FACTORS INFLUENCING ADOPTION OF IMPROVED CASSAVA PROCESSING TECHNOLOGIES BY WOMEN PROCESSORS IN AKOKO-EDO LOCAL GOVERNMENT AREA, EDO STATE, NIGERIA

BY

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A THESIS SUBMITTED TO THE SCHOOL OF POSTGRADUATE STUDIES, AHMADU BELLO UNIVERSITITY, ZARIA, IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF SCIENCE DEGREE IN AGRICULTURAL EXTENSION AND RURAL SOCIOLOGY.

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DECLARATION

I hereby declare that this Thesis titled "**Factors Influencing Adoption Of Improved Cassava Processing Technologies By Women Processors In Akoko-Edo Local Government Area, Edo State**", has been written by me in the Department of Agricultural Economics and Rural Sociology under the supervision of Dr. M.O. Akinola and Prof. T.K. Atala. The information derived from the literature have been duly acknowledged in the text and a list of references provided. It has not been presented before in any award of a degree programme.

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CERTIFICATION

This thesis titled "**Factors Influencing Adoption Of Improved Cassava Processing Technologies By Women Processors In Akoko-Edo Local Government Area, Edo State**" by Abudu SULEMAN meets the regulations governing the award of Degree of Master of Science in Agricultural Extension and Rural Sociology, Ahmadu Bello University, Zaria, and is approved for its contribution to scientific knowledge.

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DEDICATION

This Thesis is dedicated to my senior sister Mrs. Grace Adun Mba and my Mother Mrs. Fatimah Balogun.

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ABSTRACT

This study was designed to examine the factors influencing adoption of improved cassava processing technologies by women in Akoko-Edo Local Government Area of Edo State. Specifically, the study described the socio-economic characteristics of women cassava processors; determined the level of adoption; and the factors that influenced adoption; examined the effect of adoption on the output, income and level of living of women processors and identified the constraints faced by women processors using improved processing technologies. Both primary and secondary data were used for the study. A total of 121 respondents in three villages were interviewed using structured questionnaire. Analysis of the study was done using descriptive statistics, multiple regression model and Z-test statistics. The result revealed that majority of the women cassava processors were 41-60years of age, had secondary years of schooling, no extension contact and belonged to at least a co-operative society. The level of adoption was also revealed to be high with an average of 2.7. The study also revealed that age, processing experience, affordability, compatibility and complexity significantly influenced adoption with an R^2 value of 0.83. Result of the mean output and mean income before and after adoption revealed that there was positive effect of adoption on the output and income of women processors. The constraints encountered by the respondents in the study area include lack of credit facilities, high cost of machines, bulkiness of the machines, lack of spare parts and inability to read manuals. It is recommended that the improved cassava processing technologies should be made affordable to the women cassava processors. The study revealed lack of credit facilities as the major constraint; it is therefore recommended that the women cassava processors should utilize their memberships in co-operative societies by organizing joint contribution to assist themselves financially.

CHAPTER 1

INTRODUCTION

1.1. Background of the Study

The process of increasing the efficiency of agricultural production through agricultural modernization depends mainly on the extent to which farmers can incorporate improved agricultural practices (technologies) into their farming operations (Sasore, 2005). The importance of technology to agricultural development especially in less developed countries is widely acknowledged. This is predicated on the observed impact of the technology and its potential and actual contributions to the development of agriculture. It has been commonly shown that acceptance of new farming practices takes place over time (Nweke, 1994). When a new farming practice is introduced in a community, not all people adopt it at the same time. Some farmers, no matter what, would continue to practice farming based entirely upon traditional agriculture and therefore, are inevitably poor (Nweye, 1990).

In particular, Nigerian women play indispensable role in solving many problems that constitute bottlenecks in smallholder farming systems especially weeding, harvesting, processing and storage (Awoyemi, 2000). A sizeable proportion of Nigeria's annual food output is produced by small-scale women farmers. In some parts of Nigeria, they comprise even more than three quarters of the farming population, making rather important decisions which sometimes have appreciable bearing on the produce of the entire farming community. Given the important roles women play in economic development, one would expect that pride is accorded women in the nation's

development programme. Rather, available evidence suggests that women access to resources to improve women productivity remains severely limited (Oyewole *et al*., 1986). Consequently, they are faced with problems of primary production (lack of inputs) and inadequate transportation for their farm produce. Even more serious is the problem of inadequate facilities for food processing and preservation.

Although, significant breakthroughs have been achieved worldwide in the area of improved food processing technologies, Nigerian women still rely on traditional methods of processing ((Nweke *et al*., 2004). For instance, traditional processing methods of cassava are so laborious that a number of improved cassava processing technologies have been put in place to reduce the drudgery and labour intensive traditional cassava processing methods. Cassava (*Manihot* spp) has been singled out as one crop that has to be cultivated extensively for human food as well as for industrial purposes. Cassava tubers are extremely perishable after harvest and cannot usually be kept for more than a few days without severe rotting, making them unfit for human consumption. This characteristic of cassava is well known and has long been a problem as regard to storage (Nweye, 1990).

A nation that cannot preserve its food output until when needed for consumption is far from realizing its aim of food security. Therefore, to ensure that each and every Nigerian has unimpeded access to enough food for healthy living throughout the year, special attention has to be paid to the rural food processing industry which accounts for over 80% of all processed foods in the country (Nweke *et al*., 2004). In this respect,

the Nigerian women farmers who dominate the rural food industry need to be assisted and trained in the use of modern processing technologies. Thus, the study looked at the factors influencing adoption of improved cassava processing technologies by women processors in Akoko-Edo local Government area of Edo State.

1.2. Problem Statement

Many of the small scale farmers who live in the rural areas of Nigeria are women who engage not only in on-farm production activities, but also post-harvest activities such as processing (Shiva, 1991). The processing sector has a number of weaknesses. Any large expansion in production which is technically feasible, could lead to market instability and price drops unless the mechanism for processing (to ensure that cassava is available in the most appropriate form) is developed and improved. There is absence of adequate information associated with different processing techniques (Oyewole *et al*., 1986). For instance, the earlier neglect of women's role in agricultural production was reflected in the design and dissemination of agricultural technologies by development agencies and research institutes. Most of the technologies were designed based on their assumption that farmers are male (Nweke, 2004).

However, the growing awareness on the role of women and the need to alleviate their burden has motivated the Agricultural Mechanization Research Programme (AMRP) of the Institute for Agricultural Research (IAR) in Ahmadu Bello University, Zaria to develop machines especially for women's agricultural operations. Among the machines produced are the multicrop thresher, maize Sheller and groundnut oil extraction tools.

The machine for cassava processing (motorized graters, motorized flakers, hammer mill, motorized chippers and mechanical sifters) have also been developed by the University of Nigeria, Nsukka, Project Development Authority (PRODA), Enugu National Centre for Agricultural mechanization (NCAM), Ilorin, Federal Institute for Industrial Research, Oshodi, Nigeria (Nweke *et al.,* 2004).

The problem however is that while factors relating to cost of labour and efficiency have been relatively well tackled, gender related factors have not been in proper focus. Technologies are thus developed without reference to who traditionally performs the task, why and how they wish to perform the task and the desired products and by-products in case of processing. These have led to majority of the equipment developed not being used or adopted by the end users and in certain cases creating a misplacement of priorities. The improved cassava processing technologies such as stitching machine, power screw dehydrating press, grating machine, mechanical sifter and cassava fryer (Toaster) have been introduced to Ibillo, Ojirami and Lampese women cassava processors by Edo State Agricultural Development project since 2007. Hence the need to address the following research questions:

i. What are the socio-economic characteristics of the respondents in the study area.

ii. What is the level of adoption of improved cassava processing technologies by women processors in the study area?

iii. What are the factors that influence the women's use of the improved cassava processing technologies?

iv. What is the effect of the adoption of improved cassava processing technologies on the women's output, income and level of living in the study area?

v. What are the constraints/challenges encountered by the women using the improved cassava processing technologies in the study area?

1.3. Objectives of the Study

The broad objective of this study was to examine the factors influencing the adoption of improved cassava processing technologies by women processors in the study aarea. The specific objectives are to:

i. describe the socio-economic characteristics of the respondents in the study area.

ii. determine the level of adoption of improved cassava processing technologies by women processors in the study area;

iii. determine the factors that influence the women's use of the improved cassava processing technologies;

iv. examine the effect of the adoption of improved technologies of cassava processing on the level of living of women processors, and

v. identify the constraints/challenges encountered by the women using the improved cassava processing technologies in the study area.

