NIGERIAN AGRICULTURAL JOURNAL
ISSN: 0300-368X
Volume 51 Number 2, August 2020 Pg. 253-258
Available online at: http://www.ajol.info/index.php/naj

ADOPTION SCALE ANALYSIS OF CASSAVA VALUE ADDITION TECHNOLOGIES AMONG RURAL WOMEN IN ONICHA LOCAL GOVERNMENT AREA, EBONYI STATE, NIGERIA

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Abstract
The study provides empirical findings on adoption analysis of cassava value addition technologies (CAVAT) among rural women in Onicha LGA, Ebonyi State, Nigeria. Purposive and random sampling technique was used to select 120 respondents for the study in 2019. The study analytically adopted descriptive statistics, Lickert Rating Scale and multiple regression analyses to analyze the data. The result shows that the respondents were still strong and active, had mainly formal education with large households, many years of farming experience and are married. The results on level of adoption shows that cassava flakes, flour and doughnut were adopted technologies at varying levels. The determinants of adoption of cassava value addition shows that coefficients for age and education were positive at 1% and 5% level of probability for cassava flakes and flour respectively. Household size was negative for cassava flour and doughnut at 10% and 5% level respectively and positive for flakes at 1% level, while income were positive and significant at 5% and 10% level of probability for cassava flour and chin-chin. The coefficients for experience were also positive and significant for all products; expect chin-chin at varying levels, while marital status was significant and negative for cassava doughnut at 5% level, and positive for chin-chin and flakes at 5% and 1% respectively. This implies that increase in these variables will lead to corresponding increase or decrease in adoption of cassava value addition products. The results also shows that inadequate funding, unsteady electricity supply, inadequate value addition facilities and inadequate transport facilities were the most important constraints militating against cassava value addition adoption in the study area. The results therefore call for policies aimed at provision of accessible education and more extension contact to enhance their access and ability to process information on CAVATs. There is also need for availability of infrastructural amenities such as stable electricity supply, storage facilities and processing machines in the study area, not only to boost food production but also to create more employment opportunities and enhanced livelihoods.

Key words: Cassava Flakes, Constraints, Determinants and Income

Introduction

The growing level of unemployment, poverty and hunger in developing countries (especially Nigeria) is still high, despite global advances, agricultural technologies and entrepreneurship development. Men and women have begun to engage in different income earning activities in order to improve their livelihood. This has lead to huge investment in agriculture and agri-related business in almost all parts of the country. Investment in cassava crop enterprise is one of them which have contributed towards poverty alleviation in Nigeria. Cassava is an important tuber crop, constitutes the major staple food items for more than 58% of Nigerians (Nwachukwu, 2010). The crop plays a crucial role in raising the sociological, nutritional and economic development of the country (Ikeorgu, 2011).

Cassava (*Manihot esculenta Crants*), is among the world's most important food crops grown mainly for its root (Allem, 2002) and has been described as a miracle crop because of the numerous products and by-products which add value to it. Every part of the root is useful for one purpose or the other. While the peel can be used as feed for livestock, the rest of the root can be processed into various products such as *gari*, *fufu*, *tapioca*, starch, chips, flour, fried balls, among others (Agbarevo and Obinne, 2008). The diversity in cassava use is expanding, as further processing can produce chips, pellets, flour, alcohol and starch (Adebayo, 2009). A wide range of industries use cassava in the production of livestock feed, textiles, confections, plywood and soft drinks. In addition to its key role as the major staple in

Nigeria, it has grown to become strategically important as an instrument for rural development.

About 600 million people in Africa, Asia and Latin America depend on the cassava crop for their food and incomes (Okogbenin *et al*, 2002). In Nigeria, adoption of value added innovations on cassava roots has resulted in a rise in its production and consumption. Nevertheless, Nneoyi *et al.,* (2008) noted that a major limitation of cassava production is the rapid post harvest deterioration of its roots, which usually prevents their storage in fresh state for more than a few days. A typical analysis of cassava root shows it has 70% moisture, 24% starch, 2% fiber, 1% protein and other substances including minerals 3%.

National Root Crops Research Institute (NRCRI), Umudike has developed several cassava value added technologies in addition to the existing ones (conventional methods) aimed at addressing the high perish ability of cassava roots, and diversifying it uses. These technologies include the method of processing, the use of cassava flour in making secondary products like bread, biscuits, cakes, chin-chin, seasoned cassava flakes, doughnut, chips, salad cream etc. Although all these value addition products of cassava was aimed to increase the utilization and alternative uses of cassava and wide range of food recipes. It was observed that some communities, towns and states still stick to their traditionally processed food from cassava. With this, the challenges of meeting the rapidly growing food needs of the masses may seem unsuccessful; hence the knowledge of value addition technologies and level of adoption of cassava products become paramount in today's research (Nwachukwu and Kanu, 2011). However, NRCRI have trained and re-trained rural women on the root and tuber crops value addition in South East Nigeria and beyond, with the purpose of promoting the new and improved forms of processing, utilization and packaging of the agricultural crops for sustainable food production, income generation, increased source of food vitamins and possible foreign exchange earnings in the country (Oti and Aniedu, 2011).

