INTENSITY AND PROFITABILITY OF SMALLHOLDER CASSAVA FARMERS PARTICIPATION IN VALUE ADDITION IN AFIJIO LOCAL GOVERNMENT AREA OF OYO STATE, NIGERIA

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Abstract: *This study investigated the intensity and profitability of smallholder cassava farmers' involvement in cassava value addition in Afijio Local Government Area of Oyo State, Nigeria. Data were collected from 150 cassava farming households through the use of a well-structured questionnaire and employing a simple random sampling procedure. The data collected included information on the socioeconomic characteristics of the respondents, intensity of value addition among the respondents, factors influencing their decisions to add value as well as the extent of value addition, profitability of cassava value addition and the factors that determined the profitability level of the enterprises. The data were analyzed using the descriptive statistics for profiling the socioeconomic characteristics of the respondents, gross margin was used to measure profitability, and ordinary least squares regression model was used to determine the factors influencing the decisions of smallholder cassava farmers to add value to cassava as well as the extent of value addition among them. The results revealed that majority of the respondents were females (52.7%) with average age between 31-40 years of age while the average household size (52.7%) is between 6-10 members. Regression analysis of the determinants of the intensity of value addition revealed that the decisions to add value to cassava as well as the extent to which value was added were influenced positively by educational attainment, household size, and years of experience in cassava value addition. Results of the gross margin analysis revealed a positive return on variable costs thus indicating that the cassava value adding enterprise is a profitable one. These findings presented the need for all the stakeholders concerned to focus their attentions on proffering solutions to the challenges faced by cassava processors within the minimum time possible.*

Keywords: *Cassava, Cassava Processors, Profitability, Smallholder farmers, Value Addition.*
(JEL CODE: L11, M11, M21, Q13, R32)

INTRODUCTION

In sub-Saharan Africa, the agricultural sector is the key sector for rural development. Majority of rural household dwellers, who represent 70% of the poor, depend upon agriculture for their livelihood (Diao et al., 2010). Thus agriculture primarily contributes towards economic development of most African countries by reducing poverty as well as creating employment opportunities (FAO, 2012; World Bank, 2008). Currently, about half of the world's production of cassava is in Africa (FAO, 2018).

Cassava is cultivated in around 40 African countries, stretching through a wide belt from Madagascar, in the southeast to Senegal and Cape Verde in the Northwest. Food industry accounts for around half of the total global cassava consumption followed by feed industry. Region-wise, Nigeria is the world's leading producer of cassava accounting for around fifth of the world's production followed by Thailand, Indonesia, Brazil, Ghana, Congo and others (FAO, 2018). Throughout the forest and transition zones of Africa, cassava is either a primary staple or a secondary staple food. Cassava has the potential to increase farm incomes, reduce rural and urban poverty and help close the food gap.

Without question, cassava holds great promise for feeding Africa's growing population. Cassava can be produced with family labour, land and a hoe, making it an attractive and low-risk crop for farmers. Furthermore, cassava is available to

low-income rural households in the form of simple food products which are significantly cheaper than grains such as rice and wheat. Similarly, urban households in many parts of West Africa consume cassava in the form of gari (Nweke, 2001).

Cassava production is vital to the economy of Nigeria as the country is the world's largest producer of the commodity, with about 50 million metric tons annually from a cultivated area of about 3.7million hectares, accounting for cassava production of up to 20 percent of the world's, about 34 percent of Africa's and about 46 percent of West Africa's production (FAO, 2020). The growth in Cassava production in Nigeria has been primarily due to rapid population growth, large internal demand, availability of high yielding improved varieties and the existence of a relatively ready market. Table 2 (see appendix) shows the trend of cassava production in Nigeria from 2007-2017. Nigeria's cassava production moved from about 43 million tonnes in 2007 to an unprecedented 59 million tonnes representing 20.4% of global production in 2017.

Estimates of industrial cassava-use suggest that 165,000 metric tonnes of cassava root production was utilized as an industrial raw material in 2014 in Nigeria, representing just 0.3% of the total reported by FAO. The majority of agricultural produce in Nigeria is sold raw and at the farm gate leading to lower returns to the farmers. It is estimated that over 50 percent of farm produce in the Nigerian agricultural sector is rural-based and below commercial value. However, potentials exist for improved returns and income from value addition in the agricultural sector, which involves the development of new products and creating remunerative markets for higher value agricultural commodities. Value addition is important for raising the livelihood of smallholder farmers in Nigeria (Adeyemo et al., 2019).