1.4. Hypotheses

i. Socio-economic characteristics of women cassava processors have no significant influence on the women's adoption of improved cassava processing technologies.

ii. Adoption of improved cassava processing technologies has no significant effect on the women's output, income and level of living.

1.5. Justification for the Study

The cassava processing enterprise is one of the major activities of women in the study area. This is obvious from the fact that cassava processing holds daily in the area. A lot of food processing technologies have been put on ground in Nigeria and several of them have also been exhibited under the appropriate technology scheme and skills training for rural women. The International Institute of Tropical Agriculture (IITA) has constructed and displayed a range of machines for cassava processing for women (Awoyemi, 2000).

Despite the significance of the cassava processing industry, there is no adequate study conducted to examine the factors influencing the adoption of improved cassava processing technologies by women processors in the study area. It is believed therefore that the findings of the study would be useful to the manufacturers of the improved cassava processing machines by identifying the areas that need improvement. This study will add to the existing knowledge in the area of food processing enterprise in Nigeria especially in the area of improved processing technologies. This study will contribute to the information that will guide incoming researchers who might be interested in carrying out further works on cassava processing. This study is also intended to provide valuable information to raise public awareness of the factors influencing the adoption of improved cassava processing technologies by women processors in Akoko-Edo Local Government Area of Edo State.

CHAPTER 2

LITERATURE REVIEW

2.1. Cassava Production in Nigeria

Cassava (*Manihot spp)* is one of the major Root crops in Nigeria. Cassava produces bulky storage roots with a heavy concentration of carbohydrate of about 80% (Coursey, 1973). It is about the only crop whose production cuts across all ecological zones (Ersado, *et al.,* 2004). Cassava was introduced in Nigeria by returnee slaves from America. It performs so well in the country that Nigeria has become the world largest producer having overtaken Brazil and Thailand (FAO, 2006). Since 1990, Food and Agriculture Organization has consistently affirmed that Nigeria has been witnessing a steady increase in the level of cassava production both locally and internationally (FAO, 2008). Boma (2004) emphasized that government should come up with favorable policies that will encourage Nigerians to go into cassava production and assist in overall pricing of the product so as to make it worth the labour put into its production.

2.2. Importance of Cassava

Cassava, just like yam, is a root and tuber crop. It has underground roots which can be consumed by man and livestock animals after processing. It has other advantages over yam, in that it can grow in relatively poor soil and in low rainfall area. The root is also rich in carbohydrates. It is propagated by stem cuttings which are planted from March to September (Sasore, 2005). In spite of the fact that there are about 8000 plant species of cassava of which about 300 have been domesticated for use in food by man, we in

the tropics decided to adopt the most toxic of cassava as our staple food crop due to tradition. Because of our tradition of eating starchy roots and tubers of various kinds, it has been necessary to eat even the toxic ones, particularly during the hungry season (Bruijn, 1973). Gari is the most popular of the cassava products and the sequential processing takes place from one to seven days (Sanni, 1994).

The importance of cassava in the food basket of many families in Africa has significantly increased due to several factors. Some of these factors include declining purchasing power, poor yield of other crops due to depletion of soil nutrients (FAO, 2006). Cassava appears to be the major staple food that matches population growth. It has untapped genetic potentials which can be exploited through adoption of new improved processing technologies. Cassava with potential supplements can substitute for coarse grains in livestock feeds and partly meet the rapidly rising demand for feed grains in developing countries (Sanni, 1994). Cassava has market potentials in pharmaceutical wood, textile and paper industries. It has been reported that cassava root meal can replace maize completely in the diet of pullets, cockerels and pigs (Nestle, 1973).

2.3. Need for Cassava Processing

Several root crops contain toxic substances e.g. cyanide in cassava and in some varieties of potato. The presence of such toxic factors demands special processing procedures to make the product safe for human consumption. Before cassava can be used for human consumption, it must be processed properly because of the presence of

toxic substance (cyanide) in the roots. Different varieties of cassava contain varying amounts of cyanide ranging from 15mg to 400mg/kg fresh weight (Coursey, 1973).

Improvement of cassava processing and utilization techniques would greatly increase labour efficiency, productivity and income of cassava farmers. Improved processing techniques will also make transportation easier, raise marketing opportunities and upgrade nutrition (Nweke *et al*., 2004). The raw cassava root and leaf are not palatable. Thus, there is need to process cassava into various products that will increase easy transportation, marketing and have improved palatability. The processing of cassava into a dried product is also a way of dealing with the perish ability of cassava because, once harvested, fresh cassava roots show deterioration within 24 hours (James, 1985).

2.4. Women Development: A Paradigm

Women development is the process whereby concerted efforts are made to facilitate significant increase in resource productivity with the overall objectives of enhancing the living standard among the women (Jiggins *et al.,* 1998). According to Egonu (1997) women in Nigeria did not enjoy equal development strategies such as provision of credit and use of tractors like their male counterparts. An adequate concept of women development in Nigeria today must consider that rural farm families - men, women and children do not experience rural changes in a uniform manner. Women are rarely given the benefit of agricultural training.

The lack of reliable and comprehensive information for rural women is a major hindrance to agricultural development. They require information on agricultural inputs, market prices, transportation systems, new agricultural technologies, food processing and preservation. However, most available local information are packaged in a raw form and therefore difficult to access or use. The situation is compounded because women do not know where to find this information and mostly because they are not educated. To ensure the relevance of rural women, information on new agricultural technologies and market information should be repackaged in a format and language appropriate for rural women (Shiva, 1991).

In a shift to realize the contribution of women to agricultural development, it is now widely demonstrated that rural women, as well as men, throughout the world are engaged in a range of productive activities essential to household welfare, agricultural productivity and economic growth (Jiggins *et al.,* 1998). For instance, a recent study of gari processing in Ibadan showed that it is a preferred job for the urban unemployed, poor women whose labor is augmented by that of children. Almost all these women purchase cassava roots and pay for mechanical grating and dewatering by specially constructed hydraulic jacks, in privately owned, small-size processing centers. Processors, who do not own a sieve or the calabash used for mixing during roasting, can hire these utensils. In these centers, the women could also rent a frying pan by the hour for roasting. Each woman can produce 45 – 60kg gari per day (Sanni, 1994).

2.5. Cassava Processing Technologies

2.5.1. Traditional cassava processing method

Traditional cassava processing is essentially manual and some of the unit operations such as peeling, grating, frying or roasting and grinding are arduous and time consuming. In Edo state, fresh cassava tubers are mainly processed into gari and flour. Gari is the most popular end product of grated fermented cassava in Edo state. Fresh cassava tubers are peeled washed and grated using perforated tin sheets. The pulp is then packed into bags (*Ishaka*), and the liquid is squeezed out by placing heavy stones on top, or the bags are pressed between wooden boards. This process is done from between 3-5 days depending on individual preference. During this period, fermentation and dehydration occur and this eliminates cyanide from the cassava (Nkonya *et al*., 1997). After draining water from the grated cassava, it is then sieved to separate the edible grated cassava from the fibers for frying. Frying is done using aluminum pan with constant tossing around to avoid burning.

2.5.2. Improved cassava processing technologies

i. **Mechanical grater:** A cassava grater was developed by African Regional Center for Engineering Design Manufacturing (ARCEDEM). ARCEDEM cassava grater has blades for grating at approximately 300kg per hour. Different graters have been produced by different Agricultural Mechanization Departments of Research Institutions, but on the average, the performance of cassava grater is efficient provided that grating surface is properly maintained.

ii. **Pressing equipment:** Presser**s** are used to dehydrate cassava mash to a moisture content of 40-50%. Two types are common in Nigeria, those that use a hydraulic jack mounted on a steel frame and those that use power screw shafts **(**Nkonya *et al.,* 1997**).**

iii. **Frying equipment:** Machinery for frying and other gari processing equipment were first designed by Federal Institute for Industrial Research (FIIR), Oshodi, Nigeria (Omifare, 1989).

iv. **Milling equipment:** Milling equipments are popular in the State. The mills are usually operated by diesel engine. Dry cassava chips are grinded into flour.

