



Technology Adoption and Women Entrepreneurial Behaviour: Case of Agro-Allied Businesses in Rural South Western Nigerian Communities

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ABSTRACT

Women entrepreneurs rely heavily on traditional techniques of production in agro-allied enterprises such as garri and palm oil processing in southwestern rural communities in Nigeria. Focus was on (1) assessing the appropriateness of available technology on garri and palm oil processing, and (2) analyzing the response of grassroots women entrepreneurs to adopting improved technology. Technology Adoption Model (TAM) was employed to explain the attitude of these women entrepreneurs towards technology adoption. The factors identified as having direct impact on women's behaviour towards adoption of appropriate technology are educational level, marital status, access to finance and raw material. These guided the design of data collection structure which was captured using pre-visit to study communities, partially structured questionnaire and focus group discussion (FGD). The findings that emerged from this study clearly indicate that most rural women entrepreneurs are reluctant in adopting improved technology and this is largely affected by their educational level and marital status. The study recommended some strategies to overcoming the reluctance of the women entrepreneurs towards adopting improved technologies for their food processing. The study concluded that there is an urgent need to deal with the women entrepreneurs' perception about improved technology for food processing to enhance their adoption and thereby increase their performance and their economic empowerment.

Keywords: *Women's behaviour, technology-adoption, food-processing, rural-communities, entrepreneur*

1. INTRODUCTION

Women have been known in successive generations to be enterprising and it has been recognized that economic growth particularly in developing countries can be stimulated, though requiring catalysts within the economy. One of such catalysts has been identified in entrepreneurship (Romijn, 1989) amongst women. However, the socio-economic conditions of women who participate actively in the economy of the country, particularly at the grass-roots level, have remained challenging despite implementation of economic reforms in Nigeria. Presently, indigenous entrepreneurship amongst women in Nigeria is still at its infancy and is mainly limited to micro and small scale businesses, significantly in the food processing sector. This is partly caused by the fact that some important services and infrastructure such as electricity, accessible good roads, etc necessary to encourage entrepreneurship growth are not accessible to local entrepreneurs particularly women. According to the 2006 census figures, women make up 49% of the total population in Nigeria (FRN, 2007), and make up over 60% of the over 1 billion poorest in the world (UNDP, 2006). Survival for this set of people is hard. In addition to working outside the home and maintaining an active public role, women shoulder the responsibilities of raising the children and carrying out the

vast majority of household duties. This creates a heavy burden for women. As a way out of this burden, many women seek succor through self-employment in the informal sector which has become an important outlet for women attempting to lift themselves beyond the threshold of poverty. Unfortunately, these women are faced with some challenges which affect their business performance. These challenges range from heavy reliance on traditional methods of production (outdated technology), inability to secure credit/loan from banks, lack of access to appropriate information, as well as lack of training, and land acquisition issues amongst others (ILO, 2002). Factors affecting performance of women entrepreneurs have been researched into broadly, and these can be classified as: human capital, strategic choice, and structural barriers (Ogbimi, 2001).

The scope of this paper is limited to certain aspects of the structural barriers which are: access to credit and financing and acquisition of improved technology. According to Soetan (1995) because women have limited access to critical resources like education, land, technology, and credit, they are easily excluded from being engaged in the formal sector. As a result, most of the enterprises grassroots women engage in fall into the informal sector using rudimentary technology, and these enterprises are crucial to the survival of women and their

families. Therefore the study examined the behaviour of women engaged in rural enterprise activities (garri and palm oil processing) towards technology adoption in improving their performance.

2. SIGNIFICANCE OF STUDY

The role of women in the informal sector, particularly at the grass root level, requires special attention as it has been observed by Soetan (1995). Hence, even within the informal sector, they are confined to micro-enterprise, which include trading and low technology-related occupations. Since most women work in this sector not as a matter of choice but as a necessity, the outcome of this study is intended to provide baseline data for policy-making in its attempt to enhance the performance of the women entrepreneurs. In addition, the study will also contribute to a better understanding of the behavior of women entrepreneurs to improved technology for producing garri and palm oil.

3. OBJECTIVES OF STUDY

The study set out to examine women behaviour towards adoption of improved technology for their entrepreneurial development using garri and palm oil production as case studies. To this end, the specific objectives of the study were to:

- Assess the appropriateness of available technology on garri and palm oil processing, and
- Analyze the response of grassroots women entrepreneurs to adopting improved technology.

4. THEORETICAL FRAMEWORK

The model adopted for the study is Technology Acceptance Model (TAM) TAM is a model developed for assessing the process of technology diffusion. Since our interest is to examine how the women in rural businesses would respond to improved technology introduction, this section therefore examines process, social and other factors influencing the diffusion of technology. According to Wahid (2007), the attributes of technologies that modify the adoption and diffusion process include characteristics of the potential adopters and strategies that contribute to successful technology adoption and integration. Hence, within this context, "adoption" refers to the stage in which a technology is selected for use by an individual or an organization. "Innovation" is similarly used with the nuance of a new or "innovative" technology being adopted. "Diffusion" refers to the stage in which the technology spreads to general use and application. "Integration" connotes a sense of acceptance, and perhaps transparency, within the user environment. Typically, past adoptions of a new technology have signaled a confidence in its potential to alleviate a particular problem or to make a job easier or more efficient. Figure 1 presents a schematic representation of TAM.

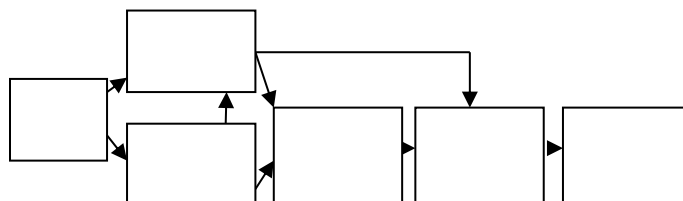


Figure 1 Technology adoption model adapted from Wahid (2007)

