Factors Influencing Adoption of Agricultural Processing Technologies Developed by National Centre for Agricultural Mechanization (NCAM) in Ifelodun Local Government Area, Ilorin Kwara State

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Abstract: ***This study was carried out in Ifelodun Local Government Area of Kwara State, Nigeria with the objective to promote adoption of NCAM agricultural processing technologies among farmers in the neighboring communities. Data was collected using a 2-stage sampling technique randomly selected from 77 respondents. Interview schedule with a structural questionnaire was used to collect data for the study. The data were analyzed using simple descriptive statistics and multiple regression analysis. The results from the findings indicated that adoption of NCAM developed processing technologies is majorly in the hands of female, middle aged, educated and full-time farmers. Also, majority (about 67.5%) did not belong to any farmers group or cooperative society, 70% were not aware of NCAM technologies. The multiple regression analysis result indicates that the co-efficient of sex, cooperative society, relevant aspiration as well as age were fund to be significantly influencing the adoption of these two NCAM technologies. The study recommends good finishing, durability of materials, need for adequate publicity, feedback, and provision of adequate extensionist in the study area.***

Keyword: Adoption, Agriculture, NCAM, Technologies, Processing

1. Introduction

In Nigeria, agriculture plays a vital role in economic development. This is because its contributes about 37.2% of the country's Gross Domestic Product (GDP), provides direct employment to about 75% of the population (NBS, 2007, Falusi, 2008), accounts for only 44% of Nigeria's total exports and 56% of total non-oil export, provides over 90% of the food requirement of the Nigerian population. Agriculture also provides raw materials for 60% of industries in the country.

In spite of all these tremendous potential, it is indeed not only an irony but an embarrassment, that Nigeria, a country endowed with substantial natural resources and ecological diversities still find itself in the unenviable group of low income and food deficient countries in Africa. Any attempt at addressing the issues of food security in Nigeria must of necessity concentrate on efforts to stimulate adoption of technologies among our peasant farmers who remains the main driver of agricultural production.

According to Abalu (1993) "why they may not be general consensus, it can nonetheless, be concluded that technology stocks capable of attaining growth rates in excess of 8.0 – 10.0 percent do in fact exist or can be made available for several agricultural commodities in the various ecological Zones". This statement is particularly applicable to the National Centre for Agricultural Mechanization (NCAM) which has made tremendous efforts in the design and development of simple agricultural technologies aimed at improving the income and livelihood of small scale farmers.

NCAM has made some modest breakthrough in the development of a peeling tool for cassava (Manihot esculaenta) a crop considered to be very important in Nigeria. Cassava is important as a major source of food, providing close to 70% of the calorific requirement of the Nigeria diet (Okigbo, 1980). Cassava is also important in the Industrial Sector where it is used for confectionary baking, animal feeds, pharmaceuticals, ethanol, textile, biofuel etc. Unfortunately, mechanization of cassava peeling has proved to be a major challenge in cassava processing due to lack of size uniformity and configuration.

Okro (Abelmoschus esculentus), is a vegetable plant widely consumed in Nigeria and has a potential to improve nutrition, boost food security, foster rural development and sustainable land care (NRC. 2006). Okro is consumed fresh where the mucilaginous slime contains usable form of soluble fibre popularly called Draw Soup in Nigeria. In some cases, the fresh fruit is sliced, dried and pounded to produce soup. Okro leaves may also be cooked in a similar way to the green vegetable or eaten raw in salad (Miiliiken and Feniger, 1996). A characteristic of fruits and vegetables is their tendency to spoil and get wasted if not processed within a short period. In Nigeria and Kwara State in particular, large quantities of this important vegetables are produced during the rainy season and most of them are not processed and preserved. Consequently, the prices of the vegetable seem to be uncompetitive low during the peak period and become very scarce and expensive during the dry season. NCAM has similarly developed a simple technology that can be used for slicing okro for drying and preservation in order to improve the income and food security of farmers.

