ANALYSIS OF ADOPTION OF IMPROVED CASSAVA PROCESSING TECHNOLOGIES BY WOMEN IN ANKPA LOCAL GOVERNMENT AREA KOGI STATE, NIGERIA

BY

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DECLARATION

I hereby declare that this dissertation titled **"Analysis of Adoption of Improved Cassava Processing Technologies by Women in Ankpa Local government Area, Kogi State, Nigeria"** has been written by me and it is a record of my own research work. No part of this work has been presented in any previous application for another degree or diploma in this or any other institution. All borrowed information has been duly acknowledged in the text and a list of references provided.

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CERTIFICATION

The dissertation **"Analysis of Adoption of Improved Cassava Processing Technologies by Women in Ankpa Local Government Area, Kogi State, Nigeria"** by Christiana AUGUSTINE meets the regulations governing the award of the degree of Master of Science in Agricultural Extension and Rural Sociology of the Ahmadu Bello University, Zaria and is approved for its contribution to knowledge and literary presentation.

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DEDICATION

This dissertation is dedicated to my wonderful and dear husband Mr Benjamin A. Ocheni and to my lovely children, Cynthia, Israel, Emmanuel and Josiah. You are all great and I thank you for your patience and support during the period of this study.

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ABSTRACT

The study was conducted to examine the adoption of improved cassava processing technologies by women in Ankpa Local Government Area, Kogi State, Nigeria. Purposive sampling was used to select three villages for the study which were Ikanekpo, Inye and Awo-Akpali. Random sampling was used to select 152 respondents which constitute 20% of the sample frame of 760. Analytical tools used were descriptive statistics, regression analysis and Z-test statistic. The results showed that the mean age of the respondents was 35 years. About 68% of the respondents were married. The mean household size was 9 persons. About 16% of the respondents had no formal education. Only 26% of the respondents had extension contact, 20% of the respondents had access to credit and 22% belonged to associations. The average adoption level of the improved cassava processing technologies was 53%. The regression analysis showed that age, household size, processing experience and membership of association were significant to the adoption of improved cassava processing technologies. The coefficient of determination (R^2) was 0.47 which implies that 47% of the variations observed in the adoption of improved cassava processing technologies were explained by the selected factors included in the model. The Z-stat (20.04) for output was greater than the Z-critical (1.98) while the Z-stat (24.30) for income was greater than the Z-critical (1.98) and both were significant at p<o.o5, implying that output and income of the respondents increased after adoption of improved cassava processing technologies. The major constraints encountered by the respondents include inadequate credit, inadequate extension contact, high cost of cassava tubers and high costs of hiring cassava processing machines. The study concluded that age, household size, processing experience and membership of association, were significant and they are important factors to consider in ensuring high level of adoption of improved cassava processing technologies. Only 23% of the respondents received information from extension agents. About 77% get information from other sources like radio, fellow processors, friends and relatives. It was also concluded from the result of the Z-test statistics that adoption of improved cassava processing technologies resulted in higher output and income for the women cassava processors. It is therefore recommended that the women cassava processors should form cooperative societies through which they can put their financial resources together for reinvestment and also through that they can benefit from microcredit schemes to boost their cassava processing enterprise. The extension services on improved cassava processing technologies should be intensified in the study area by offering services especially in aspects that show low adoption in this study like the mechanical sifter and fryer. Improved cassava processing technologies should be made available for the women cassava processors by government and non-governmental agencies. The women themselves can also put their financial resources together to acquire some of the technologies.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Agriculture has traditionally been regarded as the mainstay of the Nigerian economy as it supplies food, raw materials and generates household income for the majority of the populace. Agricultural production has contributed to foreign exchange earning, government revenue and employment (Adebayo and Okuneye, 2005). The sector is a major source of foreign exchange earnings contributing 23% to the Gross Domestic Product (GDP). It has an annual growth rate of 5.50% and employs about 70% active workforce of the population (CBN, 2014).

Cassava (*Manihot esculenta Crantz*) is a starchy root crop that belongs to the family *euphorbiaceae* and grown widely in West Africa. Nigeria is currently the largest producer of cassava in the world with an annual output of 54 million tonnes of tuberous roots (FAO, 2014). The crop has become a basic raw material for many small scale businesses such as cassava flour mills, bakeries, fast food firms, restaurants, gari processing firms and is currently an income generating activity (Odii, 2012). Cassava production has been increasing for the past 20 years in area cultivated and in yield per hectare (FAO, 2004). Cassava is virtually grown in all parts of Nigeria with rainfall greater than 100mm and accounts for over 70% of the total production of tuber crops in Africa. This achievement has been attributed to the improved, high yielding, pest and disease resistant varieties produced through research collaboration of International Institute of Tropical Agriculture (IITA), Ibadan, National Root Crop Research Institute (NRCRI), Umudike and other research institutes. The major area where the crop is grown extends from the coast in the south to the middle belt. By zone, the north central

zone produces about 7 million tonnes of cassava a year. Benue and Kogi states in the north central Nigeria are the largest producers of cassava in the country (IITA, 2004).

Cassava occupies a prominent position in foreign exchange earnings following presidential cassava initiative of the federal government of Nigeria. This initiative brought cassava and its potentials to a national limelight. The initiative had as its goal the promotion of cassava as a viable foreign exchange earner and also the development of the production system to sustain the national demand (Sanni *et al.*, 2009). Nigeria has been recognized as one of the leading producers of cassava in the world since 2002 (FAO, 2004).

The position and capability of women meeting the challenges of agricultural development cannot be overemphasized (Albright, 2006; Rahman, 2008). In Nigeria, women play a dominant role in agricultural production (Adisa and Okunade, 2005). Their active participation in African agriculture at large is also not new. Damisa and Yohanna (2007) also asserted that the role of women in agricultural production can never be underestimated as they perform crucial roles in the domestic economic life of the society. Women play significant roles in agriculture, the world over. About 70% of the agricultural workers, 80% of food producers, and 10% of those who process basic foodstuffs are women and they also undertake 60-90% of the rural marketing; thus making up more than two third of the workforce in agricultural production (FAO, 1995; Rahman, 2004). They are almost entirely responsible for processing cassava which provides them with additional income earning opportunity and enhances their ability to contribute to household food security. Women contribute about 58% of the total

agricultural labour in the Southwest, 67% in the Southeast and 58% in the central zones of Nigeria (FAO, 2005).

Government intervention and the efforts of non-governmental organizations have led to a number of measures that support the production, processing and marketing of cassava. Through this effort appreciable progress has been made in the development of processing technologies and rural infrastructure. Several labour-intensive operations in processing notably, grating, dewatering and milling have been mechanized (FAO, 2004). According to IITA (2004) engineering research in Nigeria and other African countries resulted in successful mechanization of some of the labourous and time-consuming cassava processing operations. Thus, the use of appropriate technologies or machineries is essential to meet for home consumption and industrial uses. Consequent upon this, there is need to appraise the level of acquisition of these appropriate technologies in order to appreciate the prospects and constraints. The adoption of improved agricultural technology is influenced by many factors ranging from socio-economic, institutional to technological factors (Voh, 1982; Atala, 1984; Bolorunduro *et al.*, 2000).

1.2 Problem Statement

The Food and Agricultural Organization (2010) observed that in many developing countries, wide adoption of research results by farmers is quite limited. This is partly due to the fact that many of the farmers in developing countries live in the rural areas where they have inadequate sources of information. About 75% to 80% of Nigerians live in the rural areas relying on agriculture for their employment and yet spend high proportion of their income on food because of low production and processing level. This

situation is further worsened by food losses that occur as a result of inadequate processing facilities (Ayichi, 1995; Kotze, 2003). Poor processing is a major cause of post harvest losses in the world with special emphasis on developing countries such as Nigeria (FAO, 2004). According to IITA (2004) only about 45% of harvested cassava in West Africa are processed into dried chips and flour. Cassava is the most perishable of the roots and tuber crops and can deteriorate within two or three days after harvest. So there is need to process it within the shortest time after harvest. Moreso, cassava contains a poisonous substance called cyanogenic glucoside which is usually removed during processing. It is for this reason that instead of being sold as fresh produce like other roots and tubers, cassava is mostly sold as processed product.

Cassava processing is labour intensive, often characterized by low quality, low output per unit of time and full of drudgery. Emphasis is therefore required on appropriate technology for increasing food availability through increased processing and preservation. The modern cassava processing technologies such as the mechanical grater, screw press, mechanical sifter, and fryer (toaster) are in existence in Ankpa Local Government Area. However, enough research has not been conducted to study the factors that influence adoption of improved cassava processing technologies by women processors and how they affect the quality and quantity of the processed products. The only study available is on the role of women in cassava processing. There is therefore the need to initiate studies to probe into the factors that influence the adoption of improved cassava processing technologies by women in the area. This will enable the women processors to overcome the constraints militating against them and confidently adopt the improved cassava processing technology for optimum and better cassava processing enterprise. This study intends to ask the following questions:

i. What are the socio-economic characteristics and institutional factors of women using improved cassava processing technologies in the study area?

ii. What is the level of awareness of improved cassava processing technologies in the study area?

iii. What are the sources of information on improved cassava processing technologies in the study area?

iv. What is the level of adoption of improved cassava processing technologies in the study area?

v. What are the socio-economic, institutional and technological factors influencing the adoption of improved processing technologies among women cassava processors in the study area?

vi. What is the effect of the adoption of the improved cassava processing technologies on output and income of the women cassava processors?

vii. What are the constraints to adoption of improved cassava processing technologies in the study area?

1.3 Objectives of the Study

The broad objective of the study was to examine the adoption of improved cassava processing technologies by women in Ankpa Local Government Area of Kogi State. The specific objectives were to:

i. describe the socio-economic characteristics and institutional factors of women using improved cassava processing technologies in the study area;

ii. identify the level of awareness of improved cassava processing technologies in the study area;

iii. identify the sources of information on improved cassava processing technologies in the study area;

iv. describe the level of adoption of improved cassava processing technologies in the study area;

v. determine the socio-economic, institutional and technological factors influencing adoption of improved cassava processing technologies among women cassava processors in the study area;

vi. determine the effects of adoption of improved cassava processing technologies on output and income of women processors in the study area;

vii. describe the constraints militating against adoption of improved cassava processing technologies in the study area.

1.4 Justification of the Study

The importance of food to human existence cannot be over-emphazised because it is one of the major necessities of life. Therefore, ensuring adequate food production, processing and marketing is very important to boosting food availability to the teeming population of Kogi State. Cassava is a staple crop in Nigeria and apart from being used as food it also serve as raw material for manufacturing industries and as livestock feed.

According to National Fadama Development Project (2009), Kogi State is the second largest producer of cassava in Nigeria with a production figure 2.854 million tonnes. The state also implemented Root and Tuber Expansion Programme (RTEP) whose major goal is to facilitate increased production of cassava, yam and cocoyam as well as processing and marketing of their products. In addition to the efforts of Kogi State to boost cassava production, the International Institute of Tropical Agriculture (IITA), Ibadan, Institute of Agricultural Research (IAR), Samaru, Zaria, National Root Crops

Research Institute (NRCRI), Umudike, Umuahia and many other research institutions have developed appropriate cassava technology packages aimed at promoting cassava production, processing and improvement on cassava yields.