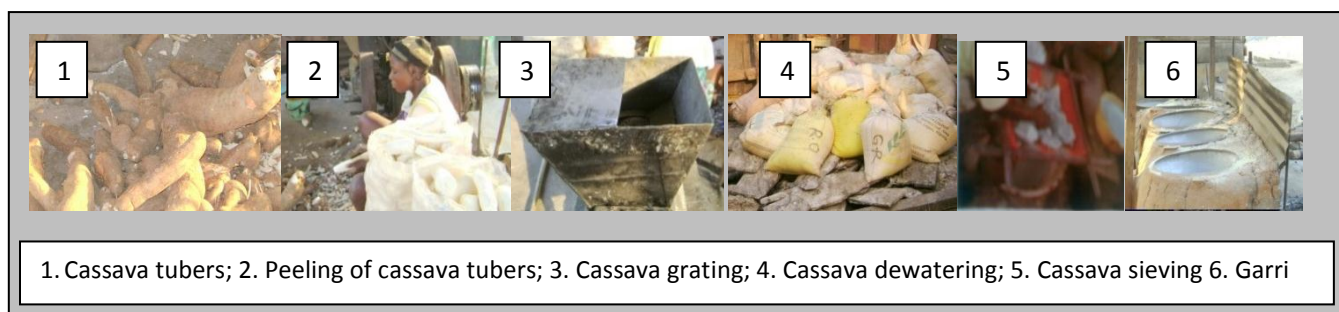


Plate 1 - Flow of garri making from manual technique of cassava processing

TAM proposes two specific beliefs – perceived ease of use (PEOU) and perceived usefulness (PU) – that determine behavioural intention to use technology. Behavioural intention is a measure of the strength of one's

intention to perform a specified behaviour. Perceived usefulness is defined as 'a prospective user's subjective probability that using a specific technology will increase his or her job performance within an organizational

context' (Davis, Bagozi and Warshaw, 1989). Further, the TAM assumes that perceived usefulness will be influenced by ease of use, because, other things being equal, the easier a technology is to use, the more useful it can be. Perceived ease of use refers to 'the degree to which the prospective user expects the target system to be free of effort' (Davis, Bagozi and Warshaw, 1989). By assuming that other variables are constant, the easier a technology is to be used, the higher is its possibility to be adopted by users.

In summary, the conditions needed for technology adoption and diffusion include strong stable advocacy and training in its technical aspects. Furthermore, application of the technology to real needs is crucial to its integration beyond the innovators and early adopters. Time for experimentation and development of applications is essential. Successful peer users are needed to lead its integration into the society. If the technology is perceived as difficult to learn and/or too time consuming to prepare and use, or is in some other way perceived as threatening, it probably will not be used. No amount of administrative force would likely be effective reversing a negative trend. A perception of value in terms of needs/problem solving or other rewards through establishment of policies, incentives and recognition in environment need to be nurtured by the policy makers in order to encourage the acceptance and use of new technology. The assessment of respondents' behaviour to improved technology used in agro – allied businesses was done using TAM against the backdrop of improved technology adoption. So for women entrepreneurs in the informal sector of food processing, particularly women involved in garri and

palm oil production, it becomes imperative that they are made to understand the significance of adopting improved processing technology. Though, they do not operate the same mode of technology but they both apply or work with traditional technology and operate in the same environment. In order to apply the relevance of TAM to local situations, relationship between the independent (behavioural response) and dependent (improved technology adoption) variables were examined.

5. DESCRIPTION OF TRADITIONAL PROCESSING TECHNOLOGIES FOR GARRI AND PALM-OIL PRODUCTION

5.1 Garri Processing

This section describes the procedures for production of garri and palm oil. To curb post-harvest losses of highly perishable cassava, processing is usually done almost immediately after harvest. Its processing however has been constrained by quite a number of factors which include lack of steady supply of tubers throughout the year, high transport cost to processing centres, inadequate processing equipment and low returns from small-scale processing (Davies et al, 2008). Garri, is one of the major products obtained from the processing of cassava tuber and it is considered the most widely consumed staple food in Nigeria. There are two methods of processing garri, namely, the manual (traditional) (see Figure 2 and Plate 1) and mechanized technologies (see Figure 3 and Plate 2). Both methods are based on the same basic principles.

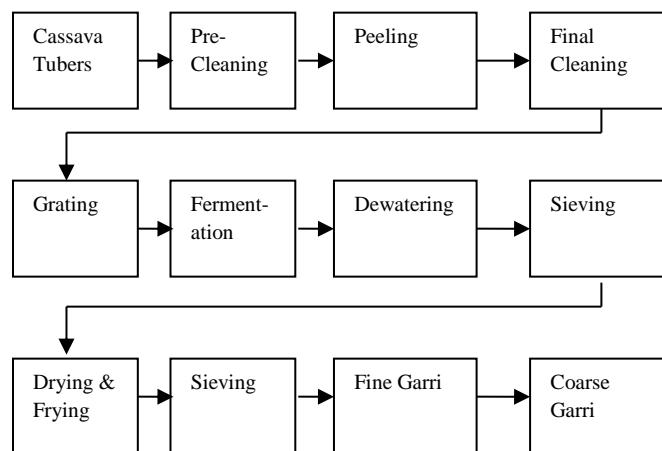


Figure 2 Flow-Chart for Garri Processing (Source: Ugwu, 1991)

Traditional or manual approach to garri making from processed cassava has been reported as a labour intensive one. Women and children suffer most of the brunt of this intensive production process. Manual technique takes an average of 90 hours to process 100 kg of garri per person and 65% of the total time could be spent on peeling and 25% on frying. This processing technique is known to be responsible for poor quality, in addition to its being time

consuming. Six steps are involved in the processing of garri, which consist of: peeling and washing of cassava tubers; grating the peeled tubers; dewatering/fermentation; sieving; and frying, and second sieving (Ogwu, 1991). Most of the women interviewed in this study in the various communities processing garri were found to be using mainly the traditional/manual technique.

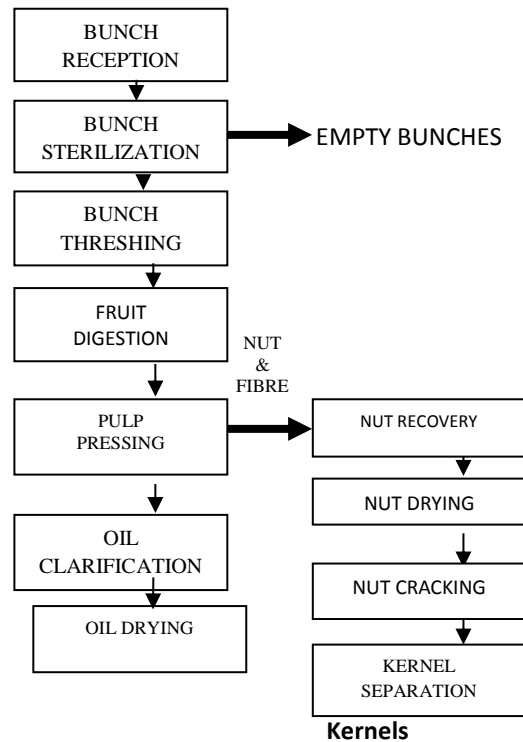
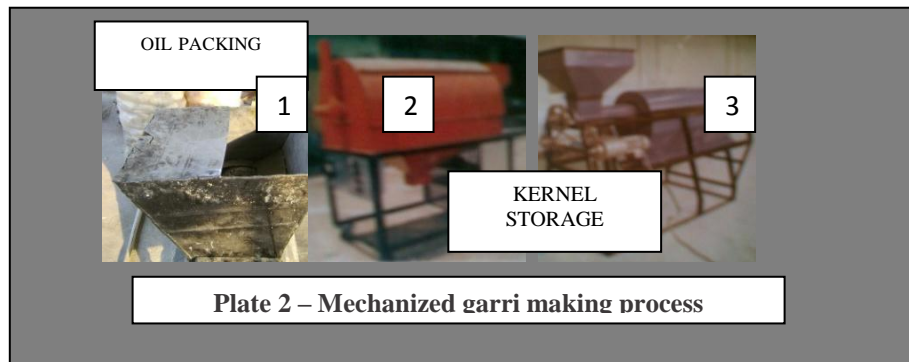


Figure 3 Palm Oil Processing Unit Operations (Source: Ogwu, 1991)

Plate 2 presents some of the built mechanized garri making machines. These include the grater, rotary sifter and cassava drying and roasting machine.