The adoption rate of simple processing technologies developed by NCAM like cassava peeling tool and okro slicer remain very low thus limit the purpose of which they are meant for. Adoption of agricultural technologies remains a viable strategy for making farmers economically viable and increase farm productivity. In spite the effort of NCAM in development of simple processing technologies, there is

dearth of information on the adoption of these technologies. The aim of this study is to bridge that gap.

Specifically, the study was designed to:

1) Describe the socio-economic characteristic of respondents in the study area,
2) Determine the factors affecting adoption of agricultural developed technologies in the study area.

2. Methodology

This study was carried out in Ifelodun Local Government Area (LGA) of Kwara State, Nigeria. Ifelodun is the largest Local Government Area in Kwara State with an estimated population of about 206,042 and an estimated total land area of about 3,435Km^2 (NPC, 2006 and KWSMI, 2002). The area is located between latitude 7^{0}45'N and 9^{0}30'N and longitude 2^{0}30'E and 6^{0}35'E.

It is characterized by dry and wet season. The annual rainfall ranges between 1000mm and 1500mm. Average temperatures varies between 30^{0}c and 35^{0}c while humidity range from 35% to 60%. The major source of livelihood and occupation of the people in the area is farming. Farming is traditional in nature with emphasis on the cultivation of crops such as cassava, yam, maize, sorghum and vegetables like Okro, Amaranthus etc (KWSMI, 2002 and Mohammed, 2008). Cassava and Okro are predominantly grown in the area; this informed the choice of the National Centre for Agricultural Mechanization (NCAM) to develop processing prototype machines for these crops in the study area.

A 2-stage sampling technique was employed for the study. The first stage involved the purposive selection of four communities namely; Ganmo, Fufu, Idofian and Jimba-Oja. Based on their relative proximity to the Centre. In the second stage, a random sampling technique was used to select 77 farmers from the selected communities based on their relative population size. Preliminary meetings were held with the village/community opinion leaders to sensitize them on their relevance in mobilizing the farmers in their domain for the adoption of NCAM develop processing technologies.

The technologies to be adopted were demonstrated to the farmers while arrangement was made for publicity, press coverage (Radio jingles) during the demonstration after which the farmers were provided with the samples for their private use. The data used for this study was basically primary data. This involved the use of an interview schedule with a structured questionnaire administered to the farmers. Relevant data collected include; socio-economic characteristics, sources of information on research results/ technologies, adoption of technologies and constraints militating against adoption of NCAM processing technologies.

The data collected from this study was analyzed using descriptive and quantitative methods. This includes the use of percentages, frequencies and averages. Multiple regression analysis was used to determine factors affecting adoption of agricultural developed product in the study area. The relationship between the adoption of agricultural technologies and factors affecting it can be expressed implicitly as follows:

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_{8, Xe})$$

where:
Y = adoption of NCAM technologies
X_1 = age of farmers
X_2 = Sex
X_3 = Marital status
X_4 = Experience
X_5 = Family size
X_6 = Source of Information
X_7 = Educational status of farmers
X_8 = Association among farmers
E = Error Term

3. Results and Discussion

The result from the study in Table 1 shows that the adoption of NCAM developed processing technologies is majorly (61%) in the hands of the female. This agrees with (Annon, 2006) that women are responsible for carrying out 70% of agricultural labour, 50% animal husbandry related activities and 60% food processing activities in Nigeria. The table also revealed that majority of the respondents (58.5%) within the age of between 30-50 years, indicating that most of the respondents were in their productive age group. This is an advantage since they are still in the age at which they are supposed to be energetic, more mentally alert in learning new technology than the older farmers and hence can actively involve in processing activities. This result is in line with studies of Lawal and Oluyole (2008), and Agwu (2004). Age is an important determinant of social-economic status, people wear in energy as they advance in age. Also, age has effect on level of awareness and on agricultural production. Also, majority of the respondents (77.9%) were married while 15.6% were single, 3.9% and 2.6% wee widowed and divorced. This implies that the respondents are responsible according to the societal standard and therefore are likely to have some experience of life.

