



EFFECTS ECONOMIC OF CASSAVA VALUE ADDITION ON THE INCOME OF SMALL SCALE FARMERS IN OSHIMILI NORTH, DELTA STATE, NIGERIA

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Abstract

This paper examined the effect of cassava value addition on the income of small scale farmers in Oshimili North, Delta State. Structured questionnaires were used to collect primary data from 312 small scale cassava farmers and analytical techniques employed were descriptive statistics, independent sample t-test and Probit regression model. Results on socioeconomic characteristics of the respondents indicated that majority (67%) are males, 48.7% are between 38-47 years, 72.7% were married and about 58.3% do not have access to credit facility. In the study area, the most processed cassava by-products are garri, fufu, cassava flour and cassava chin chin, with 17.1%, 16.1%, 12.9% and 10.9% respectively. Also, there was a statistical significant difference between the income of farmers who practice value addition and the income of farmers who did not. Probit regression results revealed that gender (5%), farm size (1%), farming experience (1%), education (1%), access to credit (1%) and membership of cooperative society (5%) are the socio-economic factors influencing the practice of value addition in the study area. Furthermore, 11 constraints were found to pose severe threat to cassava value addition in the study area. These include lack of capital for business expansion (93.1%) high cost of processing inputs (91.8%), preference for close substitutes such as wheat and semolina (88.4%). The study, therefore, recommended that extension service agents be empowered to effectively create awareness of the importance and practice of cassava value addition, provision of credit and basic infrastructural facilities to ease cassava production and practice of value addition.

Keywords

Cassava
Value addition
Income
Small scale farmers
Oshimili North

JEL Classification

Q22, Q120, J43

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1. Introduction

Agriculture has been the main source of source of food, income and employment to the populations of the developing countries, thereby playing an essential role in their economy (World Bank,

2007). Among the crops grown in Nigeria, root and tuber which include yam and cassava, play key roles in agricultural sector. Cassava (*Manihot Esculenta*) is one the most important root crop and its starchy root is a major source of dietary

energy. It is also known as one the highest producer of carbohydrate among staple crops in Nigeria which can be processed into various forms resulting into increased demand due to its multiple roles (Akinpelu *et al.* 2011). Cassava has been widely cultivated in many parts of the country among small scale farmers because it serves as a food and cash crop and (Obinna, 2015).

Gneiting and Sonenshine, (2018) opined that the role of the small scale farmers is germane in the global food system, their ability to earn a sustainable income is vital to sustainable livelihood. However, they posit that farmers' success depends on generating adequate resources that will enable them manage risk associated with crop production. Consequently, the global development community as well as business community have intensified support for small scale farming ever since the global food crises of 2008, to ensure a long term supply of commodities and help feed the world, and also to keep rural communities in a mode of productive growth.

Small scale farmers as those owning small-based plots of land on which they grow subsistence crops and one or two cash crops relying almost exclusively on family labour (Adeniyi and Adesina 2014). They argued that over 90% of farming population are small scale farmers who produce as much as 85% of the total food for the citizen. Larger percent of the cash income realized from all food crops grown among the small scale farmers, especially in the eastern region of Nigeria is attributed to cassava. It is considered as one of the ways of improving productivity in agriculture and the level of income generation of the rural communities (Obinna, 2015). Apart from improving farmer's income, value addition has also increased employment opportunities (Nwosu and Ogbonnaya, 2014). In the time past, majority of the small scale farmers disposed their farm produce without processing or adding value to it. Such practice drastically reduced the level of

income realizable. The practice only enriched the middlemen at the expense of the small scale farmers who could hardly raise enough capital for the next farming season.

Olukunle (2016) described value addition as the series of exertion necessary for transforming a product or services before delivery to the final consumer. Value addition is the process where producers, processors as well as the consumers operate in ways that maximizes the value of product or services. It can also be defined as a chain of successive activities aimed at increasing the value of a product. The farm and all the intermediary procedures constitute the agricultural sector value addition. Also, Ja'afaru *et al.*, (2016) observed that value addition in Agriculture in developing economy is widely becoming widely acceptable strategy for both government and non-governmental organization, towards improving income generation of rural communities. The practice of agricultural value addition is fast transforming the agricultural sector from the production of low quality bulk commodities sold in undefined markets to production of improved variety crop sold in specialized markets. However, Amadi, Eze and Ibezim (2017) observed that the practice of value addition among small scale farmers is still relatively low in Nigeria. Indeed, the enormous potential of the various cassava value added by-product and the increase in farmer's income resulting from value addition has not been fully utilized. Oyewole and Eforuoku (2019) identified, among others, weak linkage between market actors which delay harvested cassava from reaching the processors on time, weak extension services, and lack of access to credit facilities, poor efficiency of processing enterprises and non-commercial orientation, as systemic constraints inhibiting growth in the sector.