5.2 Palm-oil Processing

Palm oil is derived from palm fruit, which has been estimated to have 45% to 50% oil content (FAO, 2000). The production and processing of palm oil are largely in the hands of small holder farmers. For the processing, there are essentially two categories of technology existing in the industry. These are the traditional technology and mechanical technology. The traditional technology, which is characteristically labour intensive, involves two alternative processes. The first process, known as “hard oil” process, requires a rather lengthy duration of

fermentation to loosen fruits from bunches and to accelerate the softening of the mesocarp. The fermented fruits are pounded in a wooden mortar with wooden pestles. Water is subsequently added to the masticated fruits to extract the oil. The mixture is drained and boiled, and the clean oil skimmed off. The ‘soft oil’ process is an improvement on the ‘hard oil’ process because rather than pound the fermented fruits, they are first boiled before being pounded in order to extract the oil. A great deal of energy and resources have been devoted to developing the technology capable of increasing both the extraction rate and quantity of palm oil. Literature revealed that since the

1930s, a series of processing machines have evolved (Ogwu, 1991). Although the machines achieved varying levels of extraction efficiency, the traditional processing

technique has persisted and is reported to account for about 80% of Nigeria's palm oil production. Plate 3 presents the traditional flow of palm oil making.

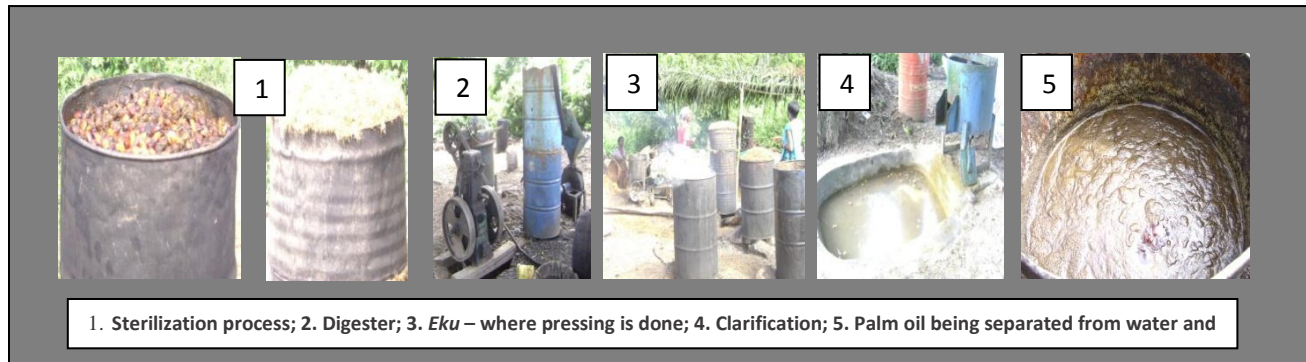


Plate 3 - Traditional techniques being applied in palm oil extraction



Plate 4 - Examples of improved/mechanized technology applied in palm oil extraction

5.3 Improved Processing Techniques and Technologies

To overcome the deficiencies in the traditional processing, there have been appreciable improvements on the methods used for garri making from cassava processing (RMDRC, 2004).

5.4 Garri Processing

Manual grating has been replaced with powered grating machines while hydraulic press has replaced the traditional dewatering device. The use of modified high output powered lever or hydraulic press to de-water the grated mash after grating, has gone a long way to complement the gains following the introduction of powered cassava graters. In contrast, the new method gives consistent quality, better flavour, far greater standards of hygiene, and is time and labour efficient. This permits direct control of the level of dewatering, the types of fermentative microorganisms and the level of moisture content of the caked dewatered product. This has a direct effect of shortening of cooking process during frying to produce garri. Most of the cassava processing machinery/equipment fabricated in Nigeria are the simple

low capacity model. However, most of these machines (about 90%) are below the 10-tonne/day capacity. This is in line with the household and cottage level production process undertaken by most of the processors. The major components involved in the improved processing methods include:

- Cassava Peeling
- Cassava Grater
- Dewatering Press
- Garri Fryer

5.5 Palm-oil Processing

For the process of producing palm oil mechanically, the general steps involved can be classified into:

- unloading, storage and cleaning the fruits
- dehulling, preparation and pressing the fruits; and
- solvent extraction and meal treatment

Literature reveals that a steady evolutionary development has taken place in machinery and equipment required to process palm fruit bunches to meet changing circumstances of the small-scale palm oil processing

industry. These innovations have progressed from the development of individual machines to carry out particular operations to machines that combine several operations in the process. The mechanized process in palm fruit processing to extract palm oil, includes: threshing, sterilization, digestion, pressing, clarification and drying of oil, and eventually oil storage. Plate 4 presents examples of improved/mechanized technology applied in palm oil extraction.

5.6 Cost Implication of Adopting Improved Technology

Due to various constraints in the construction occasioned by global economic meltdown of the examined improved technology for garri and palm oil processing, it was discovered that a number of the existing manufacturers were no longer involved in production of these technologies. As such, it was difficult obtaining reliable cost data of the technology. However, the researchers opined that from the perception of the various respondents to the issue of improved technology, cost of acquiring the technologies (maybe up to 20 times the cost of traditional techniques) would be much more than the traditional method. Further, considering the other factors of infrastructural facilities that will make the adoption of the technologies to work in rural areas, it becomes apparent that the improved technology would be priced out of the reach of these rural women without government direct intervention.

Hypothesis

The following hypothesis represents the major relationship arising from the theoretical framework as well as the issues raised and highlighted in the collection of the literature. The broad assumption is also presented.

