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ANALYSIS OF FACTORS INFLUENCING LEVEL OF ADOPTION OF SWEETPOTATO VALUE ADDITION BY WOMEN PROCESSORS IN ABIA STATE

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ABSTRACT

The study analyzed factors influencing adoption of sweetpotato value addition by women processors in Abia State. Specifically, the study described the socio-economic characteristics of women sweet potato processors; identified sweetpotato value addition techniques practiced by the women; determined the level of adoption of value addition of sweet potato; determined factors influencing level of adoption of sweet potato value addition, and identified problems against value addition by women processors. Purposive and multistage sampling techniques were adopted for the study. Descriptive and inferential statistics were used to analyze data obtained. The socio-economic characteristics result showed that the mean age and household size of women were 38.00years and 4.16 persons respectively. The result also showed that cumulatively, 98.75% of female processors in Abia state had one form of formal education or the other. The women adopted sweetpotato chips ($\bar{X}$3.06), sweetpotato flour ($\bar{X}$3.00) and sweetpotato meat pie ($\bar{X}$3.31). The Ordinary Least Square (OLS) regression estimates of the factors influencing level of adoption of sweetpotato value addition showed that age, education, income, availability of processing equipment, processing experience, extension contact, access to credit, membership of cooperative societies and household size were significant at varying levels. The study recommended that women sweetpotato processors should be empowered to process sweetpotato using modern processing techniques in terms of training on value addition of sweetpotato by extension agents.

INTRODUCTION

Value addition is that process of changing or transforming a commodity from its original state to a more valuable product (Pietrobelli and Saliola, 2008). Value addition may take various forms that could be summarized in three levels that are: Level 1 - Post-harvest level/primary processing includes proper cleaning, sorting, grading and packing of raw tubers of sweet potatoes for sale. This is the most common type of value addition practiced by farmers. Level 2 – Secondary/ basic processing includes steaming, boiling or roasting sweet potato raw tubers. In addition, it takes the form of grinding sweet potatoes into flour and packaging the flour into different sizes. Level 3 – which is the high end processing, involves activities such as frying sliced root tubers to obtain potato chips, noodles, candy and desserts. This level also involves actual packaging of processed sweet potato products, branding, and marketing (Ndunguru, 2003). Researchers have stated that it is necessary to adopt improved sweetpotato processing technologies and process sweet potato into desirable and storable products (Odendo and Ndolo, 2002; Agoh, 2021).

Technology adoption is therefore defined as a decision to continue full use of an innovation Ekong (2003). It is a conscious or unconscious mental process through which an individual passes from first knowledge of innovation to a decision to reject or accept the knowledge and make it part and parcel of permanent behavior**.** There are some factors that influence adoption of sweetpotato value addition. These are: the farm size, household size, level of education, credit, membership of cooperatives and wealth level are factors mostly observed to influence technology adoption and utilization (Okebiorun, and. Jatto, 2017).

There is limited range of ways and availability of adapted processing technologies for sweet potato utilization in Nigeria. This has seriously undermined potential benefits of the crop to farmers, consumers and other chain actors *(*Mmasa, 2013; Emilia *et al*., 2020*)*. Most of the operations in processing of sweetpotato are carried out mainly by women (Ironkwe *et al*., 2008) who incidentally are disadvantaged in adoption of sweetpotato processing technologies due to limited access to production resources, cultural, religious and institutional barriers. These gender inequalities result in them (female) having small farms, less decision making power, time, education, less access to agricultural information, extension services and credit (Rahman, 2004).

Contemporary studies and research by International Potato Centre (CIP) on value addition to agricultural produce have established that farmers could be motivated to process their products and also potentially increase their revenue by doing so. Despite these documented initiatives and interests in the need for value addition, preliminary investigations as documented in a survey done by Inter- Diocesan Christian Community Services (IDCCS) in 2009 showed that majority of smallholder sweet potato farmers in Nigeria and Africa had not embraced product processing value addition.

Specifically the study:

i. described socio-economic characteristics of women sweet potato processors in Abia State;
ii. determined the level of adoption of value addition to sweet potato by women ~~post-harvest~~ processors in the study area;
iii. determined factors influencing level of adoption of sweet potato value addition by women sweet potato post-harvest processors in the study area;

METHODOLOGY

The study was carried out in Abia state of Nigeria. The state is in South Eastern geopolitical zone of Nigeria. The state lies within approximate Latitudes of $4^0 4'$ N and $6^0 14'$ North of the Equator and Longitudes 7^0 10′ E and 7^0 8′ East of the Greenwich Meridian. The state covers an area of about 5,243.7 square kilometers which is 5.8 percent of the total land area of Nigeria (NPC, 2006). The climate of the state is essentially tropical humid with annual rainfall of 1500-2600mm distributed throughout the wet season (April to October).