Despite the significance of the role of women in the cassava processing industry, there is inadequate study conducted to examine the factors influencing adoption of improved processing technologies by women in the study area. The key roles played by women in cassava processing makes it imperative to carefully study the factors influencing adoption of improved cassava processing technologies by women in the study area. Since women's contribution to the availability of such food and raw material and hence Nigeria's economic development cannot be ignored, effort must therefore be made to ascertain the constraints militating against women's adoption of improved cassava processing technologies and possibly come up with recommendations.

This study if conducted will highlight the benefits of adoption of improved cassava processing technologies to women cassava processors in the study area. The users of processed cassava will enjoy higher supply of cassava if women processors in Ankpa Local Government Area will use the optimum processing techniques. This study will also be of help to other researchers who are interested in conducting research on the adoption of improved cassava processing technologies by women.

1.5 Hypotheses of the Study

i. The socio-economic characteristics of the women cassava processors have no significant influence on the adoption of improved cassava processing technologies.

ii. The institutional characteristics of the women cassava processors have no significant influence on the adoption of improved cassava processing technologies.

iii. The technological characteristics of the women cassava processors have no significant influence on the adoption of improved cassava processing technologies.

iv. The adoption of improved cassava processing technologies has no significant influence on the women processors' output and income.

CHAPTER TWO

LITERATURE REVIEW

2.1 Origin of Cassava

The cassava plant originated in the North East Brazil and Central America, and was probably first grown for food by the American Indians in those two areas (Onwueme and Sinha, 1991). Cassava has since spread to various parts of the world and today it is grown in all parts of the tropics. Cassava was introduced to Africa in the sixteenth century by the Portuguese who brought it to Congo River Delta from South America. Since the crop was readily adaptable to different environmental condition as well as suited to traditional farming system and social circumstance it spread rapidly on this continent. Its continuation becomes especially widespread in regions of high population density such Southern Nigeria, Western Zaire, Eastern and Northern Tanzania where food security is still heavily dependent on cassava production (Ngoddy, 1976). In Africa, significant cassava production occurs in practically every country within the tropical belt but the greatest production is found in West Africa and Congo basin.

2.2 Economic Importance and Uses of Cassava

World production of Cassava root was estimated to be 184 million tonnes in 2002, rising to 230 million tonnes in 2008 (FAO, 2010). The majority of production in 2002 was in Africa, where 99.1 million tonnes were grown; 55.1 million tonnes were grown in Asia and 33.2 million tonnes were grown in Latin America and the Caribbean. Nigeria is known to be the leading producer of cassava globally harvesting 3.81 million hectare. It produces 45.72 million tonnes in 2006, 18% higher than its production in 2004. This increase in production between 2004 and 2006 came about as a result of the interventions of the Nigerian government and some developmental agencies. The

Nigerian government facilitated the development of new disease-resistant cassava varieties by the joint efforts of International Institute of Tropical Agriculture (IITA), National Root Crop Research Institute (NRCRI), Root and Tuber Expansion Programme (RTEP) and Federal Ministry of Agriculture (FMOA) in Conjunction with State Agricultural Development Projects (ADPs) and Cassava Farmers (Sanni *et al.*, 2009).

Cassava is a very important food crop in the tropics. It is important, not only as a food but also as a major source of income for the largest number of households in relative to other staples contributing positively to poverty alleviation (Ajayi and Onuche, 2005). In the south, cassava is the staple food followed by yam. Yam consumption in most of the south is seasonal, being highest in the months of August to January, the period of harvest. Thereafter, cassava products and other supplementary food take over. The average Nigerian meets about 96% of the minimum energy requirement mainly from cereals and roots and tubers, followed by grain legumes. Cereals constitute the highest group of food produced and consumed in the northern zones of the country while roots and tubers constitute the highest group in the central and south zones. Grain legumes features more prominently in the food production system in the north and are pre-eminent in both northern and southern food baskets (FAO, 2005).

In the middle belt yam is preferred staple in most of the zone followed by cassava. These crops are grown primarily for food and consumed as such but substantial proportion is sold. About 60% of yam is consumed while 40% may be sold while 40% of cassava is consumed and the rest 60% is sold. During the growing season or hungry period as much as 50% of food intake is from cassava along with grains as fewer yams

are available. The importance of minor tubers (cocoyam and sweet potato) in the diet is far less than that of yam and cassava products. In all locations cassava has become a very popular crop and is fast replacing yam and other traditional staples of the area, gaining ground increasingly as an insurance crop against hunger. As shown earlier, cassava is also a major cash crop. A large proportion of cassava, probably larger than other staples is sold and as a result considerable income is also generated from cassava processing. As women are largely responsible for growing and processing cassava, it provides them with an income- earning opportunity, enabling them to purchase commodities which can contribute to household food security (FAO, 2005).

2.3 The Importance of Cassava Processing

Processing is the conversion of a commodity from its raw state to a form that is more acceptable to the buyers or the next stage in the production process. Processing prolongs shelf life and enables production of varieties. Processing is the traditional responsibility of women (Sabo, 2006). Cassava roots are perishable spoiling within three to four days after harvest. They are also heavy containing 70% moisture by weight. In addition, they contain cyanogenic glycosides which breakdown to form hydrocyanic acid (HCN), which is a toxic compound. Processing is necessary to reduce the moisture content and weight, improving product storage, enhancing flavour and reducing the hydrocyanic acid potential. Traditional processing methods are very effective in reducing the HCN potential to safe level if properly carried out. The most important processes for reducing cyanide levels are the mechanical breaking of the cell walls followed by mixing and exposure to temperature above 45.7^0c at which HCN volatilizes (IITA, 1999).

The objectives of cassava processing according to RMRDC (2004) are to:

i. reduce post harvest losses of fresh tubers;

ii. improve the taste of cassava products;

iii. add value to cassava products;

iv. provide raw materials for cassava-based industries.

Processing into dry forms reduce the moisture content and converts it into a more durable and stable product with less volume, which makes it easier for transportation (IITA, 1990). Processing is also necessary to improve the palatability of the food products. In addition processed cassava is required for a number of small or medium scale industries in Africa (IITA, 1990; RMRDC, 2004).

2.4 Socio-Economic and Institutional Characteristics of Women in Cassava Processing

Previous studies on socio-economic characteristics carried out in Nigeria have shown that there exists a close relationship between farmers' socio-economic and institutional characteristics and their involvement in agricultural food processing.

The age of the cassava processor is very important. While the younger and energetic women may be involved in strenuous farm based activities older women are more likely to be involved in less strenuous activities like trading (Fapojuwo, 2010). In a study of appropriate technology for rural women in the processing of cassava and soybean in Oyo State, Odebode (1997) found that majority of cassava and soybean processors in Oyo state were in the 31 – 50 years age bracket. Thus, age can be regarded as the youthful and active period when women can make vital impact in agricultural production, processing and technology development generally. Age determine the

availability of able bodied people for agricultural production, ease of innovation and level of risk aversion (Odebode, 2008).

Yahaya (1990) and Odebode (1997) asserted that majority of women involved in agricultural activities are married. Ekong (2003) stated that married people often try to make ends meet in order to care for their family effectively. Bello *et al.,* (2013) in their study of rural women processing cassava in Doma Local Government Area of Nassarawa State, Central Nigeria found that 85% of the respondents were married. This shows that there is great importance attached to marriage in the society especially in Africa where production largely depends on family labour. The married have advantage over the unmarried because members contribute to labour availability

Household size is very important to farmers because the consumption unit is also the production unit. For this same reason larger household size results in more labour availability for family use and for other productive purposes. According to Ani (2007), giving birth to many children or having large household size is of advantage to farmers because the household members would be of assistance on the farms in terms of labour availability. In societies where little mechanization is practiced most economic productions are carried out manually, thus, the more the number of hands available the greater productivity for the family. The number of children owned by a family is a great attribute to determine the extra labour force needed for farm work.

Education is a process through which a child or an adult acquires knowledge, experience, skill and sound attitude through teaching and learning. Education is an important variable that tends to influence adoption of modern technology. It also

influences the choice of food consumed by individuals and household. Education can positively influence the decision to adopt a technology. Ekong (2000) observed that education is a dynamic instrument for enhancing women participation in agricultural production. This is because as farmers acquire more education their ability to obtain, process and use new information improve and hence the likelihood to adopt technologies (Abdoulaye *et al.,* 2014). Education is an essential factor for effecting desirable change in attitudes, skill and knowledge of individuals (Odebode, 2008). The higher the level of literacy the better the women's ability to understand and interpret new skills, then apply such into income generating activities which can improve their productivity.

Education increases the ability of farmers to use their resources efficiently and that will enhance their ability to obtain, analyze and interpret information (Abdoulaye et. *Al.,* 2014). Low educational attainment among women processors has a tendency for low level of technology adoption that has implication for use of improved processing techniques by women cassava processors (Fapojuwo, 2010). In a similar study by Bello *et al.* (2013), it was reported that 59% of women cassava processors in Doma Local Government Area of Nassarawa State have no formal education. According to Abdoulaye *et al.* (2014) in their study of awareness and adoption of improved cassava varieties and processing technologies in Nigeria, younger farmers have been found to be more knowledgeable about new practices and may be willing to bear risk and adopt new technologies because of their long planning horizon. The older the farmer the less likely they are able to adopt new practices as they place confidence in their old ways and methods.

Access to credit is also a very important factor in agricultural food processing enterprise. For women to fully participate in cassava processing there is need for access to credit. They should move beyond credit from friends and relatives to credit from cooperatives and banks. Credit is a very strong factor needed to acquire or develop an enterprise. Without credit most farmers cannot afford recommended inputs because the income of small scale farmers in Nigeria is very low (Chianu and Tsuji, 2004). They also found close relationship between access to credit and decision to adopt innovations. Credit therefore is often used to promote adoption of agricultural innovations.

Membership of association is also very important because it is an avenue by which people come together to achieve in group what they cannot achieve alone. For example, membership of association can serve as a means to access credit, labour and information on techniques and enterprises. Being a member of an association encourages social participation which serves as a forum where farmers could exchange information and ideas on new farm practices (Ekong, 2003). Membership of association enhances interaction and exposes farmers to information about improved farm practices thereby yielding high success rates when they work in group.

2.5 Level of Awareness of Improved cassava Processing Technologies

Awareness of improved agricultural technologies is the first stage in the adoption process. It is the stage where an individual or group first learns about the existence of a technology (Ekong, 2003). It is a very important stage in the adoption process because women cassava processors should be aware of a technology before they ever think of adopting it.

Awareness and knowledge of a technology is a prerequisite for its use as farmers with firsthand information from research and extension agents have higher awareness and use in all introduced technologies (Abdoulaye *et al.*, 2014). According to Yahaya and Olayide (2006) farmers in Nigeria have very high awareness of associated technologies.

2.6 Sources of Information on Improved Technologies

The world is globalizing and knowledge, information and communication have become significant factors for production and services and as a result acquire more importance (Ani, 2007). It is for this reason that Gurstein (2003) asserted that information and communication have become an increasingly powerful tool for improving the delivery of basic services and enhancing social development opportunities.