Assumption

It is assumed that women’s behaviour towards technology adoption for garri and palm oil processing will affect their entrepreneurial performance. This is assumed to stem from understanding of perceived ease of use and perceived usefulness of the adopted technology. However this assumption is premised on the axiom that the women are educated, have freedom of choice without cultural inhibitions such as marriage as well as financial limitations that will curb their desire to embrace the improved technology. Other factors such as internal environment of the business as defined by access to raw materials and adequate infrastructural facilities (roads, transportation, electricity, and telecommunication services) are taken to be constant. Thus optimal enterprise performance is assumed to be present in locations where

these three factors – adequate infrastructural facilities, access to raw materials and finance – are conducive. These factors serve as indicators of measuring the impact of improved technology on entrepreneurial performance. The presence of these factors in locations where the women-entrepreneurs operate is expected to affect their optimal enterprise performance. In order to test this assumption, an operational hypothesis is proposed. This is:

H1: *The woman-entrepreneur has positive behavioural response towards technology adoption for processing of garri and palm-oil making in rural communities.*

This hypothesis was tested for the insight it could provide towards understanding the impact of the woman’s behaviour towards technology adoption at the grassroots level as it affects the performance in food processing business. In order to test this hypothesis, the following variables are used. They are:

| Variable type | Indicator | Measurement parameters |
|---------------|------------------------------|--------------------------------------|
| Independent | Behavioural Response | Level of Education Marital status |
| Dependent | Improved technology adoption | Productivity Income generated |

To analyze the influence of improved technology (internal environment) on women entrepreneurial performance at the grassroots level in garri and palm oil processing, the parameters measured were productivity and income.

6. Methodology

The factors stated above guided the design of data collection structure. Identification of the factors was done to capture data relevant to explaining the relationship between variables that impact directly on the women behaviour towards technology adoption and their performance. The instruments employed to capture relevant data were pre-visit to study communities, partially structured questionnaire and focus group discussion (FGD).

6.1 Research Instrument and Data Collection Techniques

Through a pre-visit to the localities, the numbers of households in the entire communities were enumerated

and information concerning the business set up of the women in the communities was obtained. During the pre-visit, it was observed that each household had a woman processing either garri or palm oil or both, as these are major businesses they engaged in to earn a living and sustain their different families. Further testing of the questionnaire for clarity and understanding through some selected respondents was carried out to ascertain its validity, before finally being administered. In order to capture the salient factors necessary to measure the performance indices of the women entrepreneur in these localities, partially structured questionnaire (Johnson and Wichern, 1997) was administered to 265 women involved in the processing of either garri or palm oil (or both) at household level. Focus Group Discussions (FGD) which is an informal, guided discussion about a particular research (De Negri and Thomas, 2003) was conducted in the six communities to obtain first hand information from the women to handle the lapses observed in the questionnaire administration.

6.2 Location of the Study and Population

The study was carried out in six purposively selected rural settlements within Ife Central Local Government Area in Osun State, one of the six states in the southwest region of Nigeria. The settlements include: Ita Elewa, Eleso, Abule Ooni Ilare I, Ooni Ilare II, Eleweran and Kajola. The study locations were selected based on the fact that they were found to be good representation of where women are mainly involved in the informal food processing industry, particularly garri and palm oil production.

6.3 Sample Size, Sample Selection and Data Collection

Six communities were purposively selected from the total number of communities within Ile-Ife Central Local Government Area of Osun State involved in the processing of garri and palm oil as entrepreneurs. All the communities together consist of 472 households and households with at least one person involved in either of the two businesses or both were purposely selected. Out of which alternate households were randomly selected. Further to the questionnaire administration, FGD which is a loosely structured discussion was conducted in the purposively selected communities to capture data gaps that were identified after the questionnaire administration. Between 8 and 10 respondents were randomly selected from each of the six communities with a moderator guiding the discussions, encouraging participants to talk freely to reveal their thoughts and feelings about the experience of women entrepreneurs in their communities.

6.4 Data analysis

Data collected from the field survey were collated and analyzed using descriptive statistics of mean and frequency tables and chi-square test as inferential statistical techniques through Statistical Package for Social Science (SPSS) developed by SPSS Inc. (2001).

7. RESULTS AND DISCUSSION

7.1 Questionnaire Administration

The response of the respondents shows variations amongst the communities and the question sets respectively. Table 1 shows the breakdown of involvement of the respondents in either or both garri and palm oil processing. Responses show that about 37% fall in the category of garri making, while 41% are into palm oil processing. Only 22% indicated that they were engaged in the processing of both products. However, the FGD revealed that almost all the women were involved in processing of both garri and palm-oil in the communities visited.

Table 1. Population and Sample Size in Each Community

| LOCALITY | Population | | | Household Population | Household Population Chosen |
|-------------------|------------|--------|-------|----------------------|-----------------------------|
| | Male | Female | Total | | |
| Ita Elewa | 193 | 224 | 417 | 83 | 47 |
| Eleso | 166 | 188 | 354 | 71 | 40 |
| Abule Ooni IlareI | 195 | 159 | 354 | 71 | 40 |
| Ooni Ilare II | 309 | 379 | 688 | 138 | 76 |
| Eleweran | 79 | 72 | 152 | 30 | 17 |
| Kajola | 209 | 188 | 397 | 79 | 45 |
| TOTAL | 1150 | 1211 | 2361 | 472 | 265 |

Source: National Population Commission and Field Survey

7.2 Socio-Demographic Information

Table 2 gives a breakdown of population figures of each of the communities in Ife Central LGA according to the census exercise conducted in 2006, with a total population of 2,361 made up of about 48% male and 52% female. It also presents the communities' household population of 472. About 265 of the households are involved in garri and palm oil production.

Table 3 shows that the women who fall within the labour force age bracket of 21 – 60 are about 80% and about 19% of the respondents are well above 61 years old. This latter record becomes more worrisome when the tedious nature of food processing using the traditional technology is considered. The married women constitute of about 88% of the respondents, 3% are single, about 8% are either separated or divorced while the remaining 1% was not filled. Fifty six percent (56%) of the respondents belong

to monogamous homes, 34% are into polygyny setting and the remaining 10% hid their identity by not filling in the needed information. About 73% of the women involved in the production of garri and palm oil have

formal education at either the primary or secondary school level, while 25% have no formal education and 2% unfilled (Table 4).

Table 2. Age Grouping, Marital Status and Family Type of Respondents

| Age Grouping | F | | Marital Status | F | | Family Type | F | |
|--------------|------------|------------|----------------|------------|------------|-------------|------------|------------|
| | F | % | | F | % | | F | % |
| 11-20 | 3 | 1.0 | Single | 9 | 3.0 | Monogamy | 148 | 56.0 |
| 21-30 | 30 | 11.5 | Married | 232 | 87.5 | Polygyny | 89 | 33.5 |
| 31-40 | 49 | 18.5 | Separated | 10 | 4.5 | Not Filled | 28 | 10.5 |
| 41-50 | 77 | 29.0 | Divorced | 9 | 3.0 | | | |
| 51-60 | 55 | 20.5 | Not filled | 5 | 2.0 | | | |
| 61-70 | 38 | 14.5 | | | | | | |
| 71-80 | 12 | 4.5 | | | | | | |
| Not Filled | 1 | 0.5 | | | | | | |
| Total | 265 | 100 | | 265 | 100 | | 265 | 100 |