Aniedu (2014) noted that encouraging farmers to adopt value addition in their production chain gain, will enable them to fully exploit and utilize the benefits of cassava root crop, limit the post-harvest losses and maximize the potentials. Onicha Local Government Area (LGA) of Ebonyi State was one the locations for training and retraining of cassava value addition by NRCRI, Umudike. Aniedu *et al*., (2012) observed that among the cassava products, cassava flake is highly processed and consumed by the rural people in the community. Study by Oti and Aniedu (2011) noted that rural women in Onicha LGA, were among the participants that were trained in cassava value addition by NRCRI in the past years. Due to high consumption and production of this product in the area, it has become a major source of income and employment creation for the rural women in the communities especially during the processing and marketing of the flakes. They are also majorly engaged in production and commercialization of cassava products with more emphasis on seasoned cassava flakes. This study therefore, analyzed the adoption of cassava value addition technologies among rural women in Onicha LGA, Ebonyi State, Nigeria with the objective of describing the socioeconomics characteristics of the rural women in the study area, estimate the level of adoption and determinants of adoption and identify constraints militating against the adoption of cassava value addition technologies.

Methodology

The study was carried out at Onicha LGA, Ebonyi State. Purposive and random sampling procedures were used for the study. The study purposively selected five major cassava processing communities namely: Isu, Ukawu. Onicha, Oshiri and Ugwulagwu Communities and randomly selected 24 rural women processors in each community to give a total of 120 respondents for the study. The study used structured questionnaire and focus group discussion to elicit information on cassava value addition for the study. The study analytically adopted descriptive statistics (percentages, mean and frequency), Lickert Rating Scale and multiple regression analyses for the study.

Level of adoption was analysed by the use of a five point Lickert Rating scale thus; adoption (5), trial (4), evaluation (3), interest (2), awareness (1), and unaware (1). Respondents with mean score of 3.0 and above imply increased probability of adoption while respondents with mean score less than 3.0 imply probability of not adopting. To determine the mean likert level = Xs = ΣX. Xs of each item were computed by multiplying the frequency of each response pattern with its appropriate nominal value and dividing the sum with the number of respondents to the items. This can be summarized with the equation thus;

$Xs = \Sigma fn/N$ ..... (1)

Where,
Xs = mean score
Σ = summation
f = frequency
n = likert nominal value
N = number of the respondents

Xs=1+2+3+4+5= 15/5=3.0

The ordinary least square multiple regression model was used to estimate the influence of some socio-economic factors on level of adoption of the value added technologies in the study area. The model is specified thus;

$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8) + e$..... (2)

Where;
Y= Level of Adoption among beneficiaries of Cassava Value Added Technologies (%)

X_1 = Age (years)
X_2 = Years of formal education (years)
X_3 = Family size (number of persons in a household)
X_4 = Income of beneficiaries (N)
X_5 = Experience (years)
X_6 = Marital status (dummy variable; 1= married, 0=otherwise)
X_7 = Frequency of extensión contacts (regular = 1, not regular = 0)
e = Error term

Constraints militating against the adoption of cassava value added technologies was analysed with the use of a four point likert rating scale thus; high (4), moderate (3), Low (2), and none (1). Respondents with mean score of 2.50 and above imply the constraint was an important one, while respondents with mean score less than 2.50 imply constraint not important. To determine the mean likert level = Xs = ΣX. Xs of each item were computed by multiplying the frequency of each response pattern with its appropriate nominal value and dividing the sum with the number of respondent to the items. This can be summarized with the equation thus;

$Xs = \Sigma fn/N$ …….. (3)

Where,
Xs = mean score
Σ = summation
F = frequency
N = likert nominal value
N = number of the respondents
Xs=1+2+3+4= 10/4 = 2.50

