reducing cost of production of cassava: Paper presented at the facilitation and sensitization workshop for cassava producing states under the "Presidential Initiatives on Cassava Production and Export", 8th – 12th November, 2004. Federal Ministry of Agriculture and Rural Development, Abuja: 12-20.

Osuagwu, O.D. (2002). An Evaluation of the Institutional Impact of Imo State Agricultural Development Project (ADP) on the Rural Communities. A Ph.D Thesis. Nsukka: University of Nigeria: 6 – 11.

Philip, D.O.A. Abalu, G.O.I. Aganga A. A and Aduku, A. O. (1990). "Animal Traction Technology in Northern Nigeria: A Survey Of Constraints And A Model Of Prospects". In Starkey, P. H. and Ndiam, F (ed): Animal Traction For Agricultural Development: Proceeding of the Third Workshop of the West African Animal Traction Network held at Saly, Senegal, July 7th – 12th : 370 – 374.

Rogers, E.M. and Shoemaker, E.F. (1971). Communication of Innovations, 2nd ed. Free Press. New York .

Saito, K A. (1994). Raising Productivity Of Women farmers In Sub-Saharan Africa. World Bank Discussion Papers. Africa Technical Development Series 230. The World Bank, Washington DC, USA.

Sasakawa Global (2000) General Guide for Cassava Cultivation and Seed Production. Department of Agronomy, Institute for Agricultural Research, Ahmadu Bello University, Zaria.

Scot, G. J. Best, R. Rosegrant, M. and Bokang, M. (2000). Root and Tubers in the Global System: A Vision Statement To The year 2020, Lima, Peru: 56 – 73.

Singh, R.D. (1996). Female Agricultural Workers Wages, Male–Female Wages Differentials, and Agricultural Growth in developing countries: Indian Economic Development and Cultural change. India: 45 (2): 89 – 123.

Spencer, D. S. C. and Kainaneh, P. (1997). Cassava In Africa: Past, Present, And Future. Background Review Document Drafed As An Input Into The Formulation Of The Global Cassava Development Strategy. In Root and Tuber The Global Food System. A Vision Statement to The Year 2020, Lima Peru: 62.

Swanson, B. E. (1996). Strengthen Research Extension – Farmers Linkages: In Adekoya, A. E and Tologbonse, E. B. edition, Agricultural Extension in Nigeria, Published by Agricultural and Rural Development Training Institute (ARMTI,) Ilorin, Kwara State, Nigeria: 28 – 35.

Teresa, A. (1994). Cassava Production in Kaduna State, Nigeria. Danwaka Press and Publishers Limited, Kaduna, Nigeria.

Teresa, A. (1997). Factors influencing adoption and intensity of use of fertilizer: The Case of Lume District, Central Ethiopia: *Journal of International Agriculture*.

Williams, C.E. (1982). Effect of Technology innovation Among Rural Women in Nigeria. A case Study of Processing in Selected Villages of Bendel State, *Nigerian Journal of Rural Development:* 10 (4 & 5): 14-24.

Yahaya, M. K. (2002). Gender And Communication variables In Agricultural information Dissemination: In Two Agro–ecological Zones of Nigeria. Cooperate graphic Limited, Ibadan, Nigeria: 20 – 30.

Yahaya, M. K. (2007). Communication and Social Change: Lessons from Cassava technology transfer In Nigeria *Journal of Agricultural Extension*: (10): 178.

Yahaya, M. K. and Aina, T. (2007). Role of Information Source and Communication Channels in Adoption of Improved Practices by Farmers. *Journal of Extension Education*: 16 (5): 37 - 40.

Yakasai, M. T. (2010). Economic contribution of cassava production: A case study of Kuje Area Council, Federal Capital Territory, Abuja, Nigeria. Bayero University *Journal of Pure and Applied Sciences:* 3(1): 215-219.

APPENDIX

FACTORS INFLUENCING ADOPTION OF RECOMMENDED CASSAVA PRODUCTION PRACTICES BY FARMERS IN BWARI AND KUJE AREA COUNCILS, ABUJA, FEDERAL CAPITAL TERRITORY

Dear Respondent,

This questionnaire instrument is for research purpose only. All information given will be treated with high degree of confidentiality. You are therefore requested to answer the following questions as sincerely as possible.

Thank you.

BACKGROUND INFORMATION:

NAME…..... VILLAGE:……...

DISTRICT…… AREA COUNCIL……

Kindly tick (√) or fill in the appropriate space(s) provided.

SOCIO-ECONOMIC VARIABLES

1. Sex: Male ( ) Female ( )
2. What is your age?.....……
3. Marital status: (i) Single ( ) (ii) Married ( )
4. What is the number of people in your Household? ……
5. What is your highest level of formal education attained?