Numerous studies (Esiobu, 2019, Ettah *et al.* 2017, Kehinde and Abaoba, 2016; and kolawole, 2010) abound on cassava value addition, however, they focused on cassava

processing, with little or no emphasis on income differentials. Also, in the study area, studies such as Okpepe and Onyeagocha (2015) and Ajieh (2014) investigated the analysis of processing cassava tubers, and the adoption of improved cassava production and processing technologies respectively. These studies, however, did not examine the effects of cassava value addition on the income of small scale farmers. In Oshimili North, cassava production is mainly concentrated in the hands of small holder farmers. Only a handful of the farmers processed their farm cassava into different types

of value-added products such as gari, fufu, starch, cassava bread and animal feed, to enhance their income level. Hence, this study is poised to examining the socioeconomic characteristics of cassava farmers, identify types of cassava value added products, determine the factors influencing cassava value addition among cassava farmers; determine the difference in farmer's income due to cassava value addition; and determine the constraints/challenges to cassava value addition in the study area.

2. Methodology

2.1 The Study Area

Oshimili North local Government Area is one of the twenty-five (25) local government areas in Delta State, Nigeria. It has eleven communities which include: Animwalo, Akwukwu-Igbo, Atuma, Ebu, Ibusa, Illah, Okpanam, Ugbolu, Ukala-Okpuno, Ukala-Okwute and Ubulu. Majority of the population engage in agricultural production. The area is dominated by farmers prominent in cassava production and processing. Due to the extended period of raining season, all year round cultivation is possible. Two peak planting season are observed, namely, early planting season between April and June and late planting season of between August and October. The area is richly endowed with fertile agricultural land suitable for the growth of various tropical crops and good feeders for domestic animal. The major food crops cultivated include: oil palm, plantain, yam, pepper, maize, cassava, watermelon and sweet potatoes.

The study used Cochran (1977) formula for determining sample size to select the respondents, from the identified population of 1,930 small scale cassava farmers in the study area. The list of Oshimili North cassava farmers, from Delta State Ministry of Agriculture, Asaba, was used as sample framework for the study. The Cochran formula can be expressed as;

$$n = \frac{n_0}{1 + \frac{(n_0 - 1)}{N}}$$

Where: n= sample size projected, n_0 = derived sample size, N = total population size. To obtain n_0 , derived sample size. Cochran developed a formula to calculate a representative sample proportions as;

$$n_0 = \frac{z^2 pq}{e^2}$$

where: z= the critical value of the desired level of confidence is 1.96. p= the estimated proportion is 0.5. e=the desired level of precision is 0.05; and q= 1-p. Hence n_0 is determined as 384.

2.2. Sample Size and Techniques

Given the population size of 1,930 and sample size derived from infinite population as 384. The sample size was determined as 320. This implies that 320 respondents were selected for the study. The study employed multistage sampling techniques which includes purposive and simple random sampling techniques to select the respondents. Firstly, purposive sampling technique was used to select/identify two groups of farmers, those who practice value addition and those who do not. Secondly, a simple random sampling technique was used to select 160 farmers from each of the groups, making a total of 320 respondents/farmers. However, due to incompleteness and inconsistency, a total of 312 respondents/farmers were employed for the study. A structured questionnaire was employed to collect data from selected cassava farmers in

the study. Data for this study were analyzed using descriptive statistics, probit regression model and independent sample t-test. Descriptive statistics such as mean, frequency and percentage were used to analyze data on socioeconomic characteristics of cassava farmers in the study area. Probit regression model was used to analyze the factors

influencing value addition among small scale cassava farmers in the study area. The probit regression was used because decision to practice cassava value addition differs from one small scale farmer to the other. The independent sample t-test was used to determine the difference in income between those who add value and who does not.