Purposive and multistage sampling techniques were adopted for the study. Umuahia and Ohafia Agricultural Zones were selected purposively. The activities of sweet potato production and processing in these zones especially at National Root Crops Research Institute. Second stage involved random selection of two blocks from each of the selected zones, which gave a total of four blocks. Third stage involved random selection of two circles from each of the selected bocks, this gave a total of eight circles. Finally, from the selected sub-circles, three women sweet potato post-harvest processors were randomly selected to give a total of 48 respondents.

Objective (i) was achieved using descriptive statistics such as means, percentage and frequency distribution. Objective (ii) was analyzed with adoption score index while Objective (iii) was achieved using OLS multiple Regression analysis.

Model Specification
Adoption Score Index

The level of adoption of sweet potato value addition was determined using adoption score index. It was achieved with the aid of a 7 point likert scale graded thus; unaware = 0, Aware = 1, interest = 2, evaluation= 3 trial = 4, accept = 5 and satisfaction = 6. In accordance with Okoye *et al*., (2009) the mean adoption level was determined as follows:

$$\overline{X_s} = \frac{\Sigma x}{n}$$

Mean score was computed by multiplying the frequency of each response pattern with its appropriate nominal value and dividing the same with the number of respondents to the terms. This is summarized with the equation below.

$$\overline{X} = \frac{\Sigma fn}{nr}$$

Where;

$\bar{X}$	=	Mean score
Σ	=	Summation
F	=	Frequency
n	=	Likert nominal
n_r	=	number of respondents

$$\overline{X} = \frac{0+1+2+3+4+5+6}{7} = \frac{21}{7} = 3.0$$

Decision Rule

Less than 1.0	=	Unaware stage of OFSP
1.0 – 1.49	=	Awareness stage of sweetpotato value addition
1.5 – 1.99	=	Interest stage of sweetpotato value addition
2.0 – 2.49	=	Evaluation stage of sweetpotato value addition
2.50 – 2.99	=	Trial stage of sweetpotato value addition
3.0 – 3.49	=	Adopting of sweetpotato value addition
3.5 and above	=	Satisfaction stage

RESULTS AND DISCUSSION

Socio Economic Characteristics of Respondents

The Socio-economic profile of the respondents is presented in Table 1. The table shows that the mean age of the women was 38.00 years. The result indicated that the women were in their productive age and were actively engaged in sweetpotato value addition. Table 1 also revealed that the women had mean household size of 4.16 persons. Table 1 further showed that 50.00% of the women had secondary education. In summary 98.75% of women had one form of formal education or the other. Education increases the ability of processors to obtain, process, and use information relevant to the technology leading to greater use of new technologies (Olwande *et al*., 2009).

Table 1: Socio-Economic Characteristics of Women Sweetpotato Processors in Abia State, Nigeria

	Frequency	Percentage	Mean
Age (years)			
21-30	6	12.50	
31-40	14	29.17	41.54
41-50	15	31.25	
51-60	10	20.83	
61 and above	3	6.25	
Household Size(number)			
1-3	9	18.75	
4-6	30	62.50	4.16
7 and above	9	18.75	
Educational status(years)			
No education	1	1.25	
Primary	10	20.08	
Secondary	24	50.00	
Tertiary	13	27.08	
Total	48	100.00	

Field survey, 2021

The Level of Adoption of Value Addition Products of Sweetpotato Amongst Women Post Harvest Processors in Abia State

The result on Table 2 showed the distribution of women postharvest sweetpotato processors according to level of adoption of sweetpotato value addition products. The result shows that among these sweet potato value additions products, the women adopted sweetpotato chips ($\bar{X}$ 3.06), sweetpotato flour ($\bar{X}$3.00) and sweetpotato meat pie ($\bar{X}$3.31). Some of the women postharvest sweetpotato processors in Abia state were at interest, evaluation and trial stages. This might be because they were not fully informed about the value addition by the extension workers and this characterizes one extension worker to cover a wide range of processors at a short time. High cost of processing equipment could also be the reasons some of them did not reach trail stage. Inadequate extension services and high cost of processing equipment could as well be the reasons some of them did not reach trail stage (Udemezue *et al*., 2018).