2.6. Importance of Improved Cassava Processing Technologies

Food processing starts at the point of slaughter or harvest and finishes with food consumption. A process refers to "food chain" or a collection of activities carried out on food or crop with the aim of preservation or changing it to other products. Food processing plays an important role in ensuring food security by making safe and nutritious food available to the consumer and as a source of employment for the processors (Sasore, 2005). The consumption of cassava in its unprocessed form is limited by the extreme perish ability of the roots which begin to deteriorate within 24 hours after harvesting. With the present facilities for storage and transport, it is

difficult to market fresh cassava at any distance from the place where it is grown. Processed cassava, on the other hand, is usually less bulky to transport, and far less perishable than fresh roots (Nweke, 1994).

The continued increase in output has raised the need for improved cassava processing technologies to absorb the increases, produce diversified and high quality cassava products suitable for industrial use and export. Mechanized processing will increase post harvest management of cassava crop output and guarantee effective preservation and utilization of cassava for food security. Agricultural contributions to Nigerian's gross domestic product (GDP) has fallen from 60% in the 1960s to current 40%, while its share of export earning has fallen from 75% to 30% over the same period. The resuscitation of agriculture to play its role goes beyond the export of traditional raw materials of high quality intermediate and finished agricultural products including food staples. To achieve this, Nigeria in 2002 launched the cassava industrial revolution to produce high quality cassava products suitable for industrial use and export including cassava flour (FAO, 2006).

To earn high profit margin required to sustain the nascent mechanized cassava processing in Nigeria, high technological packages must be adopted to produce large quantities and high quality products at reduced unit cost (Sasore, 2005). For instance, Nweye (1990) has shown that cassava chips dry more rapidly when circulation of air is improved by spacing the chips in mesh trays raised off the ground because chips dried on trays are better cooking and more uniformly dried than those dried on concrete floor.

Also, Oti *et al.* (1987) have shown that a higher reduction in cyanide content of cassava leaves can be achieved by soaking chipped-up cassava leaves in fermented cassava root extract for 24 hours than by cooking cassava leaves in water. Oti *et al.* (1987) added that manual gari frying is one of the slowest and time consuming operations in cassava processing. They however said that the use of tray dryer produced by the Rural Agro-Industrial Development Scheme (RAIDS) increases the output significantly and protects the operators from smoke and excessive heat.

2.7. Adoption of Improved Agricultural Technologies

Adoption is the acceptance of continued use of innovation after individuals or groups have gone through certain mental processes (Agbamu, 2006). Adoption is not a sudden event, but a process. Farmers do not accept innovations immediately; they need time to think things over before making a decision. The reluctance of a farmer to adopt a certain innovation may indicate that the farmer has not reached the appropriate stage of development and does not see the practice as essential for the continuing development of his enterprise. There are several well-known schemes for explaining the adoption process such as awareness, interest, evaluation, trial and adoption (Ekong,2003); and other ones include knowledge, persuasion, decision, and confirmation. These four stages have been elaborated by Rogers and Shoemaker (1971) as follows:

Knowledge is when the individual learns of the existence of the innovation and gains some understanding of its function. Persuasion is when the individual forms a favorable or unfavorable opinion of the innovation. Decision is when the individual

engages in activities which lead to a choice between adoption and rejection. Confirmation is when the individual makes a final decision to accept or abandon the innovation. It is well known that some people are more innovative (responsive to new ideas) than others. Adopters have been subdivided into categories on the basis of the relative time they take to adopt innovations: innovators, early adopters, early majority, late majority, laggards. Innovativeness generally can be related to other personal characteristics: background, social status, affiliations and attitudes (Ogunbameru, 2001).

2.8. Factors Influencing Adoption of Improved Agricultural Technologies

The adoption of improved technology is influenced by many factors. Such factors include socio- psychological factors (traditional believes); personal characteristics of the famers (age, educational attainment); institutional and socio- economic factors such as access to government services and low farm income (Ukoha, 2003). Ezeilo (1979) argues that adoption of new technology is best promoted by means of integrated package of farm support measures, availability of credit, marketing, input supply services, improved transportation, price incentives and the establishment of cooperative ventures to overcome constraints due to new technology and to ensure its success. Oyenwaka (1991) discovered profitability to be the major reason for adoption while the most limiting factor was lack of awareness of the technology.

Yusuf (2009) found rate of adoption of improved technologies to be relatively higher, because the technologies were easy to operate. Idrisa *et al.* (2008), found higher rate of

adoption of the recommended practices to be due to its affordability to the respondents. Other factors associated with adoption as confirmed by other researchers include: gender, age, education of household head, family size and other demographic traits that make up the household characteristics (Clark and Akinbode, 1986), (Nkonya *et al.,* 1997 ; Ersado *et al.,* 2004).

2.9. Concept of Technological Change

According to Olayinde (1980) technological change is a continuous process of change within technical, material and physical practices in a culture. Technological changes are evident in our society in the areas of processing, transportation, communication, health, education and housing. Technological change can therefore be defined as an alteration in the existing traditional technology of a society to bring about improvement in her social and economic status. This usually results from years of research with the aim of increasing food production and the level of living of farmers and the entire population.

2.10. Technological Attributes

The process of making a decision is not an instantaneous one but rather occurs over a period of time and does not always follow the sequence in practice. It depends on the technology and the individuals in question (Vandan and Hawkins 1996). Literature on adoption (Monu, 1981) has analyzed the relationship between characteristics of technology and its rates of adoption. Abalu *et al*., (1979) reports that when women farmers find new technologies not to be technically feasible, economically viable and

culturally compatible, they often reject such technologies. Mokonem (1991) in a similar vein states that women farmers often reject innovations when innovations are inappropriate or unrelated to their needs and problems. Therefore, the attributes of a technology include compatibility, affordability and complexity in this study.

Compatibility: Compatibility is the degree to which the farmer perceives an innovation to be consistent with his values, his management objectives, the level of technology and the stage of farm development. For technology to be adopted, it should be consistent with the existing value, norms and past experience of the adopter. Incompatibility may result to in acceptance or rejection of the technology.

Affordability: This is the extent to which an innovation is affordable by the adopters. A technology may be perceived as having advantages over the ones being used, but may not be adopted because of its high cost. If the cost of the technology is high, there will be a possible slowing down of its adoption rate. Cost may not always be in terms of money or financial benefit but may also be in terms of what the adopter is expected to give up if it is more than what he/she is to gain from the technology (Okoosi, 1999).

Complexity: This is the degree to which an innovation is relatively difficult to understand or use. Technologies that are relatively simple to understand and use tend to be readily adopted than those that are complex. In the case of an improved cassava processing technology, complexity can be a barrier to adoption if servicing and spare parts are not available locally.

2.11. Constraints to Women's Use of Improved Technologies

Ngoddy (1989) argues that most of the technologies were designed without taking proper cognizance of the socio-economic realities in Nigeria such as illiteracy, cultural factors, property rights, lack of access to credit and inappropriate extension packages. He maintains that the technologies are expensive, given the inflationary trend in the country, and they are beyond the means of most small-scale women farmers. Nigeria's small-scale women farmers and food processors also suffer from high rate of illiteracy. This makes it even difficult for them to comprehend simple instructions on food processing and preservation. And the situation is not helped by the rather poor extension system that currently exists in the country. Ekong (2003) is of the opinion that most rural women do not understand even a display of instructions by line diagrams. Cultural factors have played no less a significant role in constraining the use of improved food production and processing technologies in Nigeria. The attitude of the average Nigerian towards certain improved food processing technologies has been identified as a constraint towards their usage. For instance, it has been reported that most men rather than embrace the new yam pounding machine designed to ameliorate the drudgery in women's domestic chore still insist on the manual and tedious traditional methods of preparing pounded yam meal (Okoye, 1988). It is the opinion of Sanni (2002) that losing land impacts negatively affect women's ability to meet household food needs through own production. There is the widespread exclusion of women in developing countries from owning or controlling property as well as limits often dictated by the various customs concerning their access to and use of property

such as land. This implies that they are often barred from many resources that would allow them to improve their agricultural production capacities.