There are many sources of information on improved cassava processing technologies available for women cassava processors. The type of sources of information in use depends on the locality and the focus group. Fadiji (2000) reported that radio as a channel of information was recognized as the most accessible and potentially useful means of stimulating farmers to become more actively involved. Even farmers in rural areas who do not have access to computer and television and are not literate to read printed media can have access to information through the radio. In addition to that, Yahaya and Aina (2007) in their study of role of information source and communication channels in adoption of improved practices by farmers found that 97% of farmers had access to information from extension agents. According to Jibowo (2000), audiovisuals and other teaching methods are used to transmit results of research to farmers.

2.7 Level of Adoption of Improved Cassava Processing Technologies

Adekoya and Tologbonse (2005) defined adoption as a mental process which an individual passes through in deciding to use an innovation or a new practice. According to Agbamu (2006) adoption is the acceptance and continued use of innovations after individuals or groups have gone through certain processes. In addition Rogers (1995) defined adoption as the decision to make full use of innovation or technology as the best course of action available. Adoption does not take place drastically, it goes through a process. For example, the farmer first of all hear about the technology, learns about it, tries it, then take time to think whether to adopt it or not. Adoption level of a technology refers to the number of people using the technologies as a percentage of the total number of respondents studied.

2.8 Effect of Adoption of Improved Cassava Processing Technologies

Effect of adoption of improved cassava processing technologies differs from one locality to the other and from one focus group to the other. The effects of adoption of technologies can be in the form of change in output, income and livelihood of the adopters. Suleman (2012) in his study of factors influencing adoption of improved cassava processing technologies by women processors in Akoko-Edo Local Government Area, Edo State found that adoption of improved cassava processing technologies resulted in increased output, income and level of living for the women cassava processors. Also, Bakut (2013) in his study of factors influencing adoption of recommended cassava production practices by farmers in Bwari and Kuje Area Councils, Abuja found that output and income of respondents inceased after adoption.

2.9 Cassava Processing Technologies

Cassava processing by traditional method is labour intensive (FAO, 2005). On the other hand application of improved processing technology results in reduced processing time and labour which in turn encourages increased output from processing. According to IITA (2004), engineering research in Nigeria and other African countries resulted in successful mechanization of some of the laborious and time-consuming cassava processing operations.

2.9.1 Traditional cassava processing technologies

When using the traditional method of processing cassava into gari the cassava is first of all peeled, washed and grated by hand using perforated tin containers of different shapes. The grated cassava is then packed into sacks and heavy stones or logs of woods are placed upon it to press out the water or moisture content. After draining water from the grated cassava, it is sieved by manual sieves and then fried using aluminum pans over firewood which involves a lot of fumes and smoke.

2.9.2 Improved cassava processing technologies

In a bid to overcome the inherent problems of the traditional cassava processing giant strides have been made towards mechanizing several labor-intensive operations notably grating, water expression and milling. Various agro-engineering centres such as Rural Agro-industrial Development Scheme (RAIDS), Product Development Agency (PRODA), Federal Institute of Industrial Research (FIIRO),National Root Crop Research Institute (NRCRI) and International Institute for Tropical Agriculture (IITA), as well as the Agricultural Engineering Departments in several universities in the country, have developed many mechanized units designed to remove the constraints that

processors face at the household level (FAO, 2005). The application of improved cassava processing technology results in reduced processing time and labour (Nweke, 1997). Under the transformation regime, high yielding cassava varieties have been developed to improve yield while labour saving and improved processing technologies have been put into place thus reducing the cost of producing and processing cassava products (Nweke *et al.*, 2002).

Mechanical grater: Processing of cassava into gari by the improved method involves using the mechanical grater to grate cassava instead of using hand graters. The mechanical graters have blades that grate cassava faster because they are motorized. They are either powered by diesel or petrol.

Mechanical grater: Different kinds of pressers are used to dehydrate the grated cassava. Commonly used grater is the screw press. The grated cassava is poured into sack and kept under the steel frame. The screw is then turned and in the process, moisture (or water) is pressed out of the cassava paste.

Mechanical Sifter: This consist an iron mesh attached to iron bars. It is rectangular in shape and raised above the ground level. As the mesh tray moves left and right, it sieves the grated and pressed cassava into a fine and uniform consistency ready for frying.

The fryer (toaster): The fryer or toaster takes care of the grated, pressed and sieved cassava. It consists an aluminium pan moulded round about with clay and raised above the ground level. Firewood is commonly used to supply heat. There is an iron pipe

which serves as exhaust for the smoke. So when frying the gari there is no side effect of smoke and fumes on the people involved.

2.10 Processing of Cassava into Gari

Gari is the most popular form of cassava consumed in West Africa. To make it, the tubers are peeled, washed, grated and packed into bags. The bags are subjected to pressure in order to remove the water, and are left for 2-4 days. This period permits a slight amount of fermentation which further reduces the glucoside content of the meal. At the end of this period the meal is sieved and then toasted on shallow metal pots over fire. Palm oil may be added during the toasting to impart a yellowish colour to the gari and to prevent the product from burning during toasting. The final product may again be sieved to get fine and uniform granules. Gari is an ideal convenience food since it is dry and can be stored for long periods. It can be eaten dry as a snack or soaked in water and eaten. Most commonly, however, it is poured into boiling water to form a paste known as "eba" which is eaten with soup or stew (Onwueme and Sinha, 1991).

2.11 Factors Influencing Adoption of Improved Cassava Processing

The adoption of improved cassava processing is influenced by many factors. Some of the factors are socio-economic, institutional while others are technological. Adoption is a mental process through which an individual passes from first knowledge of an innovation to a decision to adopt or reject and later confirmation of his decision (Ekong, 2003). The most important factors affecting adoption behaviour of processors are their personal and socio-economic characteristics (Onu and Madukwe, 2002). Atala (1984) in his study of the relationship between socioeconomic factors and agricultural innovation and utilization of information sources in two Nigerian villages found out that the most

important variables which influenced adoption were extension contact , farm size and hired labour. In agriculture generally, factors that influence adoption of recommended practices include profitability, compatibility and viability of the technologies (Bolorunduro *et al.,* 2005).

2.12 Constraints Faced by Women in Adoption of improved Cassava Processing Technologies

A number of constraints to adoption of improved cassava processing technologies have been identified by researchers. For instance, the Food and Agriculture Organization of the United Nations (FAO, 2004) identified high cost of peeling of cassava root and also quick deterioration of roots. Machines designed to peel the tubers are not successful due to the non uniformity of the tubers. So, peeling is mainly done manually using knives which require labour from many people. It is also time consuming and cumbersome.

IITA (1990) and RMRDC (2004) also see the following as constraints in the processing of cassava. Gari frying expose those cooking the gari to heat, smoke and cyanide fumes. High cost of technology and as a result of that many of the processors cannot own processing machines. They have to take their cassava to processing centers which are often far away. No access to technology as most of the technologies are sometimes located far way from the processors. Limited access to credit and insufficient extension staff to teach new innovation are also identified as constraints. Odurukwe *et al.* (2006) in his study of the impact of Women in Agriculture (WIA) on women's lives outlined some of the constraints faced as follows: Lack of capital, unavailability of machine, difficulty in operation as most of them are operated by men. Limited access to credit, insufficient extension staff to teach new technology and difficulties in transporting cassava.

Poly-Mba and Udeogu (2002) in their study of Women Participation in Root Crop Production observed that about 63% of the respondents have no access to farm credit. This is due to the fact that women are rarely considered credit worthy because they have no collateral. Ajala *et al.* (2013) in their study of assessment of extension service delivery on improved cassava technology among cassava farmers in Osun state observed that about half of the respondents do not have extension contact. Adesoji (2009) in a similar study found that there is very low level of extension contact among farmers.

2.13 Theoretical Framework

The theoretical framework by which this study will be guided is the theory of social change using the adoption and diffusion perspectives.

2.13.1 Social change theory

Social change is defined as a process by which alteration occur in the structure and function of a social system (Rogers, 1971). Social change may also be referred to as the alteration in the social order of a society. Social change may include changes in nature, social institutions, social behaviors or social relations. Social change may be driven by cultural, religious, scientific or technological forces. A social system may be a social group, a community, a city, a region or a nation. Ekong (2003) stated that social changes are brought about mainly through invention, diffusion and discovery and they may refer to changes in behavioural patterns, norms and values over time.

Theories of social change have in general been concerned with the explanation of the sources of social change, the time span of change and the effect of change on the

changing unit (Ani, 2007). Change comes from two sources: One source is random or unique factors such as climate, weather, or the presence of specific groups of people. Another source is system factors. For example, successful development has some general requirement such as a stable and flexible government, enough free and available resources and a diverse social organisation of society.

Social change may be planned or unplanned. Planned change is conscious, deliberate and an intended attempt to bring about the change by one or more agents (Rogers, 1995). The adoption of improved cassava processing technologies by women cassava processors in Ankpa Local Government Area is a planned change because the ADP deliberately introduced the technologies in the area to boost output and consequently income from cassava processing.

2.13.2 Adoption and diffusion perspectives

Adoption is an individual process detailing the series of stages one undergoes from first hearing about a product to finally adopting it. Rogers (1995) defined adoption as the decision to make full use of innovation or technology as the best course of action available. Another important and influential idea discussed by Rogers is the concept of adopter categories. This concept states that for any given innovation a certain percentage of the population would readily adopt the innovation while others will be less likely to adopt. The concept of adopter category is important because it shows that all innovations go through a natural, predictable and sometimes a lengthy process before becoming widely adopted within a population. According to Rogers there is usually a normal distribution of the various adopter categories that form the shape of a bell curve.

Diffusion of innovation is a theory that seeks to explain how, why and at what rate new ideas and technology spread through cultures. According to Rogers (1995), diffusion is the process by which an innovation is communicated through certain channels over time among members of a social system. Ekong (2003) outlined the four main elements that influence the spread of a new idea. They are: innovation, communication channels, time and social system. This process relies largely on human capital because the innovation must be widely adopted in order to self-sustain.

2.13.3 Adopter categories

Ekong (2003) classified adopters into categories on the basis of the relative time they take to adopt innovations as follows: innovators, early adopters, early majority, late majority and laggards.

The innovators: They are the first individuals to experiment with and adopt new practices. They do not wait for an innovation to be tried by others but go out to try it themselves. They are venturesome, daring and rash risk takers. They are usually younger, more highly educated, more widely travelled, sharper to comprehend and apply complex technical ideas, of higher social class and often operate more efficient, specialized and larger farms than others in the community.

The early adopters: They are individuals who are among the first to use, though not to try out new practices. They are not as venturesome as the innovators but are among the first to adopt tried ideas or practices. They have high levels of education and participate in a number of formal organizations.

The early majority: They are those who adopt a new idea just before the average member of the community does. They take some time to deliberate before adopting an innovation hence their adoption period is longer than that of either the innovators or early adopters.

The late majority: These are individuals who are usually skeptical about innovations and only adopt when the average members of the society have adopted. They want to be absolutely sure that the innovation works. They are generally poorly educated, relatively older and poorer than the average.

The laggards: They are individuals who are the very last to adopt an innovation. They have no opinion leadership: are isolated and suspicious of others: are traditional and very conservative in outlook: are poorly educated or not formally educated at all: not widely travelled: have little specialization: are very poor: are very old and tend to be alienated from a too fast-moving world.