Table 2: Distribution of Respondents According to their Level of Adoption of Value Addition Products of Sweetpotato by women

Value addition to sweetpotato	Unaware 0	Aware 1	Interest 2	Evaluation 3	Trial 4	Adopted 5	Reject 6	Total	Mean adoption score
Sweet potato chips	0 (0)	9(9)	10(20)	9(27)	9(36)	11(55)	0(0)	147	3.06
Sweet potato flour	2 (0)	11(11)	11(22)	4(12)	4(16)	13(25)	3(18)	144	3.00
Sweet potato cake	10 (0)	10(10)	10(20)	6(18)	5(20)	5(25)	2(12)	105	2.19
Sweet potato biscuit	5(0)	8(8)	8(16)	8(24)	8(32)	9(45)	2(12)	137	2.85
Sweet potato bread	5(0)	9(9)	6(12)	8(24)	9(36)	6(30)	5(30)	141	2.94
Sweet potato starch	5(0)	7(7)	7(14)	8(24)	7(28)	8(40)	3(18)	131	2.73
Sweet potato meat pie	0(0)	6(3)	7(14)	13(39)	7(28)	15(75)	0(0)	159	3.31
Grand mean									

Source: *Field survey, 2021*

Figures in parentheses = Likert nominal score

Decision Rule: 1.0<= Unaware; 1.0-1.49 = Aware; 1.50-1.99=interest; 2.0-2.49=Evaluation 2.50-2.99=Trial;

3.0 – 3.49 =Adoption and 3.5 and above = Satisfaction

Factors Influencing Level of Adoption of Sweetpotato Value Addition

The Ordinary Least Square (OLS) regression estimates of the factors influencing level of adoption of sweetpotato value addition is presented in Table 3. From the Table, nine variables were significant out of twelve variables. The variables were age, education, income, availability processing equipment, processing experience, extension contact, access to credit, membership of cooperative societies and household size.

Specifically, the coefficient (0.006) of age was positive and statistically significant at 10.0% probability level. This implied that the older the women processors was, the more likely to adopt sweetpotato value addition. This disagreed with *a priori* expectation but lends credence to the findings of Udoh and Falake (2006) who opined that old age comes with experience and that old processors are better able to assess the characteristics of modern technology than younger processors which might explain their level of adoption to sweetpotato value addition while at the same time, younger people might view engagement in value addition as a menial job.

The coefficient (0.070) of education was positive and statistically significant at 1.0% alpha level. This implies that as the education status of the women postharvest sweetpotato processors increase, the probability of their decision to adopt sweetpotato value addition increase also. Education is important and it has been found to influence other factors especially in management. Similarly, formal education helps one to grasp issues better, anticipate, appreciate and respond to market needs. Education level can positively influence adoption of value addition in terms of training and skills required to grasp and undertake sweetpotato value addition practices (Birthal *et al*., 2005).

The coefficient (2.430e-8) of income was also positive and significant at 95.0% confidence level. This indicated that as the annual income women postharvest sweetpotato processors increases, their likelihood to adopt sweetpotato value addition increases. The economic status of an postharvest sweetpotato processors often times plays a significant role in sweetpotato value addition adoption processes. This is especially true when it involves the purchase of new implements which will usually be dictated by individual financial capability (Ben-Chendo, 2014; Okeke and Mbah, 2021).

The coefficient (0.014) of availability of processing equipment is positively related to the practice of value addition by the women sweetpotato postharvest processors and statistically significant at 5.0% level. This indicates that women sweetpotato postharvest processors who have processing equipment are more likely to participate in value addition than those who have no equipment at all. This finding is in agreement with *a priori* expectation and Chinaka and Udemezue (2015) opined that unavailability of processing equipment could be the reasons some did not adopt sweetpotato value addition.

The coefficient (0.044) of processing experience is positive and significant at 5.0% alpha level. This indicated that women sweetpotato post-harvest processors in Abia states stood better position to adopt new innovations in sweetpotato value addition and were established and knowledgeable about sweetpotato value addition, because the number of years spent in processing may give an indication of the practical knowledge acquired on how to overcome certain inherent problems in sweetpotato value addition (Omoare *et al*., 2014).