Results and Discussion
The results in Table 1 show the socio-economic characteristics of the respondents in the study area. The result shows that many (59.00%) respondents were between the age range of 45-54years, while 10.00% and 29.00% were between the ages of 35-44 and 55-64yrs respectively. Only 7.00% were between the age ranges of 25-34 years. This implies that the rural women who are engaged in cassava value addition were still strong and active. Age is said to be a primary latent characteristic in adoption decisions (Bobabana-Wabbi, 2002). The results show that about 39%, 34% and 27% of the respondents attained secondary, primary and no formal education respectively. The ability to read and understand information that may be contained in a technological package is an important aspect of adoption. Ibe (2013) noted that educated farmers are expected to be more receptive to improved techniques. About 67% of the respondents were full time farmers. This follows Asumugha (2003), who observed that full-time farmers tend to be less amenable to income diversification than their part-time counterparts. Many (51%) of the respondents had large household size of 9-12persons, while 16% and 33% had household sizes of 1-4 and 5-8 persons respectively. This is in line with the findings of Ikeorgu (2011), who noted that large family size necessitates respondents to adopt new technologies for increased returns to sustain their families. About 51% of the respondents had income ranging from N800,000.00 –N999,999.00. Programs that produce significant gains can motivate people to participate more fully in them. Farmers must see an advantage or expect to obtain greater utility in adopting a technology (Bonabana-Wabbi, 2002). Majority (61% and 61%) of the respondents had farming experience ranging from 21 – 30 years and married respectively. This indicates that they have long years of experience in processing as married. Okoye (2009), indicated that experience is a major factor in the adoption of technologies and should serve as an advantage for increased investment and technology utilization. Results also show that majority of the respondents (75.00%) belong to cooperatives indicating more acquisition of information on new technology through cooperatives. Information reduces the uncertainty about a technology's performance hence may change individual's assessment from purely subjective to objective over time (Caswell *et al*., 2001).

The result in Table 2 shows the lickert rating scale of level of Adoption for the respondent in the study area. The result shows that processing of cassava into flakes had the highest mean level of adoption (4.55), followed by cassava flour (3.68) and cassava doughnut (3.38). This implies these cassava products were adopted in the study area with the mean score above 3.00. The result also shows that Cassava cake and cassava chin-chin had the mean level of adoption of 2.15 and 1.94 respectively, below the acceptable mean and therefore were not adopted by the respondents.

The results in Table 3 show the regression estimates of the determinants of level of adoption of cassava value added technologies among rural women in Onicha LGA of Ebonyi State. The result shows F-values that were all significant at 1% level indicating that all the variables used for analyses were adequate. The results show that the coefficients for age and education were positive at 1% and 5% level of probability for cassava flakes and flour respectively. This implies that any increase in age and education will lead to a corresponding increase in the level of adoption of the value added technologies for flakes and flour. Educated farmers are expected to be more receptive to improved farming techniques, while farmers with low level of education or without education would be less receptive to improved farming techniques following Okoye *et al*., (2004).

The coefficients for household size were negative for cassava flour and doughnut at 10% and 5% level respectively and positive for flakes at 1% level. A larger household size would be expected to increase the probability of adoption of innovations. The negative relationship of adoption for cassava flour and doughnut may probably be that they are not regarded as major food in the study area. The coefficients of income were positive and significant at 5% and 10% level of probability for cassava flour and chin-chin. This implies that any increase in income will lead to a corresponding increase in the levels of adoption of value added cassava flour and chin-chin each. The coefficients for experience

were also positive and significant for flour, dough nut, cake and flake at varying levels indicating a direct relationship with level of adoption. The coefficients for marital status were significant and had an indirect relationship with adoption of value addition on cassava doughnut at 5% level and direct relationship with adoption of chin chin and flake at 5 and 1% respectively.

The results in Table 4 show the mean distribution of respondents according to constraints militating against adoption of value addition of cassava products in the study area. The results showed that inadequate funding (5.22), unsteady electricity supply (4.21), inadequate value addition facilities (3.91) and inadequate transport facilities (2.71) were the most important factors militating against cassava value addition adoption in the study area and ranked 1st, 2nd, 3rd and 4th respectively. The mean values were also greater than the lickert mean value of 2.5. Other constraints like fuel scarcity (2.47), marketing of products (2.01) and crop rot (1.26) were least important constraints militating against adoption of cassava value addition in the study area and ranked 5th, 6th and 7th respectively with mean score less than 2.5.

Conclusion

The study provides empirical information on adoption analysis of cassava value addition technologies among rural women in Onicha LGA, Ebonyi State, Nigeria. The study showed that the level of adoption of CAVATs (flour, doughnut, cake, chin-chin and flake) were moderate, since out of five products evaluated, only two (cassava cake and chin-chin) were not adopted by the respondents. The study also shows that variables like household size, experience and marital status of the respondents were the significant re-occurring factors that influence adoption on cassava value addition among the products examined in the study area. Other factors include: age, education, income and frequency of extension contact. The respondents were constrained by factors such as lack of electricity supply, inadequate funding, lack of transport facilities and lack of value added products. The results therefore call for policies aimed at provision of free and affordable education to enable the rural women access and process innovations that will enhance adoption. Extension agents should increase their visits to the rural women farmers to enhance their access to information on CAVATs. There is also need for availability of infrastructural facilities like stable electricity supply, storage facilities and food processing machines in the study area. This will not only boost food production in the study area, but will also create more employment opportunities and increase income earning.