The result of the study showed that those who had family size of 3 and below consisted 32.5% of the respondents, while majority of the respondents (67.5%) had family size ranging from 4-10. The average household size of the respondents was (4.2) which is close to national average of 4.9 (THBS, 2001), implying that they have enough family labour for processing activities. This agrees with the study of Giroh, D.Y. et al. (2011), Okoedo-Okojie and Onemolease (2009). Also, Arene (1994), reported a positive and significant relationship between family size and adoption but on the other hand Voh (1982), established that household size is not significantly related to adoption but reported to socio-economic status of farmers is positively and strongly related to adoption.

The result also showed that about 41.6% had between 1-3 children while about 58.4% of the respondent had between 4-10 children with an average of 4 children. This tends to suggest that large household does not necessarily translate to their availability for agricultural processing as more of the children in the areas may go to school and only available for work on weekends and holidays. The data on educational

status revealed that about 72.7% are literate. Out of this number, 19.5% have primary education, while 44.2% went beyond primary school level with only 27.3% had no formal education and 2.6% had Quranic education. This implies that with this preponderance of educated farmers, it is expected the respondents will be able to adopt NCAM processing technologies easily as evidenced from the follow-up visit. Education has been shown to be a factor in the adoption of agricultural processing technologies. Positive correlation has been found between education and adoption of new technologies as elucidated by Agwu (2004) and Junge et al. (2009).

The result from the study shows that majority of the respondents (64.9%) are full-time farmers, while others engaged in other occupations apart from farming ranging from civil servant 6.5%, schooling 5.2%, Artisian 11.7% and Trading 11.7%. The implication of this is that, instead of the respondents to plough back the money or income realized from cassava and okro processing into investment in agriculture, they invest the extra income in other business which will serve as sources of income to sustain them during the off season period.

Table 1 further revealed that majority of the respondent's (54.5%) sourced their credit from farming. While others were from trading (14.3%), cassava processing (15.6%), welding (3.9%), salary (6.5%) and artisan (5.2%). This implies that respondents with other sources of credit will have enough credit to finance and support their agricultural processing activities than those who relied entirely on farming as reported by Odoemenem and Obinne (2010) and Ese, et al (2006).

The findings from the study further indicate that majority (67.5%) of the respondents did not belong to any farmers/cooperative organization, while 32.5% of the respondents belong to one farmer/cooperative organization or the other. According to Peterson (1997) as reported by Agwu, (2004), farmer organizations offer an effective channel for extension contact with large number of farmers, as well as opportunities for participatory interaction with extension organizations. Also, membership to organization is considered as important information source. The implications of non-membership is that the potential of social-network through farmers group as source of agricultural related information has not been fully utilized. This observation is in line with the studies conducted by Agwu (2004), Odoemenem (2007) and Salasya et al. (2007).

Table 1: Socio-Economic characteristics of Respondents

Variables	*Frequency*	*Percentage (N=77)*
Gender		
Male	30	39.0
Female	47	61.0
Age		
<20	2	2.6
21-30	14	18.2
31-40	23	29.9
41-50	22	28.6
Marital Status		
Single	12	15.6
Married	60	77.9
Widowed	3	3.9
Divorced	2	2.6
Household Size		
<3	25	32.5
4-6	31	40.3
7-10	21	27.3
Number of Children		
<3	32	41.6
4-6	40	51.9
7-10	5	6.5
Educational Status		
No Formal Education	21	27.3
Quranic Education	2	2.6
Primary Education	15	19.5
Secondary Education	31	40.3
Tertiary Education	3	3.9
Not Specified	5	6.5
Main Occupation		
Farming	50	64.9
Civil Servant	5	6.5
Student	4	5.2
Artisan	9	11.7
Trading	9	11.7
Source of Fund		
Farming	42	54.5
Trading	11	14.3
Cassava processing	12	15.6
Welding	3	3.9
Salary	5	6.5
Artisan	4	5.2
Cooperative Society		
Yes	25	32.5
No	52	67.5
Experience		