1	=	No formal education	[ ]
2	=	Primary education	[ ]
3	=	Junior secondary education	[ ]
4	=	Senior secondary education	[ ]
5	=	Diploma/NCE	[ ]
6	=	HND / Degree	[ ]

6. Is farming your major occupation? Yes [ ] No [ ]
7. If yes, how long have you been in the farming business?.....
8. If yes, what other activity/ies do you engaged in?

   (i)…….

   (ii)…….……

   (iii)……
9. If No, what is your major occupation?.....

10. What other occupations are you involved in?

    i)……..

    (ii)…….……

11. How did you acquire land for farming activities?

    (i) Purchase ( )
    (ii) Rent ( )
    (iii) Leasehold ( )
    (iv) Gift ( )
    (v) Inheritance ( )
    (vi) Others, (specify): ……

12. What is the total size of your farm holding?.....ha

13. What is your total farm Size for cassava production? …… ha

INSTITUTIONAL VARIABLES

14. Do you have contact with extension agent(s) as regard recommended cassava production practices? Yes ( ) No ( )

15. If Yes, give number of times a year? ……..

16. Do you belong to any association? (i) Yes ( ) (ii) No ( )

17. If Yes, how many associations?.....

18. If Yes, how long? ……

19. Did you obtain credit/loan for cassava production?

    (i) Yes ( ) (ii) No ( )

20. If yes, in what form did you received the credit/loan?

    (i) Inform of cash [ ]

    (ii) Inform of input [ ]

    (iii) Others, (specify): ……

21. If cash, state the source and the amount received last year

Source	**Amount (₦) and Year**
Friends/family members	
Commercial banks	
Government ministry/parastatals	
Clubs/associations/cooperatives	
Agricultural Agencies	

Others, (specify): ……

22. If in input form. List the inputs used in kg or litre and their valve in Naira (₦).

	Input (Kg or Litre)	**Value (₦)**
(i)	……..	……..
(ii)	……..	……..
(iii)	……..	……..
(iv)	……..	……..

23. If you have not received any creditor loan, state why?

(i) No credit facilities ( )

(ii) I don't belong to any association ( )

(iii) Ignorance of the existence of bank loan ( )

(iv) Cumbersome of the procedures to obtain bank credit/loans( )

(v) Lack of collateral for bank credit/loans ( )

(vi) High interest rate ( )

(vii) Others, (specify): ……

24. Estimate the labour cost per operation per man day for your current cassava farm.

FARMING ACTIVITY	**NO. OF PERSON PER OPERATION**	**AMOUNT PER MAN DAY (₦)**
Land clearing/preparation		
Ridging		
Planting		
Herbicide applicant		
Fertilizer application		
Weeding		
Harvesting		

25. Among the following, who/what source convinced you to start using the recommended cassava production practices?

(i) Extension workers ( )

(ii) Village / Community leaders ( )

(iii) Co-farmers/friends ( )

(iv) Research Institutions ( )

(vi) Traders ( )

(vii)Others, (specify): ……

26. Identify the degree of reliability of the following sources of information.

MEDIA/AGENTS	**1 Most Reliable**	**2 Reliable**	**3 Some what Reliable**	**4 Not Reliable**
Extension Agent				
Printed Median				
Television				
Radio				
Research institute				
Friends/neighbors/Co-farmers				
Village heads/opinion leaders				

Others, (specify): ……

TECHNOLOGICAL VARIABLES

27. Have you received any formal training on recommended cassava production practices?

(i) Yes ( ) (ii) No ( )

28. If Yes, list the benefits you received from the training exercise.

(i)……....

(ii)……..

(iii)……..

(iv)……..

29. If yes, which of these recommended cassava production practices have you been trained on?

Recommended Cassava Production Practices	**Yes**	**No**
Planting material:- Healthy stem cuttings with 4 – 5 nodes		
Planting time:- April and June, then August or September for zones with bimodal rainfall pattern.		
Method of planting:- planting on ridges at an angle.		
Planting depth:- (5cm – 10cm)		
Planting spacing:- (1m x 1m) for sole cropping.		
Fertilizer application:- (NPK 15:15:15: 4 - 8 bags per hectare depending on the fertility level of the soil)		

Weeding (chemical weed control) **a.** Pre-emergence herbicide: Alachlor (Lasso) at 300ml/CP15 knapsack sprayer. **b.** Selective post – emergence herbicide: Round–up at 4 – 5 litres per hectare.		
Harvesting – **mechanical**: (combine harvesters)		