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widely travelled: have little specialization: are very poor: are very old and tend to be alienated from a too fast-moving world.

2.13.4 Stages of adoption

Awareness stage: This is the stage at which the farmer learns about an idea for the first time. However, at this stage he has little knowledge about it. He may have heard about the innovation from other family members, friends, neighbours, the mass media, change agents, sales promoters or other cooperative organization. Depending on the individuals felt need he might want to go on and find out more about the innovation.

Interest stage: This stage entails that farmer develops interest and actively seeks further information about the innovation such as how it works and what its potentials are. In this process, he might be assisted by the amount of information accessible to him.

Evaluation stage: This is the stage where the farmer shows a marked interest in the idea as it applies to him, his farming operations and his family. He wants to know how much it costs and how it works, whether there is guaranty on it or whether spare parts are available, etc.

Trial stage: This stage is the stage that occurs when the farmer has weighed the advantages and risks involved and makes a physical trial of it on his own farm and on small scale.

Adoption stage: This is the final stage when the farmer now applies the innovation on a large scale and continues to use it in preference to the old model.

2.13.5 Rate of adoption

Rogers (1995) defined the rate of adoption as the relative speed in which members of a social system adopt an innovation. Rate is usually measured by the length of time required for a certain percentage of the members of a certain system to adopt an innovation. Rogers (1995), presented three adoption / diffusion theories. They are:

i. **Innovation decision process theory**: Potential adopters of a technology progress over time through five stages in the diffusion process. Firstly, they must learn about the innovation (knowledge); secondly, they must be persuaded of the value of the innovation (persuasion); then they must decide to adopt it (decision); the innovation must be implemented (implementation) and finally, the decision must be reaffirmed or rejected (confirmation). The focus is on the user or adopter.

ii. **Individual innovativeness theory**: Individuals who are risk takers or otherwise innovative will adopt an innovation earlier in the continuum of adoption / diffusion.

iii. **Rate of adoption theory**: Diffusion takes place over time with innovations going through a slow, gradual growth period followed by dramatic and rapid growth in the adoption process and then a gradual stabilization and finally a decline.

2.14 Conceptual Model

Fig. 1 below is a diagram of the conceptual model which identifies the factors influencing adoption of improved cassava processing technologies by women in the

study area. A concept is a means by which social scientists seek to analyze social phenomena to classify the objects of the observed world, impart meaning through explanation to these phenomena and formulate higher level prepositions on the basis of these observations (Scott and Marshall, 2005). In the context of the study the independent variable in the model includes:

i. Socio-economic variables which comprises age, educational status, marital status, household size and processing experience.

ii. Institutional variables which comprises contact with extension agents, credit received and membership of association.

iii. Technological variables which comprises affordability, compatibility and complexity.

The dependent variable is the rate of adoption of improved cassava processing technologies. Technologies considered were mechanical grater, screw press, mechanical sifter and fryer (toaster).

The model in figure 1 shows that the independent variables (X) would influence the dependent variable (Y) which is the rate of adoption of improved cassava processing technologies. The observable effects of adoption of improved cassava processing technologies are change in output from cassava processing and change in income of the processors.

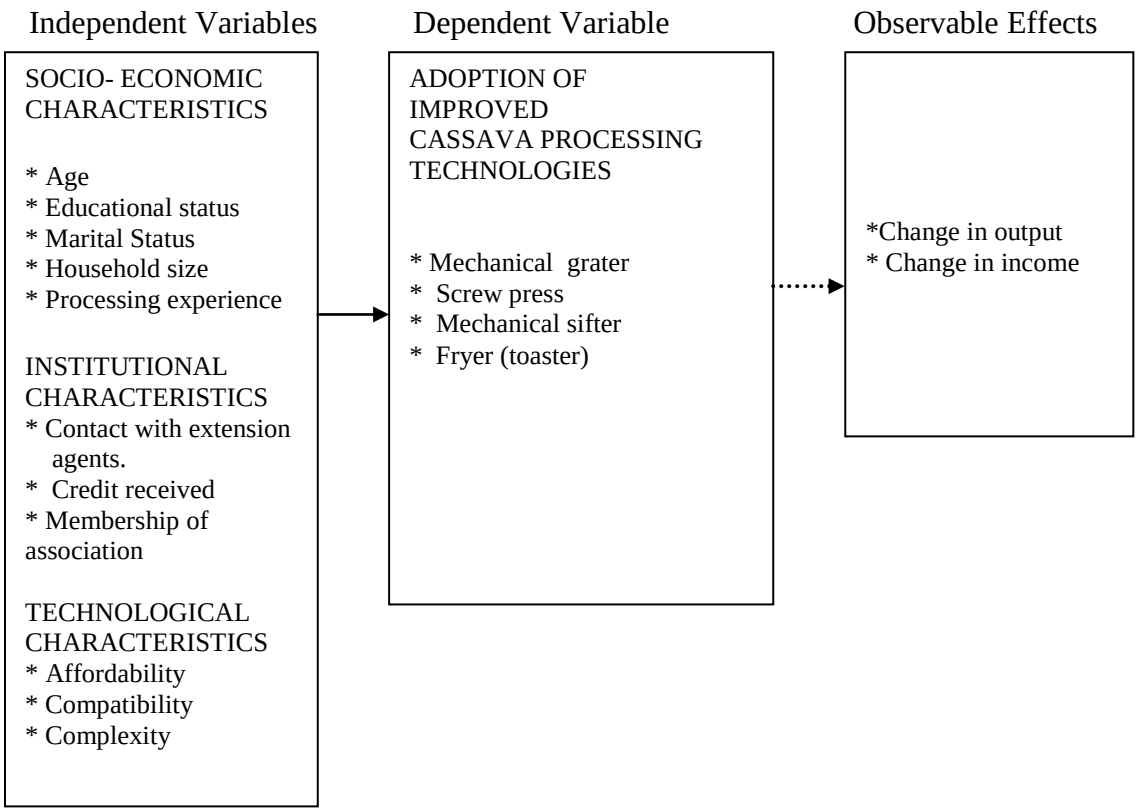


Fig 2.1: A model of socio-economic, institutional and technological factors influencing adoption of improved cassava processing technologies by women processors.

CHAPTER THREE

METHODOLOGY

3.1 The Study Area

The study was conducted in Ankpa Local Government Area of Kogi State. The State is located in North Central Nigeria and made up of 21 Local Government Areas. Kogi State has a total land area of 28,313.53 square kilometers and has a population of 3,595,789 (NPC, 2006). The projected population of Kogi State in 2015 using an annual growth rate of 2.5% is, therefore, 4,225,052. The state is situated between Latitude 6^0 26^1N and 8^0 45^1N and Longitude 6^0E and 8^0E. It is situated in Central Nigeria middle belt and bordered by ten (10) states and Abuja, the Federal Capital. Specifically, the boundaries are Abuja to the North, Nassarawa to the North-East, Benue and Anambra to the East, Enugu to the South-East, Edo to the South-West, Ekiti and Ondo to the West and Niger to the North (NPC, 2006).

Kogi State has two seasons; the wet and dry. The wet season begins in March and ends in October while the dry season spans between November and early March. The annual rainfall is between 1016mm and 1524mm while mean temperature ranges between 24^0c and 27^0c. Ankpa, one of the 21 Local Government Areas was chosen for the study because of the extensive cassava processing activities in the area. It is located in the Eastern part of the state and occupies an area of about 482.5 square kilometers. The population figure according to 2006 census was 266,176 (NPC, 2006). The projected population for 2015 using an annual growth rate of 2.5% is, therefore, 312,756.

Farming is the major occupation of the area. Both sole and mixed cropping is practiced. The major crops grown are yam, cassava, maize, cowpea, melon, bambara, beniseed

(sesame), oil palm, castor, cashew and citrus. Cropping pattern is more of mixed cropping than sole cropping. In addition to crops livestock such as goats, sheep and poultry are also kept.

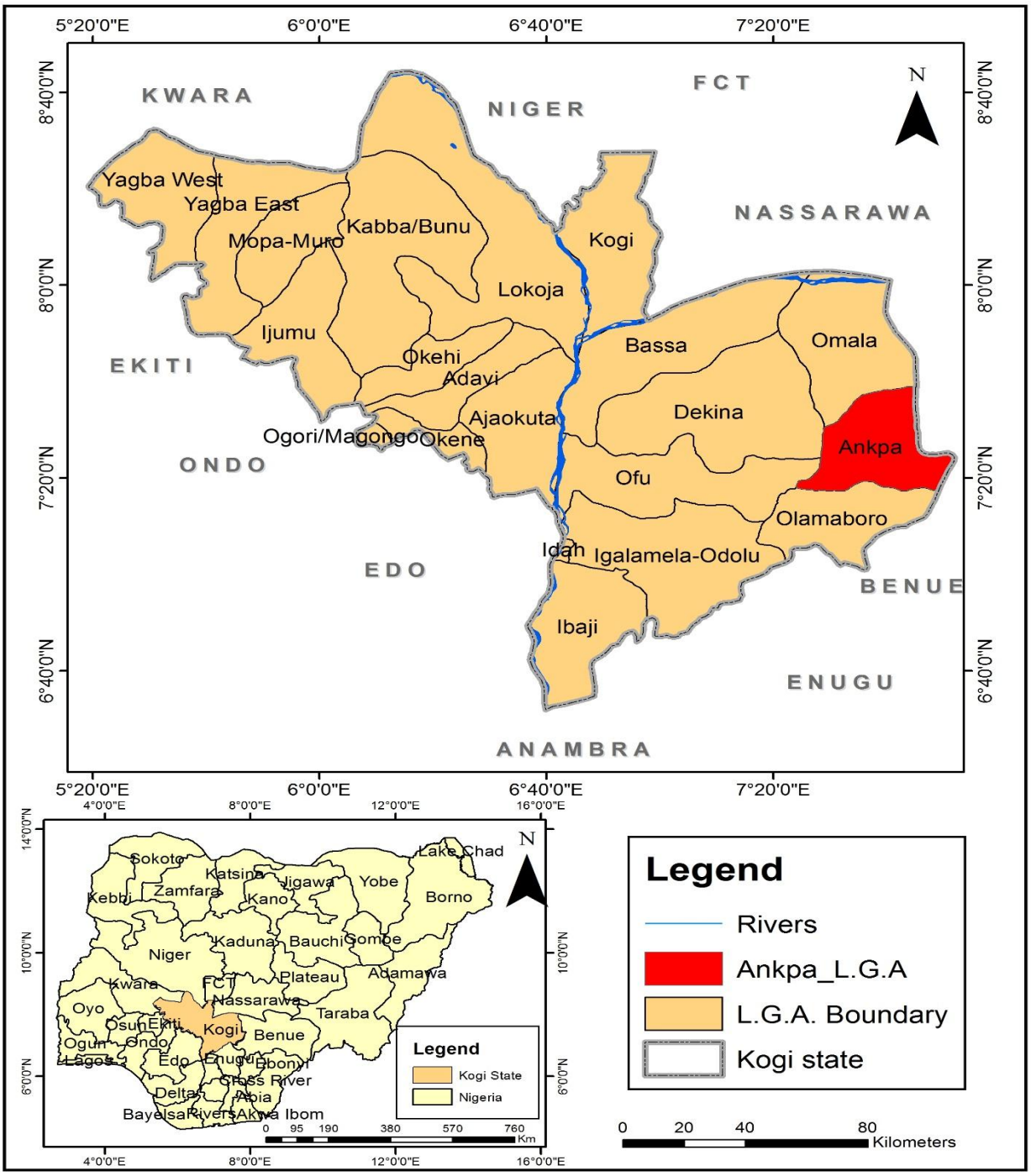


Figure 3.1: Map of Kogi State Showing the Study Area.