Model Specification

Probit regression model as employed by Anyiro and Onyeamachi, (2014). The implicit form of the model is expressed as:

$$Y_{ij} = \alpha_j + \beta_j \sum_{k=i} H_{ijs} + \epsilon_{ij} \quad 1$$

Where the H_{ijs} are vectors of the explanatory variables of the j th farmers' decision to practice cassava value addition. Y_{ij} is a vector of binary variables such that $Y_{ij} = 1$ if the j th farmer practice cassava value addition, and 0 if otherwise. Since Y_{ij} can only assume two different values for the decision yes or no, represented by 1 or 0, the expected probability can be defined as follows:

$$\begin{aligned} \Sigma(Y_{ij}) &= \Sigma [\alpha_j + \beta_j \sum_{k=i} H_{ijs} + \epsilon_{ij}] \\ &= \alpha_j + \beta_j \sum_{k=i} H_{ij} E(H_{ij}) \end{aligned} \quad 2$$

Equation (ii) defines the proportion of farmers with characteristics (H_{ij}) likely to practice cassava value addition. The model is explicitly express as thus:

$$\text{EXP } Y_{ij} = \beta_0 + \beta_1 \text{AGEH} + \beta_2 \text{GEND} + \beta_3 \text{EDU} + \beta_4 \text{HHSZ} + \beta_5 \text{HFEX} + \beta_6 \text{CRT} + \beta_7 \text{MBCP} + \beta_8 \text{HHFS} + \epsilon_{ij} \quad 3$$

Where: The dependent variable is farmers' decision to practice cassava value addition. The explanatory variables are both the continuous and binary. The independent variables include: AGEH= Age of the household head in years; GEND= Household gender. 1 if household is

male, 0 if otherwise; EDUC= Household education status in years; HHSZ= Household size, HHFS= Household farm size in hectares; HFEX= Household farming experience in years; CRDT= Access to credit/loan facilities. 1 if yes, 0 if otherwise; MBCP= Membership to cooperative 1 if yes, 0 if otherwise and ϵ_{ij} = Stochastic error term

The Independent Sample t-test is an inferential statistical test that determine whether there is a statistically significant difference between the means in two unrelated groups. Independent sample t-test was used to determine the difference in the farmer's income due to value addition. That is, to determine the level of statistical difference between the mean income of farmers that practice value addition and the mean income of farmers that do not practice value addition. Independents sample t-test was used for testing hypothesis. The model is stated thus;

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}}$$

Where:

$n_1 + n_2 = 2$ degree of freedom; 0.05 level of significance; t = independent t statistic; \bar{X}_1 = Mean income of small scale farmers that practice cassava value addition

\bar{X}_2 = Mean income of small scale farmers that did not practice cassava value addition;

S_1^2 = Variance of income of small scale farmer that practice cassava value addition;

S_2^2 = Variance of income of small scale farmers that did not practice cassava value addition;

n_1 = number of selected small scale farmers that practice cassava value addition;

n_2 = number of selected small scale farmers that did not practice cassava value addition.

3. Results and discussion

3.1. Results of Socioeconomic Characteristics

The socio-economic characteristics of farmers who practice value addition and those who did not are shown in Table 1. Majority (67%) of the respondents are males while 37% are females. Cassava cultivation is a strength and vitality. This presupposes that majority of these farmers will be males. The study of Nwosu and Ogbonnaya (2014) also revealed that majority of cassava farmers are males. Majority (48.7%) of the respondents are between 38-47 years while 27.6% of farmers between the ages brackets of

48-57 years. This implies that majority of cassava farmers are still strong and in their active ages to cultivate and can engage in value addition at will since not all the farmers engage in cassava value addition. This is in agreement with the findings of Ajieh (2014) who observed that 43% of the respondents are between the age brackets of 41-50. More than half of the respondents (72.7%) were married. This is because most of the small scale farmers in the study area are of marriageable ages and have households to cater for. Cassava production can meet both food and economic needs of the farmers' family. This also agreed with the findings of Inyada (2014) who found out that majority of the respondent are married. On education, about 44% and 29% of the cassava farmers had secondary and primary education respectively.