However, many processors experience difficulties with securing credit and it is one of the most common constraints (Akinrele, 1970). The majority of processors, in particular women, face problems when seeking credit because of government policies, lack of information, lack of collateral and prejudices against them. Saito (1990) maintains that an extension system is only as good as the technology it offers. Tools, implements and other inputs suitable for women should be portable, inexpensive, locally produced and have uses compatible with other activities. Many improved techniques have not been useful from the perspective of the farmers, particularly women. According to Shiva (1991) rural women's familiarity with production and processing stages make them excellent judges of innovations. In his study, the Women in Agriculture (WIA) Coordinator of Niger State Agricultural Development Project (NSADP) stated that a household grain threshing equipment was introduced to rural women to assist them in food preparation. The women later rejected the technology because they complained that its operation was time-consuming and they did not save any time or effort by using it unlike their traditional processing methods. Similarly, an improved cassava cultivar developed at IITA yielded tubers which were much larger than local varieties. The women however, complained that the tubers were harder to peel, were difficult to carry, had higher water content and took longer to fry (Asika, 2003).

2.12. Theoretical Framework

By theoretical model, it means a broad system of explanations which is founded not so much on prior research findings but largely on untested and perhaps improvable assumptions about realities (Ekong, 2003). The theoretical framework that guided this study is the social change theory, using the adoption and diffusion perspectives.

2.12.1. Social change theory

Rogers (1995) has defined social change more specifically as the process by which alterations occur in the structure and function of a society. Any change that occurs either in ideas, norms, values, roles and social habits of a people or in the composition or organization of their society can be referred to as social change. Most of the social changes in many known societies developed through diffusion of cultures from other societies. The theory of social change within the framework of this study helps us to understand the social reality, which demonstrated the changes that have taken place from the adoption of improved cassava processing technologies due to socio-economic factors. Therefore, the occurrence of social change can better be explained by the perspective of adoption and diffusion.

2.12.2. Adoption and diffusion perspectives

Adoption is a decision to continue full use of an innovation (Ekong, 2003). Adoption is not a sudden event, but a process. Farmers do not accept innovations immediately; they need time to think things over before making a decision. The decision to use or

adopt an improved technology by a farmer involves a series of stages which include Awareness, Interest, Evaluation, Trial and Adoption (Rogers, 1995).

As a result of increased scientific research and improved methods of technology, a great variety of new materials and ideas have been generated and brought to the doors of the farmers and other rural food processors. The rates at which these people learn innovations and adopt them however differ greatly from one place to another. The rate of adoption of technology is important in assessing the effect of technology on the users. The rate of adoption could be seen as the proportion of farmers utilizing a particular innovation within a specified period. (Rogers, 1995).

According to Rogers (1995) he defined the term diffusion of innovations as a process by which an innovation spreads. The diffusion involves four essential elements – innovation, its communication from one group to another, a social system within which this process occurs and the time period over which the process is affected. The classical diffusion Adoption theory is made up of two components: the diffusion process and the adoption process. According to Odoemenem (2007) the distinction made between adoption and diffusion concepts is that, "adoption is a concept which refers to the acceptance and continuous use of an idea or practice by single unit of a potential audience; while diffusion, on the other hand, is a concept which refers to the spread of idea, or practice through the whole of the potential audience or social systems". The perspectives of adoption and diffusion of innovation emphasizes the process of spreading new ideas or innovation within a given society.

2.13. Conceptual Model

According to Akinrele (1970) a model is simply "an attempt at classifying the major elements of an entity or a phenomenon with regards to their function and interrelationships in order to observe more closely how the elements function within the entity". Furthermore, Asika (2003) reported that these relationships and functions can be represented schematically or mathematically.

In the model (figure I), the adoption of improved cassava processing technologies depends on the factors that influenced the adoption of improved cassava processing technologies by women processors. Therefore, the independent variables in the model are the socio-economic characteristics of the women, the institutional characteristics and technological attributes while the dependent variable is the number of improved cassava processing technologies adopted by the women processors in the study area. The socio-economic characteristics of the women include age, years of schooling, extension contacts, processing experience and membership of co-operative societies while the attributes of the cassava processing technologies include affordability, compatibility and complexity.

Thus, it is expected that age should have an influence on the women's adoption of the cassava processing technologies such that, older women may adopt more than younger women because of experience, financial status and responsibilities. It is also possible for younger women to adopt more than older women because younger women are more

prone to experimentation than older women. In other words, the nature of influence of age on adoption is indeterminate (Adesina, 1995).

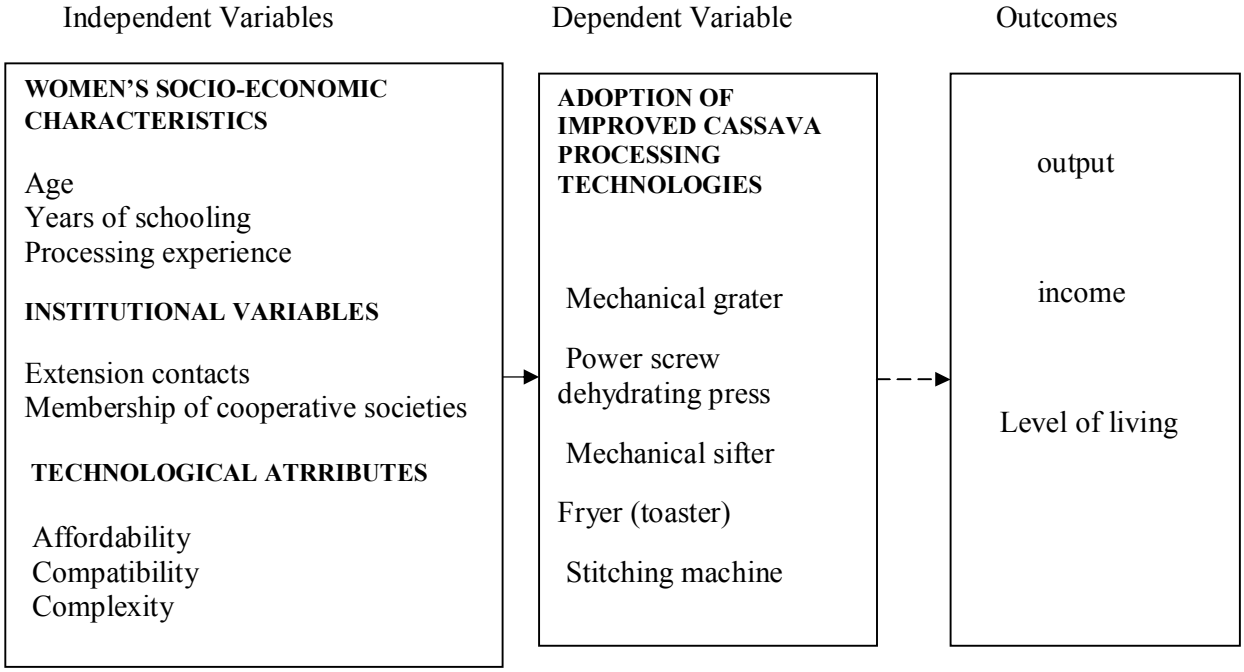

Figure 1: A model showing factors influencing adoption of improved cassava processing technologies by women processors and outcomes

CHAPTER 3

METHODOLOGY

3.1. The Study Area

This study was conducted in Akoko-Edo Local Government Area of Edo State. Edo State is an Inland state in central southern Nigeria. It's capital is Benin City. It is bounded in the North and East by Kogi State, in the south by Delta State and in the west by Ondo State. Edo State has a total of eighteen (18) Local Government Areas comprising of six Local Governments in Edo North, five Local Governments in Edo central and seven Local Governments in Edo South. Edo State has an estimated population of three million, two hundred and thirty three thousand, three hundred and sixty-six (3,233,366) and a land area of 17,902Km^2 (National Population Census, 2006). The projected population figure of Edo State for 2012 using an annual growth rate of 3.2% is therefore three million, seven hundred and forty eight thousand, three hundred and fifty eight (3,748,358).

Akoko-Edo is one of the six Local Governments in Edo North. It's headquarter is Igarra. It has an area of 1.371km2 and a population of two hundred and sixty two thousand, one hundred and ten (262,110) at the 2006 census, while the projected figure for 2012 is three hundred and three thousand, eight hundred and fifty seven (303,857). Akoko-Edo was chosen because it is an agricultural area with high number of women engaging in processing activities. Three villages namely, Ibillo, Ojjirami and Lampese were used for the study.