3.2 Sampling Procedure and Sample Size

The population studied were women involved in cassava processing in Ankpa Local Government Area. Ankpa is made up of three districts which are Ankpa, Enjema and Ojoku. Purposive samplings were used to select one village each from the three districts which comprises Ikanekpo from Ankpa, Inye from Enjema and Awo-Akpali from Ojoku. The selection was based on the high involvement of women in cassava processing in those areas. A reconnaissance survey carried out in 2014 showed that there were 760 women cassava processors comprising 254 in Ikanekpo, 196 in Inye and 310 in Awo-Akpali. Therefore, 20% of this sample frame of 760 was chosen using random sampling to get a sample size of 152 comprising 51 from Ikanekpo, 39 from Inye and 62 from Awo-Akpali.

Table 3.1: Distribution of respondents according to districts and villages showing proportionate sample size of respondents

Districts	**Villages selected**	**Population of women cassava processors**	**sample size (20 %)**
Ankpa	Ikanekpo	254	51
Enjema	Inye	196	39
Ojoku	Awo-Akpali	310	62
Total		**760**	**152**

3.3 Method of Data Collection

In carrying out this study, primary source of data was used. The data was obtained by using structured questionnaire administered to the women cassava processors by enumerators. Information collected from the respondents focused on their socio-economic characteristics such as age, educational status, marital status, household size and processing experience. Institutional characteristics such as contact with extension agents, credit received and membership of association were also collected. In addition, data on the technological characteristics such as affordability, compatibility and complexity were also collected.

3.4 Analytical Techniques

The following analytical tools were used for the study:

i. Descriptive statistics

ii. Regression analysis

iii. Z-test statistics

3.4.1 Descriptive statistics

Descriptive statistics which involves the measures of central tendency such as mean, frequency distribution, tables and percentages was used to achieve objectives i, ii, iii, iv and vii.

3.4.2 Regression analysis

The regression analysis was used to achieve objective v which was to determine the factors influencing women adoption of improved cassava processing technologies by women cassava processors in the study area.

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. The model is specified as linear production function as follows:

$$Y = a + b_1 X_1 + b_2 X_2 + b_3 X_3 + \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots + b_{11} X_{11} + e \ldots(1)$$

Where

Y = Adoption of improved cassava processing technologies

X_1 = Age (in years)

X_2 = Marital status (married =2 ,single, divorced and widowed = 1)

X_3 = Educational status (No. of years spent in school)

X_4 = Household size (in number)

X_5 = Processing experience (No. of years spent in processing)

X_6 = Contact with extension agents (No. of visits received)

X_7 = Credit received (amount in ₦)

X_8 = Membership of associations (No. of years)

X_9 = Affordability of technologies (5- point Likert scale)

X_{10} = Compatibility of technologies (5 – point Likert scale)

X_{11} = Complexity of technologies (5- point Likert scale)

$b_1 – b_{11}$ = regression coefficients

a = Constant

e = error term

3.4.3 Z-test statistic

Z - test was used to achieve objective vi. That is, to examine the effect of adoption of improved cassava processing technologies on the women's output and income before and after adoption. The Z – test statistic was used to examine the differences in output and income of the women processors before and after adoption between 2010 and 2014 respectively. The Z – test is presented as follows:

$$Z = \frac{\overline{X}_1 - \overline{X}_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}} \quad \text{.....(2)}$$

Where:

Z = The calculated Z – value

$\overline{X}_1$ = Mean output/income of women after adoption of improved cassava processing technologies

$\overline{X}_2$ = Mean output/income of women before adoption of improved cassava processing technologies

S_1^2 = Standard deviation of output/income of women after adoption of improved cassava processing technologies

S_2^2 = Standard deviation of output/income of women before adoption of improved cassava processing technologies

n_1 = No. of women cassava processors after adoption of improved

cassava processing technologies

n_2 = No. of women cassava processors before adoption of improved cassava processing technologies

3.5 Definition and Measurement of Variables

3.5.1 Independent variables

i. **Age**: The age of the farmer is important in determining productivity and it can influence the women processors' decision to hold on to traditional practices. Age was measured in number of years and based on the actual age of respondents given at the time of the study. It is expected that the older the women cassava processors the reluctant they become in adopting the improved cassava processing technologies.

ii. **Educational status**: Education tends to increase one's access and opportunities to diverse knowledge such as the use of agricultural innovations and utilization of credit opportunities. It is expected that the more educated the women processors the more likelihood of adopting the improved cassava processing technologies. This was measured by the total number of years spent in school.

iii. **Marital status:** Respondents who were married scored 2, while respondents who were single, widowed or divorced scored 1. However 2 and 1 here are nominal measures. It is expected married women as compared to the singles have more dependants so they engage in income-generating ventures to meet up with family demands.

iv. **Household size**: This is the total number of people who live in the same dwelling place and also share at meals or living accommodation. Ojukaiye (2001) defined household size as the number of people eating from the same pot. Most farmers still depend on the strength of the family labour to boost productivity. In this study household size was measured in number to include the husband, the wife (wives), the children and other dependants in the home. It is expected that respondents with larger household will tend to adopt more because the size of the family contribute a lot to labour availability.

v. **Processing experience**: This refers to the number of years spent in cassava processing. Experience could indicate practical knowledge acquired and it can also influence efficiency. This was measured by the number of years the processors spent in cassava processing business.

vi. **Membership of association**: This means social participation. It was measured by the number of years spent in association. It is expected that the respondents belonging to association tend to adopt more because through the associations they can access information, credit and even inputs which can boost their cassava processing enterprise.

vii. **Contact with extension agents**: Contact with extension agents enables farmer to be aware of new technology which will improve his processing business. This was measured by the number of visits by extension personnel received.

viii. **Credit received**: This refers to the external source of fund received by processors from donor agency, government or private for cassava processing

business. This was measured by the reported amount received in naira by the respondent in the past one year. It is expected that women who have received credit are more likely to adopt the improved cassava processing technologies.

ix. **Affordability:** This is the extent to which an innovation is affordable by the respondents. This was measured by the use of a 5-point Likert Scale. Not affordable - 1, fairly affordable – 2, Undecided – 3, Very affordable - 4, Highly affordable – 5.

x. **Compatibility**: This is the extent to which the recommended technology is perceived to meet the need and values of the respondents. This was measured by the use of 5-point Likert scale. Not compatable – 1, Fairly compatible -2, Undecided – 3, Very compatible – 4, Highly compatible – 5.

xi. **Complexity**: This is the degree to which the recommended technology is perceived as complicated or difficult to use. This was measured by the use of 5-point likert scale: Not complex -5, Fairly complex – 4, Undecided – 3, Very complex – 2, Highly complex – 1.

A 5-point Likert scale was assigned weights of 5,4,3, 2,1 respectively. This was used to measure the technological characteristics of improved cassava processing technologies adopted by the respondents. To calculate the average weighted scores of technological characteristics, the midpoint values of the scale was summed up and divided by 5 to obtain a mean score of 3. Any technological attribute with mean score of 3 and above was considered affordable, compatible or complex. On the other hand any mean score less than 3 were considered not affordable, not compatible or not complex.

3.5.2 Dependent variable

The dependent variable in this study is level of adoption. This is defined as the acceptance and usage of new/ better technologies on large scale and on continuous basis. The technologies in this study are the mechanical grater, the screw press, the sifter and the fryer. The adoption of four improved cassava processing technologies was measured by allotting percentage scores to each respondent based on their level of use of improved cassava processing technology.

3.5.3 Observable Outcomes

i. **Output:** This refers to the products (e.g gari) obtained from processed cassava which was measured in Kilogram (kg).

ii. **Income:** This refers to the money realized from the sale of processed cassava products. This was measured in Naira (₦).

CHAPTER FOUR

RESULTS AND DISCUSSION

This chapter contains a detailed presentation and discussion of the results of the study. It presents results from data analysis and interpretation. The results are in accordance with the stated objectives of the study.

4.1 Socio-Economic and Institutional Characteristics of the Respondents.

Certain socio-economic and institutional characteristics were considered in this study in order to obtain valuable information on the effects of such variables on adoption of improved cassava processing technologies.

4.1.1 Age of the respondents

Table 4.1 shows that 41% of the respondents were between the ages of 21-30, 26% were between the ages of 31-40, 24% were between the ages of 41-50, while 7% and 1% were between the ages of 51-60 and 61-70 respectively. The mean age of the respondents is 35. The results showed that 68% of the respondents were between the ages of 21-40. This implies that respondents are in their youthful and active ages in which productive energy is very high. This agrees with the finding of Odebode (2008) who reported that perception and adoption of innovation is mainly associated with youthful and active age of the farmers. It is also in consonance with Suleman (2012) who reported that 92% of the cassava processors interviewed were between 21and 60 years old. This age range (21-40) can be regarded as the active and youthful age when women can make vital decisions and impact on agricultural processing and technological development in general.

Table 4.1: Distribution of respondents according to their Age.

Age (years)	Frequency	Percentage
21-30	63	41.45
31-40	40	26.32
41-50	37	24.34
51-60	11	7.23
61-70	1	0.66
Total	**152**	**100**
Mean	**35**	

4.1.2 Marital status of respondents

Marital status can be referred to as the state of being married or single. The result in Table 4.2 showed that 14% of the respondents are single, 68% are married, while 7% and 11% are divorced and widowed respectively. Majority of the respondents (68%) are married. This agrees with Ekong (2003) who asserted that majority of married women in rural areas are into agricultural activities. This also agrees with the findings of Bello *et al.* (2013) who in their study of rural women processing cassava in Doma Local Government area of Nasarawa State found that 85% of the respondents were married. Married people have family responsibilities in terms of income to meet the family needs and increased family labour as opposed to their unmarried counterparts.

Table 4.2: Distribution of respondents according to their marital status

Marital Status	Frequency	Percentage
Single	22	14.47
Married	104	68.42
Divorced	10	6.58
Widowed	16	10.54
Total	**152**	**100**

4.1.3 Educational status of respondents

Table 4.3 presents the distribution of the respondents according to their educational levels. The result showed that 16% of the respondents had no formal education. About 44% had primary education, 30% had secondary and 9% had tertiary education. The mean value of the number of years spent in formal school is 5 Years. This implies that they need more enlightenment from extension agents on the importance and usage of the improved technologies. Sofoluwe *et al.* (2011) confirmed that education influences people's perception and adoption of innovations.