Table 3. Respondents' Educational status

| Educational Status | Ita-Elewa | | Eleso | | Ooni Ilare 1 | | Ooni Ilare 2 | | Eleweran | | Kajola | | Total | |
|---------------------|-----------|------------|-----------|------------|--------------|------------|--------------|------------|-----------|------------|-----------|------------|------------|------------|
| | F | % | F | % | F | % | F | % | F | % | F | % | F | % |
| Secondary | 12 | 26 | 10 | 25 | 10 | 25 | 19 | 25 | 4 | 24 | 11 | 24 | 66 | 25 |
| Primary | 22 | 47 | 19 | 48 | 19 | 48 | 37 | 49 | 8 | 47 | 22 | 49 | 127 | 48 |
| No Formal Education | 12 | 26 | 10 | 25 | 10 | 25 | 19 | 25 | 4 | 24 | 11 | 24 | 66 | 25 |
| Not Filled | 1 | 2 | 1 | 3 | 1 | 3 | 1 | 1 | 1 | 6 | 1 | 2 | 6 | 2 |
| Total | 47 | 100 | 40 | 100 | 40 | 100 | 76 | 100 | 17 | 100 | 45 | 100 | 265 | 100 |

Source: Field survey

Table 4 Respondent's primary occupation

| Primary Occupation | Ita Elewa | | Eleso | | Ooni Ilare 1 | | Ooni Ilare 2 | | Eleweran | | Kajola | | Total | |
|---------------------|-----------|------------|-----------|------------|--------------|------------|--------------|------------|-----------|------------|-----------|------------|------------|------------|
| | F | % | F | % | F | % | F | % | F | % | F | % | F | % |
| Garri making | 17 | 36 | 15 | 38 | 15 | 38 | 28 | 37 | 6 | 35 | 16 | 36 | 97 | 37 |
| Palm Oil processing | 20 | 43 | 16 | 40 | 16 | 40 | 32 | 42 | 7 | 41 | 18 | 30 | 109 | 41 |
| Both | 10 | 21 | 9 | 22 | 9 | 22 | 16 | 21 | 4 | 24 | 10 | 22 | 58 | 22 |
| Wrongly filled | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | <1 |
| Total | 47 | 100 | 40 | 100 | 40 | 100 | 76 | 100 | 17 | 100 | 45 | 100 | 265 | 100 |

Source: Study Survey

7.3 Women's Involvement in Production Processes

This section reveals the various stages of involvement of the women in the businesses under review and the processes identified by the women for palm oil making

and the percentages of their involvement at the different stages are as follows: Firstly, only 3% of the women in all the communities were involved in the extraction of fruit and also 3% in cooking of fruit, 7% in extraction of oil, 5% only buy finished product for palm oil production while about 39% get involved in more than one stage of

production process. Forty Three (43%) of the respondents in all communities are not involved in palm oil production (see Table 5a). Garri production process includes, harvesting with only 3% involvement. It was also observed that some communities do not participate in this

stage .About 6% are involved in the peeling stage (which actually includes grating and sieving) and 19% are into frying and about 50% are involved in almost all of the stages while 21% do not participate in garri production (see Table 5b)

Table 5a Level of women involvement in processing of palm oil

| Processes involvement | Eleso | | Kajola | | Eleweran | | Abule Ooni Ilare 1 | | Ooni Ilare 2 | | Ita Elewa | | Total | |
|-------------------------|-------|-----|--------|-----|----------|-----|--------------------|-----|--------------|-----|-----------|-----|-------|-----|
| | F | % | F | % | F | % | F | % | F | % | F | % | F | % |
| Extraction of fruits | 5 | 13 | 0 | 0 | 0 | 0 | 1 | 3 | 3 | 4 | 0 | 0 | 9 | 3 |
| Cooking | 0 | 0 | 0 | 0 | 1 | 6 | 0 | 0 | 7 | 9 | 0 | 0 | 8 | 3 |
| Extraction of oil | 0 | 0 | 3 | 7 | 6 | 35 | 0 | 0 | 9 | 12 | 0 | 0 | 18 | 7 |
| Buying finished product | 3 | 8 | 0 | 0 | 1 | 6 | 0 | 0 | 0 | 0 | 9 | 19 | 13 | 5 |
| 1,2&3 above | 12 | 30 | 11 | 24 | 0 | 0 | 9 | 23 | 0 | 0 | 7 | 15 | 39 | 15 |
| Not Applicable | 20 | 50 | 21 | 47 | 5 | 29 | 20 | 50 | 36 | 47 | 12 | 26 | 114 | 43 |
| All Aspect | 0 | 0 | 10 | 22 | 4 | 24 | 9 | 23 | 22 | 29 | 19 | 40 | 64 | 24 |
| Total | 40 | 100 | 45 | 100 | 17 | 100 | 40 | 100 | 76 | 100 | 47 | 100 | 265 | 100 |

Table 5b Level of women involvement in processing of garri

| Processes involvement | Eleso | | Kajola | | Eleweran | | Ilare I | | Ilare II | | Ita Elewa | | Total | |
|-----------------------|-------|-----|--------|-----|----------|-----|---------|-----|----------|-----|-----------|-----|-------|-----|
| | F | % | F | % | F | % | F | % | F | % | F | % | F | % |
| All Aspect | 24 | 60 | 7 | 16 | 7 | 47 | 15 | 38 | 17 | 22 | 13 | 28 | 83 | 31 |
| Harvesting | 0 | 0 | 7 | 16 | 2 | 12 | 0 | 0 | 0 | 00 | 0 | 0 | 9 | 3 |
| Frying | 9 | 23 | 4 | 9 | 0 | 0 | 7 | 18 | 20 | 26 | 11 | 23 | 50 | 19 |
| Peeling | 0 | 0 | 7 | 16 | 0 | 0 | 0 | 0 | 4 | 5 | 5 | 11 | 16 | 6 |
| 2,3,4 above | 4 | 10 | 16 | 36 | 0 | 0 | 11 | 28 | 12 | 16 | 7 | 15 | 50 | 19 |
| Not Applicable | 3 | 8 | 4 | 9 | 7 | 41 | 8 | 20 | 24 | 32 | 11 | 23 | 56 | 21 |
| Total | 40 | 100 | 45 | 100 | 17 | 100 | 40 | 100 | 76 | 100 | 47 | 100 | 265 | 100 |

Source: Study Survey

Table 6a shows that there are four sources through which women get the palm fruit to process, namely, from leased or rented land, personal farms and by buying from others. The responses show that more women get their raw palm fruit mostly from leased land and/or personal farm plus leased land. The responses also indicated that in the various communities, leasing of palm fruit farm is a common practice. About 24% also have their personal farms and over 29% are involved in leasing. Ten percent (10%) are into only buying while the remaining 37% are

not involved in the sourcing of palm fruit. Table 6b shows the distribution of the responses of women as to how they source cassava for garri making. It was observed that the women use only two means to source for cassava; these are either buying or personal farm. About 27% source from buying, 6% source from personal farm while about 28% utilize both ways to source for cassava. The remaining 39% indicated that they are not involved in sourcing for cassava.