3.2. Sampling Procedure and Sample Size

A reconnaissance survey was conducted in the study area. The sample frame of women who adopted the improved cassava processing technologies in the three villages under study is 1,206 comprising of 418 in Ibillo, Lampese 362 and Orjirami 426. In each of the sample frame of the three villages,10% of the women cassava processors were randomly selected comprising of 42 in Ibillo, 36 in Lampese and 43 in Ojirami amounting to a total sample size of 121. This is shown in the table below:

VILLAGE	WOMEN PROCESSORS	SAMPLE(10%)
IBILLO	418	42
LAMPESE	362	36
ORJIRAMI	426	43
TOTAL	**1,206**	**121**

3.3. Methods of Data Collection

Primary and secondary data were used for this study. The primary data were obtained through the use of structured questionnaire and administered to the women cassava processors with the help of enumerators. The type of data collected were the women's socio-economic characteristics e.g. age, years of schooling and processing experience, while the institutional characteristics also include extension contact, and membership of co-operative societies. Other data collected were the technological attributes such as

affordability, compatibility and complexity. Secondary data were collected from Journals, proceedings, textbooks and ADP list.

3.4. Analytical Techniques

3.4.1. Descriptive statistics

Descriptive statistics such as mean, percentages, frequency distribution and range was used to describe socio-economic characteristics of the respondents, determine the level of adoption, and identify the constraints encountered by the women processors using improved cassava processing technologies in the study area.

3.4.2. Multiple regression analysis

Multiple regression analysis was used to determine the socio-economic factors that affected the women's adoption of the improved cassava processing technologies in the study area. The general form of the regression equation is given as:

$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, U)$. Explicitly specified, the equation becomes;

$Y = a + b_1X_1+b_2X_2+b_3X_3+b_4X_4+b_5X_5+b_6X_6+b_7X_7+b_8X_{8+}e$. Where;

Y = is the number of technologies adopted by the respondents.

X_1 = Age (in years)

X_2 = Years of schooling

X_3 = Processing experience (in years)

X_4 = Extension contact (number of extension visits)

X_5 = Membership of cooperative societies (number of years spent)

X_6 = Affordability of technologies (not affordable = 1, fairly affordable = 2, affordable = 3, very affordable = 4 and highly affordable = 5).

X_7 = Compatibility of technologies (not compatible = 1, fairly compatible =2, compatible = 3, very compatible = 4 and highly compatible = 5).

X_8 = Complexity of technologies (not complex = 1, fairly complex = 2, complex = 3, very complex = 4 and highly complex = 5).

X_1 to X_8 = Independent variables as defined in the general and explicit equations above

b_1 to b_8 = Regression coefficients of X_1 to X_8

a = constant term

e = error term (explicit)

U = Error term (implicit)

The result of the regression analysis yielded R and R^2 where;

R = Mean correlation coefficient of the variables

R^2 = Coefficient of multiple determination which represents the degree of variability of the dependent variable as explained by the explanatory variables.

3.4.3. Z – test statistic

Z-test was used to examine the effect of the adoption of improved technologies of cassava processing on women's output, income and level of living before and after adoption of improved cassava processing technologies. The Z-test model was used to examine the differences in output, income and level of living of the women processors before and after adoption between 2006 and 2010 respectively. The Z-test is represented as follows:

$$Z = \frac{\bar{X}1 - \bar{X}_2}{\sqrt{\frac{S_1^{\ 2} + S_2^{\ 2}}{n_1 + n_2}}}$$

Where: Z =

Z = the calculated Z-test value

$\overline{X}_1$ = Mean output, income and level of living of the women processors after adoption.

$\overline{X}_2$ = Mean output, income and level of living of the women processors before adoption.

S^2= Standard deviation of output, income and level of living of women processors after adoption.

S^2 = Standard deviation of output, income and level of living of women processors before adoption.

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

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

The calculated Z- value was compared with the tabulated Z value at 5% level of significance for decision making.

3.5. Definition and Measurement of Variables

3.5.1. Independent variables

i Women's socio-economic characteristics:

Age: This is the number of years the respondent has lived. The age of a person determines his/her experience, authority or resources. It is believed that age is capable of influencing individual's interest, perception, view, attitude, conduct and practice. This was measured based on the exact number of the respondent's years on earth.

Years of schooling:. Years of schooling was measured and scored for the respondents.

Processing experience: This refers to how long the respondent has been into cassava processing activities. It was measured by the number of years the respondent has spent in the cassava processing business.

ii. Institutional variables:

Extension contact: This is defined as the frequency of the respondent's contact with extension workers. It was measured by the number of visits a respondent received from the extension officer in the year 2010.

Membership of co-operative societies: This was measured by the total number of years the respondents have spent in the various co- operative societies at the time the study was conducted.

iii. Technological attributes:

A 5-point Likert type scale was assigned weights of 5, 4, 3, 2, 1 respectively which was used to measure technological attributes of improved cassava processing technologies adopted by respondents. In calculating average weighted scores of technological attributes adopted, the mid-point values of scale was summed and further divided by 5 to obtain mean score of 3. Any technological attributes with a mean score of equal or above the cut-off mean of 3 was regarded and perceived as affordable, compatible or complex and mean score lower than 3 was perceived as not affordable, not compatible or not complex.

Affordability: This is the extent to which an improved technology is affordable by the respondents. This was measured by the use of a 5-point Likert Scale*:* Not affordable =

1, Fairly affordable = 2, Affordable = 3, Very affordable =4, Highly affordable = 5.

Compatibility: This is the level to which an improved technology is perceived to meet the need and values of the respondent. This was measured by the use of 5-point scale: Not compatible = 1, Fairly compatible = 2, Compatible 3, Very compatible = 4, Highly compatible = 5.

Complexity: This is the level to which an improved technology is relatively difficult to understand or use. This was also measured by the use of 5-point scale: Not complex = 1, Fairly complex = 2, Complex = 3, Very complex = 4, Highly complex = 5.

3.5.2. Dependent variable

Adoption is the acceptance of continued use of technologies after individuals or group have gone through certain mental processes (Agbamu, 2006). Adoption of recommended practices refers to the use of the practices on a continuous and large scale basis (Akpoko, 2001). In this study, five improved cassava processing technologies were studied. An adopter is a processor who uses any of the improved cassava processing technologies on a continuous and large scale basis. A processor who reported that she uses a particular cassava improved technology on a continuous and large scale was further asked to describe level of usage. It is only upon an indication of satisfactory (2/3) explanation of the scale of usage that she was credited as an adopter. Therefore, the adoption score for each processor was calculated by summing up the

number of cassava processing technologies reported being adopted by the respondent on a continuous and large scale basis.

3.5.3 Outcomes

Income: This is the money realized from the sale of processed cassava products. Income was measured by the total estimated value of income (₦) as given by the respondents.

Output: This is the amount of gari obtained from the processed cassava which was measured in bags per kilograms.

Level of living: This refers to the number of household properties purchased by the respondents before and after adoption between 2006 and 2010 respectively.

CHAPTER 4

RESULTS AND DISCUSSION

4.1. Socio-economic Characteristics of the Respondents. The Socio-economic characteristics of the respondents examined in the study were: age, years of schooling and processing experience while the institutional characteristics were: extension contacts, credit received and membership of co-operative societies. Other variables also examined were technological attributes such as affordability, compatibility and complexity. The distribution of the respondents according to these characteristics is as shown in Table 1.

Age: From Table 1, majority (66%) of the respondents belong to the age group of 41-60 years, followed by those (27%) with the age group of 21-40 years. These age groups could be regarded as the economically active age group in which the energies of people could be utilized for productive purposes. This agrees with Okunade (1998) who found that majority of the women processors were in their active age range of 21-50 years. Also, Olaniyan (1998) found in his study of adoption of improved cassava processing technologies that majority (74%) of the women processors were in their active age of 21-40 years.

Years of schooling: The study revealed that majority (46%) of the respondents had secondary years of schooling followed by (35%) primary years of schooling and (13%) tertiary years of schooling. This implies that there is possibility of understanding the adoption and usage of new innovations by the respondents in the study area. This is in

variance with Ukoha (2003) who found that 77% of the Nigerian women are illiterates.

Processing experiences: The study revealed that 53% of the respondents have been in cassava processing from 6-10 years, followed by those (33%) who have been in cassava processing from 11-15 years. The implication of this is that, majority of the respondents have had up to 10 years experience in cassava processing.