Table 1. Socio-economic Characteristics of the Respondents n=312

Variables	Frequency	Percentage (%)
Gender		
Male	197	63.0
Female	115	37.0
Age (years)		
18- 27	3	1.0
28-37	49	15.7
38-47	152	48.7
48-57	86	27.6
58 and above	22	7.1
Marital Status		
Single	25	8.0
Married	227	72.7
Widow	44	14.1
Divorced	16	5.1
Level of Education (years)		
No formal education	50	16
Primary	89	28.5
Secondary	137	43.9
Tertiary	36	11.5
Household Size		
≤ 5 members	176	57.4
6-10 members	121	38.8
11 and above	15	4.8

Farming Experience (years)

≤ 5	21	6.7
6-10	102	32.7
11 and above	189	60.6

Access to Credit facilities

Accessible	130	41.7
Not Accessible	182	58.3

Membership of Cooperative

Yes	165	52.9
No	147	47.1

Source: Field Survey, 2021.

This means majority (84%) of the small scale farmers in the study area are literate. The study of Anyiro and Onyeamachi (2014) corroborates the effect of educational status of farmers on their willingness to adopt cassava value added innovation. About 57% and 39% of the respondents had less than or equal to 5 members and 6-10 members respectively in their household. This shows respondents had a large household. Majority of the respondent (61%) have been farming for over 11 years and above. Morgan *et al.*, 2021 supports this result. About 58.3% of the respondents do not have access to credit facility, however, most of the small scale

farmers are members of one cooperative or the other.

The results according to various types of cassava value added by-products processed by the small scale cassava farmers in Oshimili North, Delta State is presented in Table 2. It shows that eleven major types of cassava value added by-products were identified which include; Garri, fufu, abacha, cassava flour, starch, cassava chin chin, cassava chips, cassava wheat/bread, cassava cake, cassava pizza, cassava salad cream.

Table 2. Types of Cassava Value Added by-Products

S/n	Cassava by-products	Frequency*	Percentage (%)
1	Garri	102	17.1
2	Fufu	96	16.1
3	Abacha	45	7.6
4	Cassava flour	77	12.9
5	Starch	32	5.4
6	Cassava chin chin	65	10.9
7	Cassava chips	53	8.9
8	Cassava pizza	27	4.5
9	Cassava bread	51	8.6
10	Cassava cake	26	4.4
11	Cassava salad cream	22	3.7

*Multiple Responses Existed

Source: Field Survey, 2021.

However, the results also indicate that garri, fufu, cassava flour and cassava chin chin, with 17.1%, 16.1%, 12.9% and 10.9% respectively were the most processed in the study area. This result is in agreement with the findings of Otekunrin and Sawicka (2019).

3.2 Results of the Probit Regression

Table 3 presents Probit regression model on factors influencing value addition in the study area. To access the fitness of the model, Pseudo-

R^2 , p-value and restricted and unrestricted log likelihood functions were used. The probability value shows that the overall model is statistically significant. The log likelihood revealed that the model has a good fit, because the results obtained shows that the unrestricted log likelihood generated values closer to zero relative to the restricted log likelihood. Also, the Mcfadden R^2 indicated that the model explained as much as 87% variation in the dependent variable.

Table 3. Probit Regression on the Factors Influencing Cassava Value Addition among the Respondents

Parameters	Estimate	Std. Error	Z	(95%CI) P-value	Lower Bound	Upper Bound
Gender						
Female	0.8141	0.4540	1.97	0.073	-0.0758	1.7040
Age						
28-37	-3.0121	2.0020	-1.50	0.132	-6.936	0.9118
38-47	-4.2539	2.1185	-2.01	0.045	-8.406	-0.1017
48-57	-5.1304	2.2625	-2.27	0.023	-9.564	-.6958
58 and above	-5.3213	2.6039	-2.04	0.041	-10.425	-2176
Formal Education	3.8814	1.3366	2.90	0.004	1.2615	6.5012
Household size	-0.4074	0.1683	-2.42	0.016	-0.7373	-0.0774
Farm size	1.4387	0.3185	4.52	0.000	0.8142	2.0631
Farming Experience	0.3271	0.0970	3.37	0.001	0.1368	0.5174
Access to Credit	1.3478	0.5179	2.60	0.009	0.3327	2.3630
Cooperative Membership	0.9531	0.4839	1.97	0.049	0.0045	1.9017
Constant	-8.5835	2.2869	-3.75	0.000	-13.0650	-4.1012
Unrestricted Log likelihood	-216.261					
Restricted Log likelihood	-27.147					
LR Chi ² (11)	378.23					
Prob Chi ²	0.0000					
Pseudo R ²	0.8745					