Source: Field Survey, 2011

4. Multiple Regression Analysis

The result of the multiple regression analysis in table 2 revealed that coefficients of sex, cooperative society, relevant, aspirations as well as age were found to be significantly influencing the adoption of these two NCAM technologies at 5% and 10% level respectively. This implies that adoption of those two NCAM technologies is determined by one or more levels of these variables. For instance the importance of age lies on the adoption of these technologies as it is generally believed that the older the farmers the less their willingness to adopt new innovation or take risks. While positive coefficient of cooperative membership implies that farmers who are members of cooperative organizations adopted NCAM technologies

more than non-members. Cooperative membership enhances access to information on improved technologies. These findings are in agreement with the reports of (Odoemenem, 2007 and Saka, et al, 2005). The effect of marital status, household size level of education, and experience were not significant, an indication that these variables are not important predictors of adoption of NCAM technologies. For example (Voh et al 2007) asserted that a married farmer is more likely to adopt improved agricultural technologies as he/she need to feed more mouths as arriage and adoption are supposed to be positively correlated. The higher the level of education does not guarantee the adoption of these technologies so also the large number of household as they tend to attach greater importance to food security. These observations contradict some findings reported in studies of (Saka et al 2005; Omoregbee and Okoedo – Okojie, 2008; Odoemenem and Obinne, 2010).

Table 2: Multiple linear regression analysis for factors influencing adoption of NCAM technologies

	Unstandardized Coefficients		*Standardized Coefficients*		
	B	*Std. Error*	*Beta*	*t-value*	*Sig.*
(Constant)	0.012	0.271		0.046	0.964
Sex (X_1)	0.246	0.111	0.277	2.204**	0.033
M-Status (X_2)	-0.12	0.085	-0.164	-1.406	0.167
H-Hold (X_3)	0.036	0.034	0.093	1.047	0.301
Edu_Level (X_4)	0.007	0.019	0.032	0.375	0.71
Co-op. Society (X_5)	0.267	0.087	0.319	3.066*	0.004
Relevant (X_6)	0.251	0.082	0.426	3.068*	0.004
Aspiration (X_7)	0.115	0.055	0.143	2.098**	0.042
Fast & Con (X_8)	0.304	0.08	0.457	3.803*	0
Preference (X_9)	0.524	0.105	0.554	5.005*	0
Experience (X_{10})	-0.011	0.009	-0.169	-1.261	0.214
Age (X_{11})	0.185	0.068	0.45	2.725*	0.009

5. Conclusion and Recommendations

The findings in this study clearly show that new technologies in agricultural development are of little value until they can be put to use for the economic and social well-being of the people involved. The result from the findings of the research work shows clearly that the level of adoption of these two technologies as evident from the respondent's perceptions and attitude about the two NCAM technologies is high. Therefore, based on the motive of the development of these technologies to make agriculture more attractive and productive to the farmers, the following recommendations are proffered:

- NCAM should ensure good finishing of the two technologies to make them more attractive and valuable;
- The materials used for the production of these technologies should be durable;
- The blade of the cassava peeling tool should be stronger, sharper and properly welded so that it will not turn or adjust itself when in use;
- There is the need to reduce the spike of the okro slicer so as to reduce the cutting size. Big sizes take longer time to dry and often change the colour of the product, thus reducing the market value;
- Farmers should be encouraged to organize themselves in to associations or groups such as cooperatives so that new ideas and technologies can easily be extended to them. This can enhance technology adoption and access to other services that may improve their welfare; and
- The extension component of the Centre should be strengthened to enable it meet the challenges of technology assimilation and adoption.

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