Extension contact: The study revealed that majority (64%) of the respondents has never had any extension contact. 0nly 20% of the respondents had extension contacts from 1 to 2 times while17% of the respondents also had contacts from 3 to 4 times. This implies that the performance of the extension agents is low. This agrees with the report of Swanson et. al (1984), that women processors had little or no contacts with extension services.

Membership of co-operative societies (years spent): The study revealed that 73% of the women cassava processors have spent 6 to 10 years in cooperative societies, 17% respondents spent 11 to 15 years, 8% spent 1 to 5 years and 2% spent 16 to 20 years. This implies that the respondents have been highly involved in one co-operative society or another for a long period of time.

Table 1: Distribution of respondents' socio-economic and institutional characteristics. (n=121)

Variables	Frequency	Percentage	Mean
Age (Years)			
21-40 (young)	32	26.5	
41-60 (middle)	80	66.1	**47**
61-80 (old)	9	7.4	
Years of schooling			
Never attended school (0yr)	7	5.8	
Primary school (6yrs)	42	34.7	**94**
Secondary school (6yrs)	56	46	
Tertiary school (2-5yrs)	16	13	
Processing experience (years)			
6-10	64	52.9	
11-15	40	33.1	**11.4**
16-20	15	12	
21-25	2	1.7	
Extension contact (number of visits)			
0	77	64	
1-2	24	19.8	
3-4	20	16.5	
Co-operative societies (years spent)			
1-5	10	8.3	
6-10	88	72.7	**9.0**
11-15	21	17.4	
16-20	2	1.7	

Technological Attributes: The technological attributes examined in the study were: Affordability, Compatibility and Complexity. As shown in Table 2, 5-point liker scale was used to reveal the respondent's different perceptions of the attributes. The results revealed 1.47 mean score of affordability, 1.71 mean score of compatibility and 1.21

mean score of complexity. These imply that the improved cassava processing technologies were not affordable, not compatible and not complex.

Table 2: Average weighted scores of technological attributes (n=121)

Attributes of technology	Mechanical grater	Power screw	Mechanical sifter	Toaster	Stitching machine	Mean score	Overall perception
Affordability	49.75	46.94	40.50	24.96	15.87	1.47	Not affordable
Compatibility	60.00	56.36	50.58	24.96	14.88	1.71	Not compatible
Complexity	42.81	54.71	35.37	8.43	5.29	1.21	Not complex

4.2. Level of Adoption of Improved Cassava Processing Technologies in the Study Area

As shown in table 3, the number of respondents who adopted the different cassava processing technologies at various levels of adoption were scored. Table 3, revealed the average weighted scores of the levels of adoption of improved cassava processing technologies. From this table, adoption level of mechanical grater, power screw dehydrating press and mechanical sifter had mean weighted score of equal or above the cut-off mean of 3 while the mean weighted score of toaster and stitching machine were lower than 3. This implies that the level of adoption of improved cassava processing technologies was high with an average of 2.7.

Table 3: Average weighted scores of levels of adoption (n=121)

Technologies	Total weighted scores	Mean weighted scores	Overall perception
Mechanical grater	463	3.83	High
Power screw dehydrating press	463	3.83	High
Mechanical sifter	397	3.28	High
Cassava fryer	189	1.56	Low
Stitching machine	101	0.84	Low

4.3 Factors Influencing Women's Adoption of Improved Cassava Processing Technologies in the Study Area

The results of the multiple regression analysis in table 4 revealed that five of the factors have significantly influenced the adoption of improved cassava processing technologies by women processors. These factors are age, processing experiences, Affordability, Compatibility and Complexity. It was found that age (.019) affordability (.021) and Compatibility (.044) have positive and significant influence on adoption at 1% level of significance. Table 4 also revealed that Complexity (.010) has significant influence on adoption at 5% level of probability while processing experience has negative influence on adoption at 10% level of probability. This implies that age, affordability, compatibility and complexity were the significant variables influencing adoption in the study area. The influence of age on adoption was also complimented in the work of

Ojuekaiye (2001) who found that socio-economic characteristics like age affect adoption of agricultural technologies. The findings above have relevance with the work of Rogers (1995) who noted that innovation characteristics such as relative advantage, compatibility, complexity and affordability among others determine adoption potentials. Similarly, Reed (2001) identified the most significant variables that influence adoption as high relative advantage, high compatibility and low complexity.

Education, extension contact and co-operative societies did not have significant influence on the adoption of improved cassava processing technologies. The result on years of schooling disagrees with several studies carried out in Nigeria that, there was significant influence of years of schooling on adoption of new improved technologies (Osuji, 1983). Co-operative societies provide exposure to useful information and actual learning experience. It is expected that membership of cooperative societies should have positive influence on adoption. However, no positive influence was found in this study. This finding is at variance with the study by Deji (2005) who found membership of cooperative societies as a predictive factor of adoption behavior of women farmers. Since most of the factors significantly influenced adoption, the null hypothesis, which states that, " socio-economic characteristics of women processors have no significant influence on the women's adoption" is therefore rejected.

Table 4: Multiple regression result of factors influencing adoption of improved cassava processing technologies by women processors

Variables	Regression co efficiency	SE	T-values	Level of significance
Constant	-201	.249	-807	.422
Age X_1	.019***	.005	3.998	.000
Years of schooling X_2	.010	.009	1.100	.274
Processing experience X_3	-.025*	.013	-1.889	.061
Extension contact X_4	-.002	.033	-.076	.940
Co-operative societies X_5	.014	.017	.828	.409
Affordability X_6	.021***	.005	4.204	.000
Compatibility X_7	.044***	.005	8.230	.000
Complexity X_8	.010**	.005	2.119	.036

$R = .910$
$R^2 = 0.83$

*** = Significant at 1% level of probability
** = Significant at 5% level of probability
* = Significant at 10% level of probability

4.4. Effects of Adoption of Improved Cassava Processing Technologies on Output, Income and Level of Living of Women Processors in the Study Area.

Z-Test Statistic was used to compare the mean output, income and level of living before and after adoption of improved cassava processing technologies by women processors in the study area. The hypothesis tested was that, "adoption of improved cassava processing technologies has no significant effect on the output, income and

level of living of the women processors". The results from Z-test revealed that the calculated Z of both mean output (35.29) and mean income (33.50) of the women processors were greater than the table (critical) value of 1.96 at 5% level of probability. Therefore, the null hypothesis which states that "adoption of improved cassava processing technologies has no significant effect on the output and income of the women processors" was rejected while the alternative hypothesis which states that " adoption of improved cassava processing technologies has significant effect on the output and income of the women processors" was accepted.

The result from Z-test also revealed that the calculated Z of level of living (1.22) of the women processors was lower than the table (critical) value of 1.96 at 5% level of probability. Therefore, the null hypothesis which states that, "adoption of improved cassava processing technologies has no significant effect on the level of living of women processors was accepted while the alternative hypothesis which states that "adoption of improved cassava processing technologies has significant effect on the level of living of women processors" was rejected. This implies that, the adoption of improved cassava processing technologies has significant effect on the output and income of the women processors but did not significantly influence level of living. The reason for this result may be due to the fact that, the money realized from the processing of cassava using improved technologies by the women processors must have been diverted to other uses such as training of children to school, assistance to the orphans and relatives. This finding supports the submission of Olaniyan (1998) who found that income and output of women farmers who adopted recommended practices of cassava production increased but did not affect their level of living.

Table 5: Result of Z-test of output and income before and after adoption of improved cassava processing technologies (n=121)

Mean	SD	Z-calculated	Z-critical	Level of probability
Output after 246.58kg/day	5.4	35.29		
Output before 53.96kg/day	0.9		1.96	5%
Income after ₦24, 545.45/day	564.0	33.50		
Income before ₦5,413.22/day	89.8		1.96	5%
Level of living after 5.21	1.74	1.22		
Level of living before 2.79	0.95		1.96	5%

4.5. Constraints Encountered by the Women using Improved Cassava Processing Technologies.

From Table 6, the major constraint affecting all (100%) the respondents was lack of credit facilities, which was ranked 1st. The problem of lack of credit facilities was also explained in the work of Sasore (2005), who stated that majority of processors, particularly women, face problem when seeking credit because of government policies, lack of information, lack of collateral and prejudices against them. Other constraints

revealed in Table 6 were high cost of machines (94%), problem of bulkiness of machines (54%) and lack of spare parts (50%) which were ranked 2nd, 3rd and 4th respectively.