Table 4.3: Distribution of respondents according to their educational status

Education	Frequency	Percentage
No formal education	25	16.44
Primary education	67	44.07
Secondary education	47	30.92
Tertiary education	13	8.95
Total	**152**	**100**

4.1.4 Household size of the respondents

Table 4.4 presents the distribution of the respondents according to their household size. It showed that respondents with household size of between 6-10 had the highest percentage (47%), followed by between 11-15 and between 1-5 which had 24% and 23%, respectively. Only 5% of the respondents had household size of between 16-20. The mean household size of the respondents is 9 persons. This is similar to Adebayo *et al*. (2003) who reported an average household size of 7 persons. This implies that the larger the household size the more labour availability and the more income requirement to meet household needs.

Table 4.4: Distribution of respondents according to their household size

Household size	**Frequency**	**Percentage**
1-5	35	23.03
6-10	72	47.37
11-15	37	24.34
16-20	8	5.26
Total	**152**	**100**
Mean	**9**	

4.1.5 Processing experience of respondents

The result of the study on Table 4.5 showed that 21% of the respondents had processing experience of between 1-5 years, 25% had processing experience of between 6-10 years, 30.3% had processing experience of between 11-15 years while 16% and 7% had the processing experience of between 16-20 years and between 21-25 years, respectively. The mean number of years of processing experience was 10 years. The finding showed

that 72% of the respondents had processing experience of between 6-20 years. This is in agrees with the findings of Bakut (2013) who asserted that farmers with long years of farming experience would be conversant with the constraints and this would increase their level of acceptance of new ideas as means of overcoming their production constraints.

Table 4.5: Distribution of respondents according to processing experience

Processing experience (years)	**Frequency**	**Percentage**
1-5	32	21.05
6-10	38	25.00
11-15	46	30.26
16-20	25	16.45
21-25	11	7.24
Total	**152**	**100**
Mean	**9**	

4.1.6 Extension contact of the respondents

The result presented on Table 4.6 shows that 73% of the respondents have not had any visit from the extension agents or to the extension agents in all their years of processing. Only 27% of the respondents have had visit from the extension agents in the last two years.

About 34% of the respondents had visit once in a year, 39% had the visit twice in a year and 26% had the visit thrice in a year. This implies that the rate of extension visit is inadequate. This validates the findings of Fapojuwo (2010) which revealed that women processors had little or no contact with extension agents. Also Ajala *et al.* (2013) in an

assessment of extension service delivery on improved cassava technology among cassava farmers in Osun State observed that half of the respondents do not have extension contact. As women get more contact with extension agents they are likely to learn modern techniques of cassava production and processing and thus their involvement in them (Onyemauwa, 2012).

Table 4.6: Distribution of respondents according to access to extension contacts

Extension contact (N=152)	**Frequency**	**Percentage**
Extension contact		
No access to extension contact	111	73.03
Have access to extension contact	41	26.97
No of visits in a year (n= 41)		
Once in a year	14	34.15
Twice in a year	16	39.02
Thrice in a year	11	26.83

4.1.7 Credit received by the respondents

Table 4.7 shows that only 20% of the respondents received credit while 80% of the respondents did not receive credit. This implies that majority of the respondents did not have access to credit.

The result also shows that credit from cooperative was the largest (42%), followed by local money lenders with 29%. About 13% had credit from relatives and friends while 6% had credit from their husbands. Finally, 6% had credit from banks while 3% had credit from agricultural agencies.

Table 4.7: Distribution of respondents according to sources of credit

Source of credit (n = 31)	Frequency	Percentage
Credit accessibility		
Accessible	31	20.39
Not accessible	121	79.60
Conventional sources		
Banks	2	6.45
Cooperative societies	13	41.94
Agriculture agencies	1	3.23
Non – conventional sources		
Local money lenders	9	29.03
Relatives and friends	4	12.90
Husband	2	6.45
Total	**31**	**100**

Table 4.8 shows that 13% obtained cash of less than ₦10,000, 10% of the respondents obtained cash in the range of ₦10,000 – 20,000, 32% obtained cash in the range of ₦21,000 – ₦30,000, 19% obtained cash in the range of 31,000 – ₦40,000, while 23% of the respondents obtained cash in the range of ₦41, 000 – ₦50, 000 3% obtained cash greater than ₦50,000. The mean cash received was ₦17, 000. This mean cash of ₦17,000 implies that the respondents who obtained credit in the form of cash can

conveniently purchase cassava tubers in bulk and also afford other inputs and expenses incurred in the course of their processing activities. The importance of access to credit was emphasized by Poly-Mba and Udeogu (2007) in their study of women participation in root crop production who found that 63% of the respondents have no access to farm credit due to the fact that women are rarely considered credit worthy because in many cases they are without collateral.

Table 4.8: Distribution of respondents according to amount of credit received.

Amount of credit received (₦) (n = 31)	**Frequency**	**Percentage**
<10,000	4	12.9
10,000 – 20,000	7	22.58
21,000 – 30,000	10	32.26
31,000 – 40,000	6	19.35
41,000 – 50,000	7	22.58
Greater than 50,000	1	3.23
Total	**31**	**100**
Mean	**17000**	

4.1.8 Membership of associations

Table 4.8 shows that majority of the respondents (78%) do not belong to any association while only 22% belonged to associations. This implies that majority of the respondents do not belong to any associations. The result also shows that 35% of the respondents spent between 1-5 years in associations, 26% of the respondents spent between 6-10 years in associations, another 26% spent between 11-15 years in associations and finally 13% spent between 16-20 years in associations. This is in agreement with the findings

of Chikezie *et al*. (2012) in their study of factors influencing rural youth adoption of cassava recommended production practices where they found that 81% of the respondents do not belong to any associations.

Table 4.8: Distribution of respondents according to membership of associations

Membership of associations	**Frequency**	**Percentage**
Membership of associations (N=152)		
Belonged to associations	31	22.39
Do not belong to associations	121	77.61
Years spent in associations (n= 31)		
1 – 5	11	35.48
6 – 10	8	25.81
11 – 15	8	25.81
16 – 20	4	12.90
Mean	9	

4.1.9 Technological characteristics of respondents

Table 4.1.9 shows the average weighted scores of the technological characteristics as perceived by the respondents. Affordability has a mean score of 1.4 which implies that the technologies are not affordable by the respondents. The technologies are so expensive that the respondents are not able to buy. Compatibility has a mean score of 3.0 which implies that the technologies are compatible with the respondents' usual methods of processing cassava. Finally, complexity has a mean score of 1.3 which implies that the technologies are not complex, they are easy to use by the respondents.

Table 4.9: Average weighted scores of technological characteristics

Characteristics of technology	Mechanical grater	Screw press	Mechanical sifter	Fryer (Toaster)	Mean score	Overall perception
Affordability	46.0	51.4	48.8	63.2	1.4	Not affordable
Compatibility	119.2	122	100.8	113.2	3.0	Compatible
Complexity	48.5	44.8	56.2	49.41	1.3	Not complex

4.2 Awareness and Sources of Information of Improved Cassava Processing Technologies.

4.2.1 Awareness of improved cassava processing technologies

Result on Table 4.11 shows that 100% of the respondents were aware of the mechanical grater. Equally, 100% were aware of the screw press; 62% were aware of the fryer (toaster) and finally 40% were aware of mechanical sifter. The mechanical grater and the screw press having 100% awareness implies that all the respondents are aware of the mechanical grater and the screw press. Usage of any technology is preceded by first hearing about the technology and then learning about it.

Table 4.11: Distribution of respondents according to the level of awareness of improved cassava processing technologies

Processing technologies	*Frequency	Percentage
Mechanical grater	152	100
Screw press	152	100
Mechanical sifter	61	40.1
Fryer (toaster)	94	61.8

*Multiple responses

4.2.2 Sources of information on improved cassava processing technologies

Table 4.12 shows that 12% of the respondents get information on cassava processing from friends and relatives, 45% from fellow processors, 16% from radio and 5% from television and 22% from extension agents. This implies that the fellow processors are the major source through which information is disseminated to the people in the study area.

Table 4.12: Distribution of respondents according to their sources of information on improved cassava processing technologies

Sources of information	*Frequency	Percentage
Relatives and friends	22	11.96
Fellow processors	82	44.57
Radio	29	15.76
Television	10	5.44
Extension agents	41	22.88

*Multiple responses

4.3 Level of Adoption of Improved Cassava Processing Technologies.

The level of women cassava processor's adoption of improved cassava processing technologies is presented in Table 4.13. Adoption and diffusion of improved cassava processing technologies and information is likely to increase when high income expectations are projected. The adoption in this study was based on mechanical grater, screw press, mechanical sifter and the fryer (toaster) introduced to the women cassava processors.

Table 4.13 showed that the mechanical grater had the highest adoption level of 100%. This was followed by the screw press which had the adoption level of 83%. Finally the mechanical sifter and the fryer (toaster) had the adoption level of 22% and 9%

respectively. The reason for the very low adoption level of the fryer (toaster) might be that the respondents prefer using the old and traditional method of frying gari. The average level of adoption is 53% and this implies that the level of adoption of the improved cassava processing technologies is fairly high.

Table 4.13: Distribution of the respondents according to level of adoption of improved cassava processing technologies.

Technologies	***Frequency**	**Percentage**	**Level**
Mechanical grater	152	100	High
Screw press	126	83	High
Mechanical sifter	33	22	Low
Fryer	14	9	Low

*Multiple responses

4.4 Socio-Economic, Institutional and Technological Factors Influencing the Adoption of improved Cassava processing Technologies by Women in the Study Area.

The fourth objective was to determine the socio-economic, institutional and technological factors influencing the adoption of improved cassava processing technologies by women in the study area. Regression analysis was used to achieve this objective. Based on the values of the standard error of estimates, the number of significant variables and conformity of the sign of coefficient of independent variables, the result of the linear regression were chosen and used for discussion.

Hypothesis 1:

It was hypothesized that the socio-economic characteristics of the women cassava processors have no significant influence on the adoption of improved Cassava processing technologies. The socio-economic characteristics considered were age, marital status, educational status, household size and processing experience. The result as presented in Table 10 showed that three out of the five socio-economic variables considered had significant influence on the adoption of improved cassava processing technologies. Age had a negative regression coefficient of 0.048 and had significant influence on the adoption of improved cassava processing technologies at 1% level of probability. This implies that the adoption of the improved cassava processing technologies decrease with an increase in age. This agrees with Umar (2014) who found that age had significant effect on adoption of recommended onion production practices. Household size had a positive regression coefficient of 0.118 and had significance influence on adoption of improved cassava processing technology at 10% level of probability. This implies that the adoption of improved cassava processing technologies increases with increase in household size. This is because increase in household size result to increased availability of family labour and higher demand for income.

Processing experience of the respondents had a positive regression coefficient of 0.086 and had significant influence to adoption of improved cassava processing technologies at 1% level of probability. This implies that the increase in years of processing experience of the respondents resulted in increased adoption of improved cassava processing technologies. Marital status which had a negative regression coefficient of 0.070 had no significant influence on adoption. This implies that being married or unmarried does not have effect on adoption or non adoption of improved cassava

processing technologies. Educational status which had a positive regression coefficient of 0.019 was not significant to the adoption of improved cassava processing technologies. This implies that education is not mandatory in the processing of cassava. The machines are usually operated by men and with little explanation from the extension agents even those with little or no formal education can adopt the improved cassava processing technologies.