The coefficient (1.027) of extension contact was positive and statistically significant at 1.0% probability level. This implies that those who had access to extension services are more likely to adopt sweetpotato value addition than those who do not. This might result from the fact that

access to extension services can provide postharvest sweetpotato processors with crucial information, such as how to transform their raw output into consumer-ready products. Extension provides postharvest processors with information on availability and properties of the new sweetpotato value addition technology and technical skills for using it (Knowler and Bradshaw, 2007).

The coefficient (0.046) of access to credit was positive and statistically significant at 1.0% alpha level. Credit access enables sweetpotato postharvest processors to purchase value addition equipment and expand their micro enterprises thereby facilitating adoption of sweetpotato value addition. Awotide *et al*. (2013) and Orinda, (2013) reported that postharvest processors with better access to credit are more likely to be adopters of innovation (sweetpotato value addition).

The coefficient (0.037) of membership of cooperative societies was positive and statistically significant at 1.0% alpha level. This implies that group membership enhances level of adoption of sweetpotato value addition since women postharvest sweetpotato processors within a group get to share ideas amongst themselves, lend each other within the group and also produce and market as a group thereby taking advantage of economies of scale as transaction costs are reduced. Membership to a group may enable postharvest processors to learn about a technology via other postharvest processors and from other development agencies (Lemaga, 2005).

The coefficient (2.208) of household size was positively related to sweetpotato value addition and statistically significant at 10.0% probability level. This indicates that a large household accords the postharvest processor fewer labour shortages at peak times and hence more likely to adopt innovations and use it intensively (Croppenstedt *et al*., 2003).

Table 3: Estimates of the Factors Influencing Level of Adoption of selected Sweetpotato Value Addition by Women Sweetpotato Postharvest Processors in Abia State

Variables	Linear	Exponential+	Double log	Sem-log
Constant	-4.577 (-1.094)	2.208 (1.208)	7.398 (1.072)	-9.309 (1.147)
Age	0.034* (1.897)	0.006* (1.647)	0.194 (1.324)	1.074* (1.598)
Marital status	-0.049 (-1.134)	-0.016 (-1.202)	-0.034 (-1.167)	-0.120 (-1.129)
Educational level	0.308* (1.864)	0.070*** (2.899)	0.148* (1.900)	0.635*** (2.840)
Annual income	-2.100E-7 (-1.115)	2.430E-8** (2.061)	-0.215* (-1.688)	0.755* (1.527)
Cost of processing	0.000** (2.167)	-9.132E-5 (1.171)	-0.974** (2.094)	0.834** (2.123)
Processing Equipments	0.060** (2.057)	0.014** (2.113)	0.179** (2.112)	0.834** (2.151)
Processing experience	0.220* (1.543)	0.044** (2.417)	0.153 (1.122)	0.766 (1.224)
Extension contact	-0.220* (-1.609)	-1.027*** (-3.342)	-0.087* (-1.746)	-0.525** (-1.983)
Credit access	0.219 (1.481)	0.046*** (3.431)	0.471 (1.416)	0.247* (1.783)
Membership of cooperative	0.046 (1.034)	0.037*** (3.126)	-0.972 (-0.127)	0.091 (1.476)
Quantity produced	0.201 (1.343)	0.048 (1.074)	0.220 (1.390)	0.931* (1.570)
Household size	-4.577 (1.377)	2.208* (1.563)	7.398 (1.343)	-1.309 (1.187)
R^2	0.638	0. 727	0. 657	0.711
Adjusted R^2	0.617	0. 719	0.639	0.685
F-ratio	117.332***	268.271***	137.125***	214.383***

Source: *Field Survey*, 2021
+ indicates lead equation
***= Significant at 1% alpha level

**= Significant at 5% alpha level
*= Significant at 10% alpha level

Conclusion and Recommendations

The study also concluded that age, educational level, annual income, processing equipment, processing experience, extension contact, access to credit, membership of cooperative societies and household size were positive determinant of sweetpotato value addition adoption by women sweetpotato ~~post harvest~~ processors in Abia state.

Based on the findings of this study it was recommended that:

i. Women sweetpotato processors should encourage farmer group formation and make farmers feel part of it since majority felt that they pool their resources together and only a few individuals benefit from it. Furthermore, group membership has an element of collective action which gives the farmers bargaining power when selling their produce.

ii. Policy makers should come up with loan package intended for those interested in value addition. Mechanisms should also be put in place on follow up on how the funds borrowed are used. This is because those who accessed loans only devoted a small portion to value addition

iii. There should be provision of improved processing facilities at subsidized rate by government to encourage women to process their raw harvested sweet potato.

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