Table 6: Distribution of the constraints/challenges encountered by the women cassava processors

Constraints	**No of respondents**	**Percentage**	**Rank**
Lack of credit facilities	121	100	1st
High cost of machines	113	93.4	2nd
Machines are too bulky	65	53.7	3rd
Lack of spare parts	61	50.4	4th
Inability to read manuals	30	24.8	5th

CHAPTER 5

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1. Summary of findings

The study revealed that age of the respondents ranged from 21 to 80 years with an average of 47 years. Majority (46%) of the respondents had years of schooling up to secondary. The years of experience of the respondents ranged from 6 to 25years. Number of extension contacts was low with about 64% of the respondents not having contact with extension agents. All the respondents belong to cooperative societies.

The multiple regression result revealed that age, affordability, compatibility and complexity had positive influence on adoption of improved cassava processing technologies. Years of schooling, extension contact and cooperative societies were not significant. The level of adoption of improved cassava processing technologies was high with an average of 2.7. From the Z-test statistics, the result revealed that the mean output and mean income of women processors were significant at 5% levels of probability while the level of living was not significantly influenced. This implies that improved cassava processing technologies had positive effect on the output and income of processors. The various constraints encountered by women cassava processors ranged from lack of credit facilities, high cost of machines, too bulky machines, lack of spare parts and inability to read manuals.

5.2. Conclusion

Majority of the respondents were within the economically active age group. This implies that the respondents are likely to take risk and have energy to cope with the rigours of cassava processing. The result of this finding reveals that, majority of the women processors were literate and this implies that the respondents are likely to have good understanding and usage of the technologies. It was discovered in this study that there was low extension services and the implication of this is that, there was low awareness creation of the potential gains of improved cassava processing technologies among the respondents in the study area. It was also discovered from this study, that majority of the respondents had long time processing experience. The implication of this is that, the respondents were likely to adopt the improved cassava processing technologies due to their long years of experience.

This study found that, the level of adoption of improved cassava processing technologies was high. This implies that the women processors were comfortable with the technologies. The study has revealed that adoption of improved cassava processing technologies had increase on the output and income but did not reflect in their level of living. The implication of this finding is that, if the respondents appropriately adopt the improved cassava processing technologies they would likely have more output and income to take care of other needs which do not directly relate to their level of living.

This finding also supported the general alternative hypothesis of this study that certain socio-economic characteristics, institutional factors and technological attributes

significantly contribute to the adoption of improved cassava processing technologies. This implies that age, processing experience, affordability, compatibility and complexity were important factors to consider in the adoption of improved cassava processing technologies in the study area. This suggests that any extension strategy for cassava processors, aimed at high level of innovation adoption should critically consider the roles of these factors. The cassava processors encountered lack of credit facilities, high cost of machines, bulkiness of machine and lack of spare parts constraints. This implies that women cassava processors did not get financial support outside their processing business coupled with the high cost of the technologies. This suggests the reason why some of the respondents were not using the improved cassava processing technologies.

5.3. Recommendations

i. The study revealed low Extension contact, therefore, Extension agents in the study area should effectively disseminate information that will influence the adoption of improved cassava processing technologies.

ii. The study revealed not affordable technologies. Therefore, it is recommended that affordable technologies should be introduced to the respondents by the extension agents in the study area.

iii. Although, the level of adoption of Power screw dehydrating press was high, the study still revealed that it needs to be improved by converting its manual

operation to mechanical powered engine. This will reduce the drudgery of forceful pulling and pushing of the machine. Therefore, Power screw dehydrating press should be improved accordingly.

iv. Lack of credit facilities was the major constraint of the respondents, it is therefore recommended that the women cassava processors should utilize their memberships in co-operative societies to assist themselves financially as people come together so as to meet collective needs that could not be resolved by an individual.

5.4. Suggestions for Further Study

i. The researcher conducted this research in only Akoko-Edo Local Government Area of Edo State. It is further suggested that similar research should be conducted in more than one Local Government Areas in Edo State to validate the findings of this study

ii. This study was conducted to examine the factors influencing adoption of improved cassava processing technologies. It is therefore suggested that further research should be conducted on factors influencing cassava production in Edo State..

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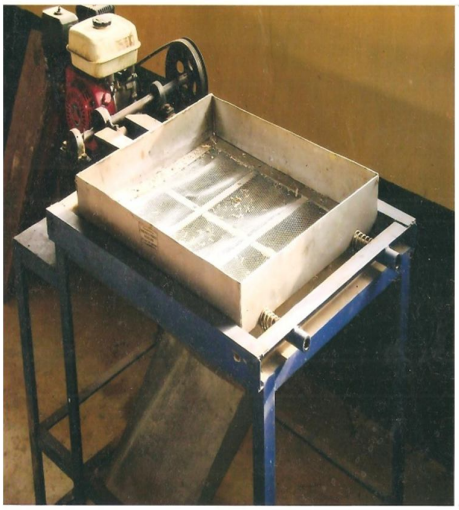
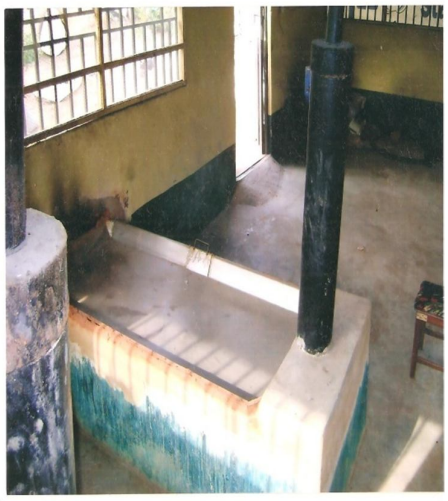
APPENDIXES

Appendix i: Mechanical grater

Appendix ii: Power screw press



Appendix iii: Mechanical sifter



Appendix iv: Toaster (fryer)

Appendix v: Distribution of respondents' perception scores according to the technological attributes

Affordability	**Mechanical grater**	**Power screw dehydrating press**	**Mechanical sifter**	**Toaster**	**Stitching machine**
HA (5)	5	0	0	0	0
VA(4)	0	8	0	0	0
A (3)	55	41	54	50	32
FA (2)	50	60	33	0	0
NA (1)	11	9	17	1	0
Compatibility:					
HC (5)	1	1	0	0	0
VC (4)	0	5	1	0	0
C (3)	118	92	98	50	30
FC (2)	2	20	3	0	0
NC (1)	0	0	2	1	2
Complexity:					
HC (5)	2	8	0	0	0
VC (4)	7	11	0	0	0
C (3)	27	55	30	0	0
FC (2)	65	38	50	0	0
NC (1)	20	6	24	51	32

Appendix vi: Weighted scores of technological attributes

Affordability	Mechanical grater	Power screw dehydrating press	Mechanical sifter	Toaster	Stitching machine
HA	25	0	0	0	0
VA	0	32	0	0	0
A	165	123	162	150	96
FA	100	120	66	0	0
NA	11	9	17	1	0
Total	**301**	**284**	**245**	**151**	**96**
Compatibility:					
HC	5	5	0	0	0
VC	0	20	4	0	0
C	354	276	294	150	90
FC	4	40	6	0	0
NC	0	0	2	1	0
Total	**363**	**341**	**306**	**151**	**90**
Complexity					
HC	10	40	0	0	0
VC	28	44	0	0	0
C	81	165	90	0	0
FC	130	76	100	0	0
NC	20	6	24	51	32
Total	**259**	**331**	**214**	**51**	**32**

Appendix vii: Distribution of respondents according to their level of adoption of improved cassava processing technologies

Technologies	Level of Adoption				
	Very High (5)	High (4)	Fairly High (3)	Fair (2)	Low (1)
Mechanical Grater	54	20	24	18	5
Power screw Dehydrating press	38	48	20	9	3
Mechanical sifter	31	39	18	16	0
Cassava fryer	14	15	16	5	1
Stitching machine	2	13	10	2	5