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Table 1: Distribution of Respondents according to Socio-Economic Characteristics (n = 120)

Variable	Frequency	Percentage
Age (years)		
25-34	8	7.00
35-44	12	10.00
45-54	65	59.00
55-64	35	29.00
Educational attainment		
No. Formal Education	26	27.00
Primary Education	36	34.00
Secondary Education	58	39.00
Family Size		
1 – 4	20	16.00
5 – 8	40	33.00
9 – 12	60	51.00
Income (Naira)		
200,000 – 399,999	12	10.00
400,000 – 599,999	23	19.00
600,000 – 799,999	28	25.00
800,000 - 999,-999	57	51.00
Experience (years)		
1 – 10	11	9.00
11 – 20	6	4.00
21 – 30	74	61.00
31 – 40	30	26.00
Dummy		
Occupation (Full time farming)	80	67.00
Marital status (Married)	80	67.00
Membership of cooperative society	90	75.00

Source: Field Survey (2019)

Table 2: Distribution of trainees by level of adoption (AIETA) (n = 120)

Adoption Level	Aware	Interest	Effect	Trial	Adoption	Total	Mean	Decision
CAVAT I(Flour)	17(17)	16(32)	13(39)	17(68)	57(285)	441	3.68	Accept
CAVAT II (Dough-Nut)	10(10)	33(66)	23(69)	10(40)	44(220)	405	3.38	Accept
CAVAT III(Cakes)	45 (45)	42 (84)	18(54)	0 (0)	15(75)	258	2.15	Reject
CAVAT IV (Chin-Chin)	31(31)	72 (144)	10 (30)	7 (28)	0 (0)	233	1.94	Reject
CAVAT V (Cassava Flakes)	0 (0)	4(8)	2 (6)	38 (152)	76(380)	546	4.55	Accept

Source: Field Survey (2019)
Adoption Mean Score (AMS) = 3.00

Table 3: Regression estimates of factors influencing the level of adoption of cassava value addition technologies among rural women in Onicha LGA (n = 120)

Variables	CAVAT I (flour)	CAVAT II (dough-nut)	CAVAT III(cakes)	CAVAT I (chin-chin)	CAVAT V (cassava flakes)
Constant	51.313	4.325	13.741	4.501	131.145
	(8.671)***	(9.216)***	(3.112)***	(2.912)***	(1.421)***
Age	12.321	3.134	3.923	1.029	14.282
	(0.716)	(0.452)	(0.492)	(0.534)	(4.514) ***
Education	0.802	-0.072	- 2.393	0.219	0.363
	(2.402)**	(0.788)	(0.682)	(1.025)	(0.325)
Family size	-8.482	-0.473	3.929	3.792	0.426
	(1.892)*	(2.941)**	(0.831)	(0.894)	(2.426) **
Income	11.583	2.284	2.339	3.735	15.082
	(2.689)**	(0.937)	(0.285)	(1.941)*	(0.635)
Experience	0.392	1.803	0.392	4.202	0.895
	(7.823)***	(1.893)*	(2.403)**	(0.913)	(1.932) *
Marital Status	6.381	-0.082	2.904	0.291	0.273
	(0.396)	(2.809)**	(0.329)	(3.872)**	(8.545)***
Frequency of extension Contact	10.986	1.918	0.329	3.130	1.958
	(0.361)	(0.691)	(2.382)**	(0.886)	(0.897)
R^2	0.551	0.401	0.305	0.346	0.584
F-ratio	14.336***	15.077***	20.986***	19.233***	25.077***

Table 3:

Source: Field survey, 2019

*****, ** and * = denote significant at 1%, 5% and 10% respectively**

Figures in parentheses are t-values

Table 4: Mean Distribution of Respondents according to Constraints militating against Adoption of Value addition of Cassava products in the study Area (n=120)

Constraint	Mean Score	Ranking score
Crop rot	1.26	7th
Inadequate value addition facilities	3.91*	3rd
Inadequate funds/funding	5.22*	1st
Lack of transport facilities	2.71	4th
Lack of Electricity Supply	4.21*	2nd
Fuel Scarcity	2.47	5th
Marketing of Products	2.01	6th

Source: Field Survey, 2019

***= Severe constraint ≥ 2.5**