Table 6a Sourcing of raw material for palm oil making

| Sourcing of Raw Materials | Eleso | | Kajola | | Eleweran | | Ilare I | | Ilare II | | Ita Elewa | | Total | |
|---------------------------|-------|------|--------|------|----------|------|---------|------|----------|------|-----------|------|-------|------|
| | F | % | F | % | F | % | F | % | F | % | F | % | F | % |
| Rented land | 1 | 2.5 | 0 | 0.0 | 1 | 5.9 | 1 | 5.0 | 20 | 26.3 | 3 | 6.4 | 26 | 9.8 |
| Leased land | 4 | 10.0 | 10 | 22.2 | 9 | 52.9 | 5 | 12.5 | 17 | 22.4 | 20 | 42.6 | 65 | 24.5 |
| Buying + Leased land | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 5 | 12.5 | 4 | 5.3 | 3 | 6.4 | 12 | 4.5 |
| Personal farm + Leased | 7 | 17.5 | 12 | 26.7 | 0 | 0.0 | 0 | 0.0 | 3 | 3.9 | 8 | 17.0 | 30 | 11.3 |

| land | | | | | | | | | | | | | | |
|----------------------|----|------|----|------|----|------|----|------|----|------|----|------|-----|------|
| Personal farm + Rent | 12 | 30.0 | 7 | 15.6 | 5 | 29.4 | 8 | 20.0 | 0 | 0.0 | 3 | 6.4 | 34 | 12.8 |
| Not Applicable | 16 | 40.0 | 16 | 35.6 | 2 | 11.8 | 20 | 50.0 | 33 | 43.4 | 11 | 23.4 | 98 | 37.0 |
| Total | 40 | 100 | 45 | 100 | 17 | 100 | 40 | 100 | 76 | 100 | 47 | 100 | 265 | 100 |

Source: Study Survey

Table 6b Sourcing of raw material for garri making

| Sourcing of Raw Materials | Eleso | | Kajola | | Eleweran | | Ilare I | | Ilare II | | Ita Elewa | | Total | |
|---------------------------|-------|------|--------|------|----------|------|---------|------|----------|------|-----------|------|-------|------|
| | F | % | F | % | F | % | F | % | F | % | F | % | F | % |
| Buying | 17 | 42.5 | 12 | 26.7 | 4 | 23.5 | 9 | 22.5 | 16 | 21.1 | 13 | 27.7 | 72 | 27.2 |
| Personal Farm | 1 | 2.5 | 7 | 15.6 | 2 | 11.8 | 1 | 2.5 | 0 | 0.0 | 4 | 8.5 | 16 | 6.0 |
| Buying + Personal Farm | 12 | 30.0 | 18 | 40.0 | 1 | 5.9 | 22 | 55.0 | 17 | 22.4 | 4 | 8.5 | 74 | 27.9 |
| Not Applicable | 10 | 25.0 | 8 | 17.8 | 10 | 58.8 | 8 | 20.0 | 43 | 56.6 | 26 | 55.3 | 105 | 39.6 |
| Total | 40 | 100 | 45 | 100 | 17 | 100 | 40 | 100 | 76 | 100 | 47 | 100 | 265 | 100 |

Source: Study Survey

From Table 7a, 68% of the respondents make use of traditional method for the production processes of both garri making and palm oil production, while barely 10% claim the use of 'modern' technology, but the grinding machines are the only form of modern technology available. Practically, all the women make use of traditional method to process their products. However, during the FGD, some women registered their interest in improved production techniques. Because they feel that it will lead to increase output, reduce the rigours involved in the traditional method as well as help their health condition. In order to understand why the women were still stuck to the traditional method, they were asked about

their awareness of any alternative, its availability, accessibility and affordability. For awareness, about 46% of the women indicated that they are aware of better alternative to their production method, 26% said no and the remaining 28% were undecided (see Table 7b). A combination of responses from the questionnaire and FGD revealed that though the women entrepreneurs might have heard of the existence of better technology for processing of garri and palm oil, they have however not seen it. But some of them expressed their desire during the FGD that they would have been very glad if the better alternative production technologies were made accessible and affordable to them.

Table 7a Respondents' method of production used

| Method used | Eleso | | Kajola | | Eleweran | | Abule Ooni Ilare I | | Ooni Ilare II | | Ita Elewa | | Total | |
|-------------|-------|-----|--------|-----|----------|-----|--------------------|-----|---------------|-----|-----------|-----|-------|-----|
| | F | % | F | % | F | % | F | % | F | % | F | % | F | % |
| Traditional | 27 | 68 | 31 | 69 | 11 | 65 | 27 | 68 | 52 | 68 | 32 | 68 | 179 | 68 |
| Improved | 4 | 10 | 5 | 11 | 2 | 12 | 4 | 10 | 8 | 11 | 5 | 11 | 27 | 10 |
| Not Filled | 9 | 23 | 10 | 22 | 4 | 24 | 9 | 23 | 16 | 21 | 11 | 23 | 60 | 22 |
| Total | 40 | 100 | 45 | 100 | 17 | 100 | 40 | 100 | 76 | 100 | 47 | 100 | 265 | 100 |

Source: Study Survey

Table 7b Respondent's awareness of better alternative method

| Is there Alternative method? | Eleso | | Kajola | | Eleweran | | Abule Ooni Ilare I | | Ooni Ilare II | | Ita Elewa | | Total | |
|------------------------------|-------|----|--------|----|----------|----|--------------------|----|---------------|----|-----------|----|-------|----|
| | F | % | F | % | F | % | F | % | F | % | F | % | F | % |
| Yes | 18 | 45 | 21 | 47 | 7 | 41 | 18 | 45 | 36 | 47 | 22 | 47 | 122 | 46 |
| No | 11 | 28 | 12 | 27 | 4 | 24 | 11 | 28 | 20 | 26 | 12 | 26 | 70 | 26 |

| | | | | | | | | | | | | | | |
|------------|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|-----|-----|
| Not Filled | 11 | 28 | 12 | 27 | 6 | 35 | 11 | 28 | 20 | 26 | 13 | 28 | 73 | 28 |
| Total | 40 | 100 | 45 | 100 | 17 | 100 | 40 | 100 | 76 | 100 | 47 | 100 | 265 | 100 |

During the FGD, it was gathered from the respondents producing garri, that about 58% have an average production capacity per day of between 42 kg (3 *garrawas*) and 70 kg (5 *garrawas*). Based on their responses, the average production capacity was estimated at about 6 kg per respondent per day. For palm oil processing, the respondents indicated that about 37% of them have an average production capacity of between 25 litres and 75 litres per season; 55% of the respondents started with a production capacity of about 150 litres per season. Less than 10% of the women have capacity beyond 200 litres or a drum of palm oil in all the season. Therefore, according to the responses, the average production capacity was estimated at about 150 litres per respondent per season. Table 8 shows the breakdown of average monthly income generated by the women through

their food processing businesses. Only about 3% of them earn \$100 equivalent or more per month. So that, to assess their improvement in terms of whether the income generated can sustain their businesses, they were asked to give their profit or loss margin for their businesses. They were unable to give this. Since the women were unable to give a quantifiable assessment of the profit/loss they experience in their businesses due to lack of business records. They were asked to give a qualitative response to this question. Their qualitative responses were ranked from 0 to 3 using Likert rating scaling, with 0 for “not filled/do not know”, 1 for “same”, 2 for “slight increase” and 3 for “tremendous increase”. As shown in Table 9, the rating gave an average value of 1.76, meaning that on the average the women have only experienced marginal to slight increase in their businesses.