30. Which of the recommended cassava stem cutting do you use? Please give the names in local dialect.

    _____

    _____

    _____

    _____

31. For how long you have been using the named cassava cutting?_____ years

32. Which of these recommended production practices do you use? Please tick from the list.

Recommended Cassava Production Practices	**Yes**	**No**
Planting material:- Healthy stem cuttings with 4 – 5 nodes		
Planting time:- April and June, then August or September for zones with bimodal rainfall pattern.		
Method of planting:- planting on ridges at an angle.		
Planting depth:- (5cm – 10cm)		
Planting spacing:- (1m x 1m) for sole cropping.		
Fertilizer application:- (NPK 15:15:15: 4 - 8 bags per hectare depending on the fertility level of the soil)		
Weeding (chemical weed control) **a.** Pre-emergence herbicide: Alachlor (Lasso) at 300ml/CP15 knapsack sprayer. **b.** Selective post – emergence herbicide: Round–up at 4 – 5 litres per hectare.		
Harvesting – **mechanical**: (harvesters)		

33. For how long have you been using the recommended cassava production practices? _____ Years.

34. What are the factors that influence your decision to use the recommended cassava production practices? Please tick from the following list using:

SA =,Strongly Agreed
A = Agreed
UD = Undecided
D = Disagreed
SD = Strongly Disagreed

	(A) Relative Advantage	**5 SA**	**4 A**	**3 UD**	**2 D**	**1 SD**
I	The recommended cassava technologies have higher yield than the old ones					
ii.	The recommended cassava technologies provide higher income than the old ones.					
iii.	The recommended cassava technologies are cheap / economical to adopt.					
iv.	The skill required to use the recommended cassava technologies can be easily acquired.					
v.	The recommended cassava technologies require less labour.					
vi.	The recommended cassava technologies make use of less inputs to give the same output as the old practices					
vii.	The recommend cassava technologies stem cuttings mature earlier than the old cultivars.					
viii.	The recommended stem cuttings are resistance to pests and disease infestations					

35. **Compatibility index**

	(B) Compatibility index	**5 SA**	**4 A**	**3 UD**	**2 D**	**1 SD**
I	The recommended cassava technologies are similar to the existing practices.					
ii.	The innovation meets my needs					
iii.	The recommended cassava technologies give me satisfaction.					
iv.	The recommended cassava technologies fit well into the existing farming systems					

36. **Complexity index**

	(C) Complexity index	**5 SA**	**4 A**	**3 UD**	**2 D**	**1 SD**
I	It is difficult to use the recommended cassava technologies correctly.					
ii.	The level of skill required to use the recommended cassava technologies is too high.					
iii.	The recommended cassava technologies are too technical.					
iv.	Training is required to correctly apply the recommended cassava technologies.					

ADOPTION

37. Which of these recommended cassava production practices have you adopted?

Recommended Cassava Production Practices	**Yes**	**No**
Planting material:- Healthy stem cuttings with 4 – 5 nodes		
Planting time:- April and June, then August or September for zones with bimodal rainfall pattern.		
Method of planting:- planting on ridges at an angle.		
Planting depth:- (5cm – 10cm)		
Planting spacing:- (1m x 1m) for sole cropping.		
Fertilizer application:- (NPK 15:15:15: 4 - 8 bags per hectare depending on the fertility level of the soil)		
Weeding (chemical weed control) **a.** Pre-emergence herbicide: Alachlor (Lasso) at 300ml/CP15 knapsack sprayer. **b.** Selective post – emergence herbicide: Round–up at 4 – 5 litres per hectare.		
Harvesting – **mechanical**: (harvesters)		

38. For how long have you been using these recommended cassava production practices?..... years.
39. What was your estimated yield of cassava tubers harvested in tones/ha during the last growing season …….
40. What was the estimated amount in naira (N) realized from the sales of harvested cassava tubers and stem cuttings?.....

41. Is there any difference in your output as a result of adoption of recommended cassava technologies? Yes [ ] No [ ]

42. If yes, state how?

Decrease [ ] Increase [ ]

GENERAL PROBLEMS AND CONSTRAINTS

43. Are you faced with challenges/constraints in the adoption of recommended cassava production practices?

44. If yes, what are these constraints?

i. Government policies on land use
ii. Scarcity of farm land
iii. Insufficient capital
iv. High cost of farm input
v. Processing, storage and marketing problems
vi. Insufficient extension agents
vii. Lack of access roads
viii. Problem of roots/tuber Pests and diseases
Ix Poor information network

Others, (specify): ……

45. Kindly rank these constraints in order of severity

List of constraints	**1 Severe**	**2 Very severe**	**3 Less severe**	**4 Not severe**
Scarcity of farm land				
Insufficient capital				
High cost of farm input				
Processing, storage and marketing problems				
Insufficient extension agents				
Lack of access roads				
Problem of roots/tuber Pests and diseases				
Poor information network				

Others, (specify): …….

46. What will you suggest as the best way to improve the recommended cassava production practices in your village?

……

……

……

……