Appendix viii: Weighted Scores of levels of adoption

Technologies	Very High	High	Fairly High	Fair	Low	Total
Mechanical grater	270	80	72	36	5	**463**
Power screw Dehydrating press	190	192	60	18	3	**463**
Mechanical sifter	155	156	54	32	0	**397**
Cassava fryer	70	60	48	10	1	**189**
Stitching machine	10	52	30	4	5	**101**

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

MSc. RESEARCH QUESTIONNAIRE

A. DEMOGRAPHIC INFORMATION

1. What is your age?.....

2. Marital status: (i) Single { } (ii) Married {) (iii) Divorced { } (iv) Widow { }

3. What is your highest years of schooling?

   (i) No formal education { } (ii) Arabic/Islamic education { }

   (iii) Primary Education { } (iv) Secondary education { }

   (v) Tertiary education { }

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

   (i) Arabic/Islamic education:…….. (ii) Primary education:……

   (iii) Secondary education:…… (iv) Tertiary education:……

5. How many years have you been in cassava processing business?.....

6. Is cassava processing your only occupation? Yes { } No { }

7. If no, which other activities do you engaged in?

   (i) ……

   (ii) ……

   (iii) ……

8. Do you have contact(s) with any extension agents as regards cassava processing? Yes { } No { }

9. If yes, how often or how many times?

   (i) Once a week { } (ii) Once a month { } (iii) Once in three months { }

   (iv) Once in more than three months { }

10. Are you satisfy with the visits of Extension agents? Yes { } No { }

11. If yes, give reasons

i) ……

ii) ……

12. If No, give reasons

i) ……

ii) ……

13. Do you belong to any cassava processing association/co-operative society?

Yes { } No { }

14. If yes, how many associations/co-operative societies do you belong?.....

15. How many years have you spent being a member of the co-operative societies?.....

B IMPROVED CASSAVA PROCESSING TECHNOLOGIES ADOPTED

1. Which of these equipment/machines below do you use in cassava processing?

(i) Chipping machine { } (ii) Power screw dehydrating press { }

(iii) Grating machine { } (iv) Mechanical sifter { } (v) Slicing Machine { }

(vi) Motorize Faker { }

2. Mention any other machines you use in cassava processing business apart from the ones mentioned above.

(i) …… (ii) ……

(iii) …… (iv) ……..

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

(i) ……

(ii) ……

(iii) ……

4. What is the source(s) of the equipment/machines you are using for cassava processing? Tick, if any below:

(i) Government { } (ii) Non-governmental organization { }

(iii) Partnership with cassava processing association { }

(iv) Private individual { }

5. Which of the machines above needs improvement in the processing of cassava? Tick, if any below:

(i) Chipping machine { } (ii) Power screw dehydrating press { }

(iii) Grating machine { } (iv) Mechanical sifter { }

(v) Slicing machine { } (vi) Motorize flaker { }

6. Mention the areas of improvements as in No.5 above.

(i)……

(ii)……

(iii)……

(iv)……

(v)……

(vi)……

C OUTPUT AND INCOME

1. Are there any difference in your output as a result of adopting improved cassava processing technologies? Yes { } No { }

2. How many bag(s) of cassava were you processing in a day before the use of the machines?.....

3. How many bags of cassava are you processing in a day after the use of the machines? ……..

4. What is the weight of a bag of cassava you processed in kilograms (kg)? ……

5. (a) Which of the following products do you process from cassava? Tick, if any.
(i) Gari { } (ii) Starch { }(iii) Chips { } (iv) Flour { }
(v) Peals { }

Specify others: (i)……. (ii)…….. (iii)……

(b) Before the use of the machines, which of the products above were you processing from cassava?

Name of Product	No of bag (s)	Weight/bag	Price/bag ₦
(i)			
(ii)			
(iii)			

(c) After the use of the machines, which of the products above are you processing from cassava?

Name of product	No of bag(s)	Weight/bag	Price/bag ₦
(I)			
(ii)			
(iii)			

6. Do you obtain any credit for the cassava processing business? Yes { } No { }

7. How much credit did you get to support your cassava processing business?

₦……

8. Where did you get the credit from? Tick from the options below:

(i) Husband { } (ii) Relatives and friends { } (iii) Local money lenders { }

(iv) Agricultural agencies { } (v) Co-operatives { } (vi) Banks { }

9. Specify other sources of your credit apart from the ones above……

D LEVEL OF LIVING

1. Which of the following household materials did you possess from cassava processing business before the use of the machines? Tick Yes or No

a) Telephone: Yes ( ) No ( ) b) Fridge: Yes ( ) No ( )

c) Television: Yes ( ) No ( ) d) Cushion Chair: Yes ( ) No ( )

e) Electric Fan: Yes ( ) No ( )

2 State any other(s) household materials apart from the ones in no.1 above.

(i) …… (ii)……

(iii)……

3. Which of the following household materials did you possess from cassava processing business after the use of the machines?

a) Telephone: Yes ( ) No( ) b) Fridge: Yes ( ) No ( )

c) Television : Yes No ( ) d) Cushion Chair: Yes( ) No ( )

e) Electric Fan: Yes ( ) No ( )

4. State any other(s) household materials apart from the ones in No.3 above .

(i) …… (ii) ……

(iii)……...

5. Did you have building(s)/accommodation of your own from cassava processing business before using the machines? Yes { } or No {)

6. Do you have building(s)/accommodation of your own from cassava processing business since you started using the machines. Yes ( ) No ( )

7 Did you have any means of transportation from cassava processing business before using the machines? Yes { } No { }

8. If yes, which of the following means of transportation did you have.

(i) Bicycle: Yes { } No ( ) Motor cycle: Yes ( ) No { } Vehicle: Yes( ) No{ }

9. Do you have any means of transportation from cassava processing business since you started using the machines? Yes { } No { }

10. If yes, which of the following means of transportation do you have ?

(i) Bicycle: Yes { } No ( ) Motorcycle :Yes { } No ( ) Vehicle:{ } No ( )

11. Mention any other means of transportation apart from the ones above……..

E. CONSTRAINTS/CHALLENGES

1. Which of the following problems do you encounter in using the machines? Tick, if any.

(i) High cost of machines { }

(ii) Inability to read and understand the instructions (manuals){ }

(iii) Custom rights against women's ownership of properties { }

(iv) Lack of credit facilities { }

(v) Machines are too bulky/heavy { }

(vi) Lack of spear parts for the machines { }

(vii) Lack of technical know-how { }

(viii) Others (specify) :

i ……..

ii……

iii……

F TECHNOLOGICAL ATTRIBUTES:

(a) AFFORDABILITY:

Which of the following machines were you able to buy? Tick the correct option

In the table below as applied to each machine. NA (Not affordable)=1,

FA(Fairly affordable)=2, A(Affordable)=3, VA (Very affordable)=4 and HA

(Highly affordable)=5.

S/N	Machines	NA	FA	A	VA	HA
1.	Chipping machine					
2.	Power Screw dehydrating press					
3.	Grating machine					

4.	Mechanical sifter					
5.	Slicing machine					
Others, specify:						
S/N.	Machines	NA	FA	A	VA	HA
1.						
2.						
3.						
4.						

b) COMPATIBILITY:

Which of the following machines meets your needs or compatible with your values? Tick the correct option in the table below as applied to each machine NC (Not compatible)=1, FC(Fairly compatible)=2, C(Compatible)=3,VC(Very compatible)=4 and HC(Highly compatible)=5.

S/N	Machines	NC	FC	C	VC	HC
1.	Chipping machine					
2.	Power screw dehydrating press					
3.	Grating machine					
4.	Mechanical sifter					
5.	Slicing machine					
	Others, specify:					
S/N.	Machines	NC	FC	C	VC	HC
1.						
2.						
3.						
4.						

C COMPLEXITY

Which of the following machines are complex to use or has high level of risk? Tick the correct option in the table below as applied to each machine.NC(Not complex)=1 FC(Fairly complex)=2, C(Complex)=3, VC (Very complex)=4 and HC(Highly complex)=5.

S/N	Machines	NC	FC	C	VC	HC
1.	Chipping machine					
2.	Power Screw dehydrating press					
3.	Grating Machine					
4.	Mechanical Sifter					
5.	Slicing Machine					
Others, specify:						
S/N.	Machines	NC	FC	C	VC	HC
1.						
2.						
3.						
4.						

SUGGESTIONS:

What suggestions will you give that can help improve cassava processing business?

i)……

ii)……

iii)……