Table 8 Average Monthly Income Distribution amongst Respondents

| Monthly Income Distribution in Naira | Eleso | | Kajola | | Eleweran | | Abule Ooni Ilare I | | Ooni Ilare II | | Ita Elewa | | Total | |
|--------------------------------------|-------|-----|--------|-----|----------|-----|--------------------|-----|---------------|-----|-----------|-----|-------|-----|
| | F | % | F | % | F | % | F | % | F | % | F | % | F | % |
| 1000-5000 | 11 | 28 | 13 | 29 | 6 | 35 | 11 | 28 | 22 | 29 | 14 | 30 | 77 | 29 |
| 5001-10000 | 14 | 35 | 16 | 36 | 6 | 35 | 14 | 35 | 28 | 37 | 17 | 36 | 95 | 36 |
| 10001-15000 | 10 | 25 | 10 | 22 | 4 | 24 | 10 | 25 | 18 | 24 | 11 | 23 | 63 | 24 |
| 15001& above | 2 | 5 | 2 | 4 | 0 | 0 | 2 | 5 | 2 | 3 | 1 | 2 | 9 | 3 |
| Don't Know | 3 | 8 | 4 | 9 | 1 | 6 | 3 | 8 | 6 | 8 | 4 | 9 | 21 | 8 |
| Total | 40 | 100 | 45 | 100 | 17 | 100 | 40 | 100 | 76 | 100 | 47 | 100 | 265 | 100 |

Source: Field survey

Table 9 Present production status

| Present Situation | Eleso | | Kajola | | Eleweran | | Abule Ooni Ilare I | | Ooni Ilare II | | Ita Elewa | | Total | |
|---------------------|-------|-----|--------|-----|----------|-----|--------------------|-----|---------------|-----|-----------|-----|-------|-----|
| | F | % | F | % | F | % | F | % | F | % | F | % | F | % |
| The same | 6 | 15 | 7 | 16 | 2 | 12 | 6 | 15 | 12 | 16 | 7 | 15 | 41 | 15 |
| Slight increase | 20 | 50 | 23 | 51 | 9 | 53 | 20 | 50 | 38 | 51 | 23 | 51 | 133 | 50 |
| Tremendous increase | 8 | 20 | 9 | 20 | 3 | 18 | 8 | 20 | 15 | 20 | 9 | 19 | 53 | 20 |
| Not Filled | 6 | 15 | 7 | 16 | 3 | 18 | 6 | 15 | 10 | 13 | 7 | 15 | 38 | 14 |
| Total | 40 | 100 | 45 | 100 | 17 | 100 | 40 | 100 | 76 | 100 | 47 | 100 | 265 | 100 |

Source: Study Survey

7.4 Women Behaviour towards Technology Adoption

One of the critical factors identified as relevant to improving the output of women entrepreneurs involved in food processing cottage/micro businesses is that of attitude towards adoption of improved technology. To this

end, one of the questions addressed the effect the introduction of improved technology would have on their production output? As shown in Table 10, about 61% of the women responded in the affirmative that the introduction of improved technology would have a positive effect on their businesses as this would improve the production techniques and stimulate rapid increase in

production output. However, it is interesting to note that about 39% are reluctant to embrace the introduction of improved technology. One common attitude amongst the respondents observed during the FGDs is their reluctance on the quality of output from the use of ‘improved’ technology and job insecurity; most of them are of the belief that their customers may not appreciate the output quality – quoting their common saying, “the quality will

be lower or lighter than that produced through traditional technology, therefore the customers will reject it” coupled with the fear of being jobless –“most of us will be jobless, since the machine will take over the production process”.

The authors take it that their belief system and perception of adopting innovative and improved technology to increase their production output is faulty.

Table 10 Effect of Modern Technology on Production Capacity

| | Ita-Elewa | | Eleso | | Abule Ooni Ilare I | | Ooni Ilare II | | Eleweran | | Kajola | | Total | |
|------------|-----------|-----|-------|-----|--------------------|-----|---------------|-----|----------|-----|--------|-----|-------|-----|
| | F | % | F | % | F | % | F | % | F | % | F | % | F | % |
| Yes | 29 | 62 | 24 | 60 | 24 | 60 | 47 | 62 | 10 | 59 | 28 | 62 | 162 | 61 |
| No | 15 | 32 | 13 | 33 | 13 | 33 | 24 | 32 | 5 | 29 | 14 | 31 | 83 | 31 |
| Not Filled | 4 | 9 | 3 | 8 | 3 | 8 | 5 | 7 | 2 | 12 | 3 | 7 | 20 | 8 |
| Total | 47 | 100 | 40 | 100 | 40 | 100 | 76 | 100 | 17 | 100 | 45 | 100 | 265 | 100 |

Source: Field survey

Further to understanding the women entrepreneurs’ behaviour towards technology adoption, they were asked to respond to the possibility of continuing the business with the present prevailing conditions. Table 11 presents collated breakdown of their responses. Coupled with the FGD, it was revealed that practically all the women would

not be interested in continuing with the businesses if present prevailing circumstances are not improved upon. However, close to 45% responded that they will continue if there is improvement, particularly in finances and technology as against the present situation.