Source: Survey Data, 2021

The results of average marginal value effects as presented in Table 4 shows the variable included in the model were found to be statistically significant in explaining the factors influencing cassava value addition in the study area. The coefficient of female was found to be statistically significant at 5% level and

positively related to the practice of cassava value addition. This implies that being a female increases the probability of practicing value addition than their male counterpart in the study area, although only by a margin of 3%. This implies that females are generally 3% more likely to practice value addition than males. This

could be attributed to the fact that the processing of food is believed to be the responsibility of women in the society. This is also in agreement with the findings of Omilani *et al.* (2015) who

observed that being female increases the likelihood of being willing to pay for training in value addition.

Table 4. Average Marginal Effects on the Factors Influencing Value Addition among the Respondents in the Study Area

met Parameter	Delta-			p-value	95% Conf. Interval	
	dy/dx	Std. Err.	Z		Lower	Upper
Gender						
Female	0.0385	0.0204	1.89	0.059	-0.0014	0.0785
Age of household head						
28-37	-0.1762	0.1195	-1.47	0.140	-0.4106	0.0580
38-47	-0.2332	0.1247	-1.87	0.061	-0.4776	0.0111
48-57	-0.2772	0.1301	-2.13	0.033	-0.5323	-0.0221
58 and above	-0.2873	0.1524	-1.89	0.059	-0.5860	0.0113
Educational status						
Formal Education	0.3190	0.1075	2.97	0.003	0.1082	0.5298
Household Size	-0.1950	0.0076	-2.55	0.011	-0.0345	-0.0045
Farm Size	0.6890	0.0116	5.89	0.000	0.0460	0.0918
Farming Experience	0.1561	0.0030	3.98	0.000	0.0079	0.0233
Access to Credit	0.7572	0.0298	2.53	0.011	0.0171	0.1343
cooperative Membership	0.5340	0.0293	1.82	0.069	0.0040	0.1110

Source: Survey Data, 2021

The coefficient of educational status was found to be significant but negatively related to value addition. Generally, as farmers grow older, their likelihood to engage in cassava value addition declines relative to the reference age category of 18-27. Farmers between the age brackets of 28-37 all through to 58 years and above respectively, have their probability of practicing value addition declining from 17.6%, 23%, 27.7% and 28.7% respectively, relative to the reference age category of 18-27. This implies that as the age of farming households increases the tendency to practice value addition tend to be reducing. This finding agrees with the result of Itam *et al.* (2015) who observed that older farmers are less willing to adopt improve technology due to their

conservative attitudes, hence their low level of efficiency.

Household educational status was found to be statistically significant at 1% level and positively related to value addition. This means that being educated increases the probability of practicing value addition by up to 31.9% relative to the reference household with no formal education. This implies that household headed by farmer with formal education is more likely to embark on cassava value addition than household headed by farmer that is not educated. These findings also agreed with the findings of Opondo *et al.* (2017) who opined that household headed by educated farmer is more likely to engage in cassava value addition than household headed by an uneducated head.

Household size was observed to be statistically significant at 1% level but negatively related to the practice of value addition among the respondents. This implies that any increase in the size of the household size tend to reduce the probability of practicing value addition by 0.0195%. This finding corroborates the study of Anyiro and Onyeamachi (2014) which revealed that the larger the household size, the lower the probability of adopting cassava value added innovation.

The coefficient of farm size was found to be statistically significant at 1% level and positively influencing value addition. This suggests that an increase in the size of household farm size also increases the probability of engaging in the practice of value addition by 68.9%. This means that households with large farms are more likely to practice value addition more than households with small farms. Hence, household farm size is a determinant of cassava value addition in the study area. This also agreed with the findings of Ejechi (2015) who found out that 73% of the respondents that adopted cassava technology had large farmer size.