Three variables (age, household size, and processing experience) out of the five socio-economic variables had significant influence on adoption of improved cassava processing technologies. The null hypothesis which stated that the socio-economic characteristics of the women cassava processors had no significant influence on adoption of improved cassava processing technologies is therefore rejected.

Table 4.14: Effects of socio-economic, institutional and technological variables on adoption

Variable	Coefficient	Standard error	t-value
Intercept	3.427	0.570	6.01***
Socio-economic variables			
Age	-0.048	0.017	-2.84***
Marital status	-0.070	0.081	-0.86NS
Educational status	0.019	0.017	1.14NS
Household size	0.118	0.064	1.83*
Processing experience	0.086	0.029	2.99***
Institutional variables			
Credit received	1.42e-06	1.46e-06	0.97NS
Membership of association	0.036	0.017	2.02**
Extension contact	0.131	0.083	1.57 NS
Technological variables			
Affordability	0.049	0.017	2.76***
Compatibility	0.017	0.018	0.96NS
Complexity	-0.051	0.023	-2.17**

$R^2 = 0.47$, $R^{-2} = 0.41$, F value = 4.778^{***} NS=Not significant

*** P<0.01
** P<0.05
* P<0.10

Hypothesis 2

It was also hypothesized that the institutional characteristics of the women cassava processors have no significant influence on the adoption of improved cassava processing technologies. The institutional factors considered were credit received, membership of association and extension contact. Membership of association had a positive regression coefficient of 0.036 and had significant influence on adoption of improved cassava processing technologies at 5% level of probability. This implies that the adoption of improved cassava processing technologies increases with membership of association. This agrees with Deji (2005) who found membership of association

significant to the adoption behavior of farmers. Credit received had no significant influence on adoption of improved cassava processing technologies. This disagrees with Odebode (2008) who emphasized the importance of credit in the use of appropriate cassava processing technologies. Extension contact also had no significant influence on adoption. This disagrees with Umar (2004) who found extension contact significant in adoption of recommended onion production practices in Goronyo Local Government Area of Sokoto State, Nigeria. Only one (membership of association) out of the three institutional characteristics was significant. Therefore the null hypothesis which states that the institutional characteristics of the women cassava processors have no significant influence the adoption of improved cassava processing technologies is accepted.

Hypothesis 3

It was also hypothesized that the technological characteristics of the women processors have no influence on the adoption of improved cassava processing technologies. The technological characteristics considered in the study were affordability, compatibility and complexity. Affordability had a positive regression coefficient 0f 0.049 which had significant influence on adoption of improved cassava processing technologies at 1% level of probability. This implies that adoption increases with increase in the ability of the respondents to buy the technologies. Compatibility had a positive regression coefficient of 0.017 and did not have significant influence on adoption of improved cassava processing technologies. Complexity had a negative regression coefficient of 0.051 and had significant influence on adoption at 5% level of probability. This implies that adoption decreases as complexity increases. Two (affordability and complexity) out of the three technological variables considered were significant. This is in consonance with Suleman (2012) who found affordability and complexity significant to adoption of

improved cassava processing technologies. Therefore, the null hypothesis which stated that the technological characteristics of the women processors had no significant influence on adoption of improved cassava processing technologies is rejected.

The coefficient of determination (R^2) was 0.47. This implies that about 47% of the variations observed in the adoption of the improved cassava processing technologies were explained by the selected socio-economic, institutional and technological variables, output and income included in the model. The remaining 53% could be attributed to other factors that were not included in the model.

4.5 Effect of Adoption of Improved Cassava processing Technologies on Output and Income of Women Processors in the Study Area.

The sixth objective of the study was to determine the effect of adoption of improved cassava processing technologies on output and income of the respondents. Paired t-test was used to compare the mean output and mean income before and after adoption of improved cassava processing technologies by women in the study area.

Hypothesis 4

It was hypothesized that the adoption of improved cassava processing technologies have no effect on output and income of the women cassava processors. Table 4.15 shows the effect of adoption of improved cassava processing technologies on the output of women cassava processors.

Table 4.15: Effect of adoption of improved cassava processing technologies on the output of respondents.

	Output Before Adoption (kg)	*Output After Adoption (kg)*
Mean	71.052	163.158
Standard deviation	30.868	62.703
Observations	152	152
Pearson Correlation	0.685	
Hypothesized Mean Difference	0	
Df	151	
z Stat	-24.045	
P(Z<=z) one-tail	8.511E-54	
z Critical one-tail	1.655	
P(T<=z) two-tail	1.702E-53	
z Critical two-tail	1.98*	

*P<0.05

Table 4.15 shows that the average output before adoption was 71.05 and average output after adoption 163.16. The standard deviation for output before and after adoptions was 30.87 and 62.70 respectively. The calculated Z - value was 24.04 and exceeds the critical value (Z - critical) of 1.98 at 5% level of probability.

Table 4.16: Effect of adoption of improved cassava processing technologies on the income of respondents.

	Income Before Adoption (₦)	*Income After Adoption (₦)*
Mean	298315.789	678736.842
Standard deviation	124204.1	260845.1
Observations	152	152
Pearson Correlation	0.713	
Hypothesized Mean Difference	0	
Df	151	
z Stat	-24.296	
P(Z<=z) one-tail	2.431E-54	
z Critical one-tail	1.6550	
P(Z<=z) two-tail	4.861E-54	
z Critical two-tail	1.98*	

*P<0.05

From table 4.16, the average income before adoption was ₦298,315.79 and the average income after adoption was ₦678,736.84. The standard deviation for income before and after adoptions was ₦124204.1 and ₦2608451 respectively. The Z-calculated was 24.30 and was greater than Z-critical of 1.98. For both output and income, the Z - calculated were greater than the Z critical. Therefore, the null hypothesis which stated that the adoption of improved cassava processing technologies has no significant influence on the output and income of women cassava processor is rejected. The result of the analysis indicates that there is significant difference between the output and income before and after adoption of improved cassava processing technologies in the study area. In other words, adoption of improved cassava processing technologies resulted in increased output and consequently increased income for the women cassava processors in the study area. The result is consistent with the findings of Bakut (2013) in his study of factors influencing adoption of recommended cassava production practices in Bwari and Kuje area of Abuja who reported that the adoption of recommended cassava production practices resulted in an increase in total production by improving yield and income of farmers.

4.6 Constraints to Adoption of Improved Cassava Processing Technologies

This section presents the constraints encountered by the respondents in the adoption of improved cassava processing technologies. Table 4.17 shows that inadequate credit facilities as given by 80% of the respondents ranked 1st on the list of constraints. Inadequate credit is a major problem especially for women because without adequate credit the women cannot fully adopt technologies thereby leading to reduction in their productivity. Inadequate extension contact which ranked 2nd as 73% of the respondents

either complained that they have never been visited by the extension agents or that the visits are not often.

High cost of transportation and high cost of machine ranked 3rd (70%) and 4th (63%) respectively. The respondents spent a lot of money transporting cassava tubers from the farm or market to the processing centres. There is also high cost of transportation in moving their produce to market. In addition to that the improved cassava processing machines are so expensive that most of them cannot afford it so they spend a lot of money in transporting their products to and fro the processing centres where they go in search of hired machinery. High cost of cassava tubers ranked 5th (55%) and bulkiness of cassava tubers ranked 6th (47%). The cassava tubers are so bulky that their bulkiness makes transporting them very difficulty. Other constraints encountered are bad access roads (8%) and long distance to processing centres (6%) which ranked 7th and 8th respectively.

Table 4.17: Distribution of respondents according to constraints to adoption of improved cassava processing technologies.

Constraints	***Frequency**	**Percentage**	**Rank**
Inadequate credit facilities	121	79.6	1
Inadequate extension contact	111	73.0	2
High cost of transportation	107	70.4	3
High cost of machines	96	63.2	4
High cost of cassava tubers	84	55.3	5
Bulkiness of cassava tubers	72	47.4	6
Bad access roads	12	7.89	7
Long distance processing centre	9	5.92	8

*Multiple responses

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary of Findings

This study focused on adoption of improved cassava processing technologies by women in Ankpa Local Government Area of Kogi State, Nigeria. Primary data were collected from 152 respondents using structured questionnaire. The statistical tools used to analyze the data were descriptive statistics, regression analysis and Z-test. The study shows that the mean age of the respondents was 35 years. Majority (68%) of the respondents were married. The mean household size of the respondents was 9 persons. About 16% of the respondents had no formal education. The mean years of processing experience was 11 years. Only 20% of the respondents obtained credit, only 26% had extension contact and only 22% belonged to an association. The mechanical grater and the screw press recorded higher levels of awareness and adoption than the mechanical sifter and fryer (toaster).

Age, household size, processing experience, membership of association, affordability and complexity were significant to the adoption of improved cassava processing technologies. Other variables such as marital status, education, access to credit, extension contact and compatibility were not significant. The coefficient of determination (R^2) was 0.47 which means that the regression model explained 47% of the variations in the level of adoption of improved cassava processing technologies.

For both output and income, the Z-stat was greater than the Z-critical at 5% level of probability. The major constraints encountered by the respondents include inadequate

credit, inadequate extension contacts, high cost of transportation, high cost of cassava tubers, bad access roads and long distance to processing centres.

5.2 Conclusion

It is apparent from the findings that majority of women cassava processors in the study area are young and most (68%) of them are married. Being young implies they are able bodied and have the energy needed for engaging in the cassava processing enterprise. The findings also revealed low extension contact. Only few of the respondents received visit from the extension agents and none of the respondents admitted visiting the extension agents. This implies that it is only those few that received information from extension agents. The others (77%) received information from other sources like radio, fellow processors, friends and relatives.

The study revealed that age, household size, processing experience, membership of association, affordability and complexity were important factors to consider in the adoption of improved cassava processing technologies in the study area. This is indicated by the R^2 of 0.47 and it implies that any strategy aimed at ensuring high level of adoption of improved cassava processing technologies should insist on incorporating these factors.

The study revealed very high awareness and adoption levels for mechanical grater and screw press and low awareness and adoption levels for mechanical sifter and fryer. This implies that with increase in awareness there can be higher adoption of mechanical sifter and fryer.

Output and income of respondents increased after adoption of improved cassava processing technologies as indicated by the z-test statistics. This implies that the adoption of improved cassava processing technologies resulted in increased output and income for the respondents.

5.3 Recommendations

The following recommendations were made to enhance the adoption of improved cassava processing technologies in the study area. The recommendations are based on the findings of the study.

i. Inadequate credit facilities was the major constraint of the respondents. The women cassava processors should form cooperative societies through which they can put in their financial resources together for members to borrow for reinvestment. Also through the cooperative societies they can benefit from government and non-governmental micro-credit scheme to boost their cassava processing enterprise.

ii. Extension services on improved cassava processing technologies should be intensified in the study area by offering services especially in aspects that show low adoption in this study like the mechanical sifter and the fryer. Moreover, information sources are very important in creating awareness of agricultural technologies in general and improved cassava processing technologies in particular. Such informations especially if transmitted in local languages would definitely encourage full adoption of improved cassava processing technologies in the study area.

iii. The study revealed a gap between the respondent's awareness and adoption of improved cassava processing technologies and its importance to increased output and subsequently income. Therefore, concerted efforts should be made towards closing this gap by government and non-governmental organizations providing and evenly distributing the improved cassava processing technologies in the study area. The women cassava processors should also form groups through which they can purchase some of these technologies by themselves.