Table 11 Possibility of Continuity

| Present Situation | Eleso | | Kajola | | Eleweran | | Ooni Ilare I | | Ooni Ilare II | | Ita Elewa | | Total | |
|------------------------------------|-------|-----|--------|-----|----------|-----|--------------|-----|---------------|-----|-----------|-----|-------|-----|
| | F | % | F | % | F | % | F | % | F | % | F | % | F | % |
| Yes, if there is financial support | 18 | 44 | 20 | 44 | 7 | 41 | 18 | 44 | 34 | 45 | 21 | 45 | 118 | 45 |
| No (very tedious) | 19 | 48 | 22 | 49 | 8 | 47 | 19 | 48 | 37 | 49 | 23 | 49 | 127 | 48 |
| Not Filled | 3 | 8 | 3 | 7 | 2 | 12 | 3 | 8 | 5 | 7 | 4 | 6 | 20 | 8 |
| Total | 40 | 100 | 45 | 100 | 17 | 100 | 40 | 100 | 76 | 100 | 47 | 100 | 265 | 100 |

Source: Field survey

Table 12 Chi-square result of the hypothesis testing

| | Value | Df | Asymp. Sig. (2-sided) |
|---|--------|----|-----------------------|
| Marital status * production method used | 0.963 | 3 | 0.810 |
| Marital status * average monthly income | 21.453 | 9 | 0.011 |
| Marital status * current employee level | 33.233 | 21 | 0.044 |

| | | | |
|---|--------|----|-------|
| Educational status * production method used | 2.851 | 2 | 0.240 |
| Educational status * average monthly income | 18.168 | 6 | 0.006 |
| Educational status * current employee level | 50.006 | 14 | 0.000 |
| Family type * production method used | 5.525 | 2 | 0.063 |
| Family type * average monthly income | 6.555 | 6 | 0.364 |
| Family type * current employee level | 9.166 | 14 | 0.820 |

8. DISCUSSION

This study was carried out to achieve two objectives. First, it assessed the appropriateness of available technology on garri and palm oil processing. Second, it analyzed the response of grassroots women entrepreneurs to adopting improved technology. In analyzing the second objective, the cost implication was also put into consideration. Based on a sample of 265 respondents in the six communities, practically all the women make use of traditional method to process their products. They do not see traditional technology as appropriate. This is because, they see traditional technology as yielding low productivity, involves a lot of rigours as well as impact negatively on their health condition. However, many of the women are still stuck to the traditional method because of problems of awareness, availability, accessibility and affordability of improved technology. The response of the women towards adopting improved technology for their food processing indicates that they will gladly adopt new technology if introduced to them. For awareness, about 46% of the women indicated that they are aware of better alternative to their production method. 68% of the respondents will be glad to adopt new technology to improve their productivity levels. The remaining 32% showed reluctance because of the fear that improved technology may lead to loss of employment for them. Put otherwise, these percentages of the respondents see perceived threat rather than usefulness in adopting new technology for improving their enterprise. Thus the study realized that these rural women entrepreneurs would need to be trained in order to overcome fears of introduction of new technology taking over their role in the use of traditional technology where new technology is introduced.

Furthermore, the study examined the present level of performance of the rural women entrepreneurs, in food processing, with the view of identifying ways to increase their performance. The framework for analysis was the TAM to capture their attitude towards the adoption of improved technology in terms of the business internal working environment. According to Aluko (2001), the internal working environment of any micro-enterprise includes appropriate technology, access to raw materials and adequate infrastructural facilities. The inter-play between these factors affects output or entrepreneurial

performance. In all the communities visited for this study, the technologies presently utilized by the women for food processing were the manually operated ones, and in terms of modern day development, outdated. Our findings indicate that these rural women do not depend on modern energy services, particularly electricity, for operations. Thus, we opine that lack of adequate infrastructural facilities, as it stands in the communities presently, has serious impact on type of technology selected by the women entrepreneurs for their production processes. In the same vein, since farming is being practiced at subsistence level, raw material production is also limited and barely adequate for the kind of traditional technology used.

Lack of adequate infrastructural facilities such as roads, electricity and supply of pipe-borne water, has been one major area identified as having negative impact on economic growth and development in Nigeria, particularly the rural areas. This has also impacted negatively on entrepreneurial growth of people involved in businesses, limiting the choices they had to make on available technology only. Furthermore, those involved in food processing have not had easy access to required farm input such as tractors (basically improved technology) for farm land preparation on production capacities and even counseling to effectively carry on with their businesses. Consequently, FGD conducted in the selected communities revealed that the lack of provision of these vital services have limited the expansion of women entrepreneurial performance in the various communities. Thus over the years, it was observed that the mindset of the women has been conditioned not to expect improvement in provision of infrastructural facilities, which in turn affects farm output and also their attitude towards any innovation – including technology. For instance, despite the provision of good roads and pipe borne water at Kajola and Elewera, respondents still have the same attitude towards improved technology adoption as do those without these infrastructural facilities. Thus the authors could not rule out the cost implication as being an inhibition to technology adoption by the women.

9. RECOMMENDATIONS

Thus the recommendations made focused on the ways through which these women entrepreneurs can be helped to increase their present levels of performance, particularly through technology adoption. To overcome the reluctance of the women adopting improved technologies for their food processing, it is recommended that:

- women should make themselves available for useful business counseling;
- the (rural) woman-entrepreneur should be encouraged to acquire formal education and training in order to properly manage her business;
- a central demonstrating unit of the improved technology should be created in each of the communities. This will help them overcome notion against perceived ease of use and perceived usefulness;
- once the improved technologies are embraced, the demonstration centres in these communities could be turned to training centres for up and coming entrepreneurs in food processing;
- infrastructural facilities should be provided, and existing ones should be improved upon, particularly in terms of functional roads, electricity and water; and,
- there is trickle-down-effect (or bottom-up approach) of the various government intervention measures to the women entrepreneur at the grassroots/micro and small scale levels, e.g. government intervention fund for the acquisition of these improved technologies.

10. CONCLUSION

Both food products – garri and palm oil – examined in this study have high demand for domestic consumption within Nigeria market and for export is quite high. The high demand for garri stems from the fact that it is one of the basic staple food consumed in almost all the regions of the country; palm oil on the other hand is in high demand because of its economic importance as a high-yielding source of edible and technical oils. This fact was corroborated through the survey using questionnaire instrument and FGD. However, increasing their (garri and palm oil) production capacities pose major challenges. This is due to the fact that, as part of the indigenous enterprise, they lack important services that encourage entrepreneurial growth. More importantly, it was observed that the women have bias towards adoption of improved technology. To explain this observation, TAM

was employed. The core factors examined in the study were education, marital status and family type, while infrastructural facilities and access to raw materials were taken as extraneous variables to women behaviour.

The study revealed that most of the women show reluctance to accept the introduction of improved technology to their production processes. The study therefore concludes that the reasons attributed to this development were ignorance as well as lack of adequate infrastructural facilities. It did not also preclude that cost implication could be an inhibition to technology adoption. Their level of ignorance could result from their educational status (though, the Chi-Square shows it is not statistically significant) as none of them went beyond secondary school education, so they may still be relishing in the effect of their traditional/cultural environment. Also, their marital status has strong bearing on decision-making in many areas, including technology adoption, as over 87% are married and as a result cannot make independent decisions without the permission of their husbands who may not also have a PEOU and PU on the improved technology. The bias against improved technology could also be as a result of the women's perception (not perceiving its ease of use and the usefulness of the improved technology – the two fundamental beliefs of TAM) towards it; this perception, we posit, could stem from unprofitability of technology adoption. There is therefore the serious need to work on the women entrepreneurs' perception about improved technology for food processing to enhance their adoption and at the same time giving them financial help for its acquisition.

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