Household farming experience is observed to be statistically significant at 1% level and positively influencing the practice of value addition. This means that being a farmer with more years of farming experience increases the probability of practicing value addition by 15.6% relative to farmers with less years of farming experience. This implies that households headed by experienced farmers are more likely to engage in cassava value addition than households headed by inexperienced farmers. Hence, household farming experience tend to increase cassava value addition in the study area. This finding is in conformity with the findings of Opondo *et al.* (2017) which revealed that farmers who have at least some level of value addition experience are more likely to participate in advanced levels of commercialization than those who have no experience.

The coefficient of access to credit facility was found to be positive and statistically significant at 1% level. This means that being a farming household with access to credit facilities increases the probability of practicing value addition by 75.7% compared to the households with no access to credit facilities in the study area. This implies that households headed by heads with access to credit facilities are more likely to engage in value addition than household headed by heads with no access to farm credit. This finding is in conformity with the findings of Inyada (2014) who opined that improved access to credit will increase capital for the cassava processing enterprise.

Membership of cooperative society is observed to be positive and statistically significant in determining value addition among the respondents at 5% level. That is, being a member of cooperative society increases the probability of practicing value addition by 0.0534% relative to farming household that are not members of any cooperative society. This is also because most co-operative societies provide exposure and useful information and actual learning experience. This finding is in line with result of Anyanwu (2018) who revealed that membership of cooperative societies is a significant factor of adoption behavior of women farmers.

3.3 Results of the sample t-test on the income of Cassava Value Addition

The result of the independent sample t-test as presented in Table 5 shows that the mean annual income of the farmers who practiced value addition was 200567.3, while the mean annual income of cassava farmers who did not practice was 122424.4. The mean difference between the two income levels was 78143, with the standard error of 3340.1. The results further revealed that there was significant difference between mean income of farmers who engaged in value addition and their counterpart who did not engaged in value addition at 1% level. Therefore,

it is fair to state that the income level of farmers that engaged in cassava value addition is higher than the income level of their counterpart who

did not practice value addition in the study area. This is in agreement with the findings of Anyiro and Onyemachi (2014)

Table 5. Independent sample t-test results on the Income of Cassava Value Addition Farmers and Non- Value Addition farmers

Variable	N	Mean Income	Standard Error	Mean Diff	t-value	P-value
Value Addition Farmers	156	200567.3	3340.1	78143	23.39	0.000
Non-Value Addition Farmers	156	122424.4				

Source: Field Survey, 2021.

3.4 Constraints/Challenges to Cassava Addition

The results according to challenges/constraints as presented in Table 6 shows the 19 major constraints/challenges confronting small scale cassava farmers in the study area. The severity of the constraints/challenges were determined based on percentage and frequency of very serious and serious constraints. From the 19

constraint identified, the more severe constraints ranges from 78(50.0%) to 90(57.7%), while the less severe constraints ranges from 3(1.9%) to 25(16.0%). The result further revealed that 11 items have been found out to pose severe (very serious +serious) threat to the respondent in the study area.

Table 6: Constraints/Challenges to Cassava Value Addition in the study area

S/N	Constraints militating against cassava value addition	Very Serious	Serious	Less Serious	Not Serious
1	High cost of processing inputs	73(46.3%)	71(45.5%)	10(6.4%)	3(1.9%)
2	High cost of transportation	51(32.9%)	86(55.1%)	12(7.7%)	7(4.4%)
3	Increased tax on processed cassava	11(7.0%)	34(21.7%)	61(38.8%)	50(32.0%)
4	Household preference for consumption of processed cassava products	64(40.8%)	72(46.1%)	12(7.6%)	9(5.4%)
5	Poor storage facilities and techniques	56(35.8%)	81(51.2%)	15(9.6%)	4(2.5%)
6	High interest rate on borrowed money for the processing business	54(34.6%)	82(52.8%)	11(7.0%)	9(5.8%)
7	Fluctuation in the price of processed cassava	22(14.1%)	32(20.4%)	63(39.7%)	50(32.2%)