5.4 Contributions to Knowledge

i. The coefficient of determination (R^2) was 0.47. This implies that 47% of the variations observed in the adoption of the improved cassava processing technologies were as result of the socio-economic, institutional and technological variables included in the model.

ii. The Z-stat (20.04) for output was greater than Z-critical (1.98) while the z-stat (24.30) for income was also greater than the Z- critical (1.98).This implies that the output of the respondents increased by 44% while their income increased by 43% after adoption of improved cassava processing technologies.

iii. The average level of adoption of improved cassava processing technologies is 53% which is fairly high. There is room for increase by making the factors favourable for the women cassava processors so that adoption can increase.

iv. The study revealed that the major constraints encountered by the respondents were inadequate credit facilities (80%), inadequate extension contact (73%), high cost of transportation (70%) and high cost of machines (63%).

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APPENDIX

Weighted Scores for Technology Characteristics

Affordability	**Mechanical grater**	**Screw press**	**Mechanical sifter**	**Toaster**
NA	104	83	96	85
FA	46	72	46	34
UD	63	90	90	9
VA	12	12	12	188
HA	5	0	0	0
Total	230	257	244	316
Compatibility				
NC	11	6	17	9
FC	20	20	52	24
UD	114	114	141	153
VC	56	80	64	80
HC	395	390	230	300
Total	596	610	504	566
Complexity:				
NC	76	93	54	73
FC	124	92	136	126
UD	42	39	87	48
VC	0	0	4	0
HC	0	0	0	0
Total	242	224	281	247

DEPARTMENT OF AGRICULTURAL ECONOMICS AND RURAL SOCIOLOGY,
FACULTY OF AGRICULTURE,

AHMADU BELLO UNIVERSITY,

ZARIA.

M.Sc RESEARCH TOPIC: ADOPTION OF IMPROVED CASSAVA PROCESSING TECHNOLOGIES BY WOMEN IN ANKPA LOCAL GOVERNMENT AREA, KOGI STATE, NIGERIA

Dear ma,

I am a master's degree (M.Sc) student of the above department. I am carrying out a research on the above topic. I need information from you to enable me carry out the research. It is strictly for academic purposes and I promise that every information you provide will be treated with optimum confidentiality. Thank you very much for your co-operation and God bless you.

Christiana AUGUSTINE

QUESTIONNAIRE FOR WOMEN CASSAVA PROCESSORS.

BACKGROUND INFORMATION OF RESPONDENTS

Name:…… Village:…….

SECTION A: SOCIO-ECONOMIC CHARACTERISTICS

1. Age …….. years

2. Marital status

i. Single [ ]

ii. Married [ ]

iii. Separated [ ]

iv. Divorced [ ]

v. Widowed [ ]

3. Educational status

i. No formal education [ ]

ii. Primary education [ ]

iii. Secondary education [ ]

iv. Tertiary education [ ]

v. Others (specify) …….

4. How many years did you spend at different levels of your education?

i. No formal education ---------- years

ii. Primary education ---------- years

iii. Secondary education --------- years

iv. Tertiary education ---------- years

v. Others (specify) ---------- years

5. Household/family size

How many are you in your household?

(a) How many males?----------

(b) How many females?----------

6. How many members of your family assist you in cassava processing?

i. Male [ ]

ii. Female [ ]

7. For how many years now have you been into cassava processing? …… years

8. Do you have any occupation (s) other than cassava processing?

Yes [ ] No [ ]

9. If, yes, List them

i. ……..

ii. ……....

10. Do you have cassava farm of your own or you buy tubers from other farmers?

iii. I have cassava farm of my own [ ]

iv. I buy tubers from other farmers [ ]

11. If you have cassava farm of your own what is the means of land ownership?

i. Inheritance [ ]

ii. Purchased [ ]

iii. Husband's farm [ ]

iv. Leasing [ ]

v. Others (specify) ……..

12. If you buy tubers to process what is the source of your tubers?

i. Farmers [ ]

ii. Market [ ]

iii. ADP [ ]

13. Do you have your own processing enterprise or you work in group?

i. I have my own processing enterprise [ ]

ii. I work in group [ ]

14. Do you have any processing machinery of your own or you use hired machinery?

i. I have machinery of my own [ ]

ii. I use hired machinery [ ]

15. If you hire, what is the distance from your home to the processing centre?

i. 10-50m [ ]

ii. 50-100m [ ]

iii. 100m-500m [ ]

iv. 500m-1km [ ]

SECTION B: INSTITUTIONAL CHARACTERISTICS

16. Have you had any visit from extension agents with respect to cassava processing in the last one year? Yes [ ] No [ ]

17. If yes, how many times were you visited by the extension agents?

i. Once in a year [ ] 1

ii. Twice in a year [ ] 2

iii. Thrice in a year [ ] 3

18. Did you visit the extension agents in the last one year?

Yes [ ] No [ ]

19. If yes, how many times did you visit?

i. Once in a year [ ] 1

ii. Twice in a year [ ] 2

iii. Thrice in a year [ ] 3

20. Are you satisfied with the visit(s)? Yes [ ] No [ ]

21. If yes, give reasons ……..

……

……

22. If no, give reasons……..…

……

23. Did you receive relevant information on recommended cassava processing practices in the course of the visit? Yes [ ] No [ ]

24. How has the visit contributed to your adoption of cassava processing technologies?

……

……

25. Did you obtain credit for cassava processing in the past two years?

Yes [ ] No [ ]

26. If yes, what was the source of your credit?

i. Husband [ ]

ii. Relatives and friends [ ]

iii. Local money lenders [ ]

iv. Agricultural agencies [ ]

v. Co-operatives [ ]

vi. Banks [ ]

vii. Others (specify) ……

27. In what form did you receive the credit?

i. Cash [ ]

ii. Inputs [ ]

iii. Others (specify)……..

28. If cash, how much was the total amount? ₦……

29. If in form of input, list them and indicate their value in naira (₦)

Inputs	Value (₦)
…….	…….
……..	……..
……..	……..

30. Did you experience any challenges or constraints in obtaining credit? Yes [ ] No [ ]

Specify

i----------

ii----------

iii----------

31. If you did not borrow, give reasons why.

i. I have enough money [ ]

ii. I don't like borrowing [ ]

iii. I don't have access [ ]

iv. The interest rate is too high [ ]

v. Others (specify)……

32. Are you a member of any co-operative society? Yes [ ] No [ ]

33. If yes, list the cooperative societies you belong to

…….

34. For how long have you been a member of such co-operative society/societies?

……..

35. What are your benefits as a member of the co-operative society/societies?

SECTION C: CASSAVA PROCESSING TECHNOLOGIES

36 Which of these improved cassava processing technologies are you aware of?

i. Mechanical grater [ ]
ii. Screw press [ ]
iii. Mechanical sifter [ ]
iv. Fryer (toaster) [ ]

37. Through what source or medium did you become aware?

Equipment/machine	**Source**
Mechanical grater Screw press Mechanical sifter Fryer (toaster)	

e.g Newspapers, Extension agents, radio, television, friends and relatives, sales agents, research institutes etc.

38. How many of these technologies do you use in cassava processing? List them

i. ……

ii. ……

iii. ……

iv. ……

39. Through what source did you access these machines or technologies?

Equipment/Machine	**Sources**
Mechanical grater Screw press Mechanical sifter Fryer (toaster) Chipping machine Milling machine	

e.g Government, non-governmental organization (NGO), co-operative, private, etc.

40. What are your reasons for using the machines mentioned above?

i. ……

ii. ……

iii. ……

iv. ……

41. What challenges or problems do you experience in using the machines mention above?

---

42. For how long have you used the equipment/machinery?

Equipment/machine	**Duration of use (years)**

43. Is there an area you feel any of the machines need improvement? Yes [ ] No [ ]

Equipment/machine	**Suggested are of improvement**

SECTION D: OUTPUT AND INCOME

44. Which of the following products do you process from cassava?

i. Gari [ ]

ii. Starch [ ]

iii. Flour [ ]

iv. Chips [ ]

45. (a) products before adoption of improved cassava processing technologies

S/N	Name of product	No of bag(s) / day	Weight/bag (kg)	Price /bag (₦)
i.				
ii.				
iii.				
iv.				
v.				

45. (b) Products after the adoptions of improved cassava processing technologies

S/N	Name of product	No of bags/day	Weight of bag (kg)	Price /bag (₦)
i.				
ii.				
iii.				
iv.				
v.				

46. Kindly give the estimate amount (N) you spent in processing a bag of gari

---

SECTION E: CONSTRAINTS/PROBLEMS

47. Which of the following problems or constraints you encounter in the course of using improved cassava processing technologies?

i. Inadequate of credit facilities, [ ]

ii. High cost of machines [ ]

iii. Bulkiness of cassava tubers [ ]

iv. High cost of cassava tubers, [ ]

v. Inadequate of extension contact [ ]

vi. High cost of transportation, [ ]

vii. Bad access roads, [ ]

viii. Distant processing centres [ ]

ix. Others (specify) ----------

48. Suggest ways of finding solutions to these constraints/problems.

i. …….

ii. …….

iii. …….

iv. …….

v. …….

SECTION G: TECHNOLOGY CHARACTERISTICS

a. AFFORDABILITY

49. The following machines were affordable. Please tick the correct option in the table below as applied to each machine. NA (Not affordable) = 1, FA (Fairly affordable) = 2, UD (Undecided) = 3, VA (very affordable) = 4 and HA (Highly affordable) = 5.

S/N	Machines	NA	FA	UD	VA	HA
1	Mechanical grater					
2	Screw press					
3	Mechanical sifter					
4	Fryer (toaster)					
Others (specify)						
S/N	**Machines**	**NA**	**FA**	**UD**	**VA**	**HA**

b. COMPATIBILITY

50. The following machines meet your needs or are compatible with your own values. Tick the correct option in the table below as applied to each machine. NC (Not compatible) = 1, FC (Fairly compatible) = 2, UD (Undecided) = 3, VC (Very compatible) = 4, HC (Highly compatible) = 5.

S/N	Machines	NC	FC	UD	VC	HC
1	Mechanical grater					
2	screw press					
3	Mechanical sifter					
4	Fryer (toaster)					
Others (specify)						
S/N	**Machines**	**NC**	**FC**	**UD**	**VC**	**HC**

c. COMPLEXITY

51. The following machines are complex or difficult of use. Tick the correct option in the table below as applied to each machine. NC (Not complex) =5, FC (Fairly complex) = 4, UD (Undecided) = 3 VC (very complex) = 2 and HC (Highly complex) = 1

S/N	**Machines**	**NC**	**FC**	**UD**	**VC**	**HC**
1	Mechanical grater					
2	screw press					
3	Mechanical sifter					
4	Fryer (toaster)					
Others (specify)						
S/N	**Machines**	**NC**	**FC**	**UD**	**VC**	**HC**

THANK YOU VERY MUCH. GOD BLESS YOU.