8	Poor road network for transporting fresh and Processed cassava products	60(38.4%)	65(46.8%)	20(13.3%)	12(7.6%)
9	Low acceptability of the processed cassava Products in the market	4(2.5%)	10(6.4%)	80(51.3%)	62(39.7%)
10	Unstable market for the products in the area	6(3.8%)	40(25.5%)	57(36.5%)	54(34.6%)
11	Lack of technical know-how to adopt cassava value addition	50(32.0%)	71(45.7%)	25(16.0%)	10(6.4%)
12	Shortage of labour	24(15.3%)	27(17.3%)	30(19.2%)	76(48.7%)
13	Poor quality of the processed cassava products	8(5.1%)	20(12.8%)	80(51.2%)	49(31.4%)
14	Preference for close substitutes such as wheat and semolina	81(51.9%)	56(36.5%)	14(8.9%)	6(3.8%)
15	Lack of capital for business expansion	92(58.6%)	54(34.5%)	7(4.5%)	3(1.9%)
16	Lack of access to such as cooperatives, extension services	54(34.6%)	82(52.6%)	14(8.9%)	6(3.8%)
17	Lack of access to market information by the processors	5(3.3%)	12(7.7%)	78(50.0%)	62(39.7%)
18	High perishability of cassava tubers	60(38.4%)	75(48.0%)	14(8.9%)	7(4.5%)
19	Insufficient extension agents to teach new innovations in cassava processing	63(40.1%)	66(42.2%)	16(9.6%)	11(7.0%)

Source: Field Survey, 2021

These items include high cost of processing inputs (91.8%), high cost of transportation (88%), household preference for consumption of processed cassava products (86.9%), poor storage facilities (87%), poor road network for transporting fresh and processed cassava products (85.2%), preference for close substitutes such as wheat and semolina (88.4%), lack of capital for business expansion (93.1%), insufficient extension agents to teach new innovations in cassava processing (82.3%), high interest rate on borrowed money for the processing business (87.4%), lack of technical know-how to adopt cassava value addition (77.7%) and lack of access to supporting facilities such as cooperatives and extension

services (87.2%) were the constraints hindering the respondent from adding value to their farm products. This is line with the findings of Odebode. (2008). who revealed that the problems encountered by cassava processors in Oyo State of Nigeria include high cost of processing equipment, transportation difficulties, poor infrastructural facilities, poor access to market, lack of fund and poor storage facilities.

4. Conclusion and recommendations

The study examined the effect of cassava value addition on the income of small scale farmers in Oshimili North, Delta State. Results on socioeconomic characteristics indicated that

majority (67%) of the respondents are males, 48.7% of the respondents are between 38-47 years, 72.7% were married and about 58.3% of the respondents do not have access to credit facility. On education, about 44% and 29% of the cassava farmers had secondary and primary education respectively. About 57% of the respondents had less than or equal to 5 members in their household. Majority of the respondent (61%) have been farming for over 11 years and above. The result on various types of cassava by-product revealed that garri, fufu, cassava flour and cassava chin chin, with 17.1%, 16.1%, 12.9% and 10.9% respectively were the most processed in the study area. Probit regression model shows that gender of household head, age of household head, educational status of household head, farm size of household, farming experience, access to credit facilities and membership of cooperative have influence on farmers' decision to practice value addition in Oshimili North, Delta State. The independent sample t-test results on the difference in the income of farmers due to value addition indicated that there is a statistical significant difference between the mean income of farmers who practice value addition and farmers who did not. In other words, the income of farmers who practice value addition is higher than the income of farmers who did not practice value addition. Lastly, the result on constraints/challenge to cassava value addition revealed that 11 out of 19 constraints pose severe threat to value addition in the study area. The practice of value addition among the small scale farmers is still relatively low; farmers still produce and process cassava as a subsistent crop. Also, despite the significant difference in income, there are still farmers who do not practice value addition.

In order to improve the practice of value addition among the farmers, extension agent should be trained and empowered to effectively create awareness about the importance of cassava value addition and the need for farmers and other stakeholders in cassava production to embrace

such practices. This can be achieved by distribution of improved cassava variety, training and demonstration on the technical know-how of processing different types of cassava by-product. Farmers and other local leaders should be encouraged on cooperative membership. This will enable them to have timely access to agricultural/processing inputs at subsidized rates, funds and materials needed for production and processing. Processing centers should also be established to enhance cassava value addition and accessible road networks to markets/end users which will increase income of cassava farmers in the study area. Furthermore, access to credit facilities cannot be over-emphasized. This will make the practice of value addition more viable.

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