Arising from the preceding points, this study will therefore attempt to provide answers to the research questions listed below;

1. To what extent are farmers involved in value addition in Afijio Local Government Area?
2. What are the determinants of cassava value addition among smallholder farmers in Afijio Local Government Area?
3. How profitable is cassava value addition enterprise on the basis of the intensity of smallholder cassava farmers in Afijio Local Government Area?
4. What effect does value addition have on profitability of cassava farmers in Afijio Local Government Area?

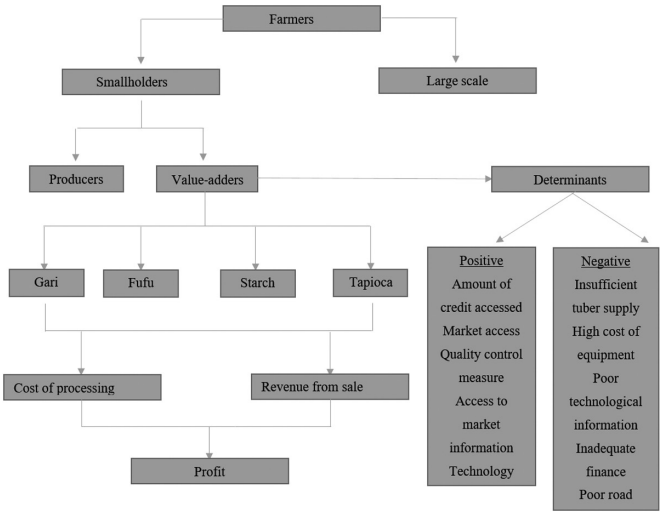
MATERIALS AND METHODS

The study area

The study was conducted in Afijio Local Government in Oyo State, Nigeria. Oyo state is one of the 36 states in Nigeria; it is located in south-west geopolitical zone of the country. Geography of Oyo state covers 28,454 square kilometers (Nigeria-Galleria, 2022). It is bounded in the south by Ogun State and in the north by Kwara State, in the west by the Republic of Benin while in the east it is bounded Osun State. Oyo State has a totality of 33 Local Government. Administratively, it has 33 local government areas which are then grouped into four Agricultural zones done by Oyo State Agricultural Development Programme (OYSADEP), namely; Ibadan-Ibarapa, Oyo, Saki and Ogbomoso zones.

Agriculture is the major occupation of the people and subsistent agriculture is prevalent. The climate in the state favours the cultivation of crops such as: maize, cassava, yam, kola,vegetable, plantain and cowpea. Afijio is a local government area in Oyo State with its headquarters in Jobele town. It has an area of 722km² and a population of 134,173 at the 2006 census. Afijio local government is subdivided into 10 wards, which are: Ilora I, Ilora II, Ilora III, Fiditi I, Fiditi II, Aawe I, Aawe II, Jobele, Iware and Imini (NigeriaGalleria, 2022). The indigenous of Afijio local government are mostly farmers and the area is blessed with vast agricultural products such as maize, cassava, yam and so on. Cassava is the major tuber crop produced by almost every household in Afijio local government area, hence the choice of the crop.

Figure 1: Conceptual Framework of the Intensity and Profitability of Cassava Value Addition



Source: Adapted from Author's Compilation, 2022

Research Design/Sampling Technique/Data Collection

The survey method of design was adopted for the study. The study adopted the random sampling procedure in selecting the respondents which are the cassava farmers/processors. Primary data was generated through the use of interview and well-structured questionnaires that was administered to the respondents to access information on various determinants of the intensity of cassava value addition and profitability in the study area.

Data Analysis

A combination of analytical tools was employed to analyze the data collected in the study. These include the descriptive statistics, such as tables of frequencies, means, standard deviation and so on which were used to profile the socio-economic characteristics of the respondents.

Descriptive Statistics

The descriptive statistics was used to analyze data on basic characteristics of the sampled household such as socioeconomic characteristics, farm size, age, sex, educational attainment. These results were presented in frequencies, percentages and means.

Intensity Ratio

This was used to determine the extent to which value was added to cassava.

$$\textit{Intensity ratio} = \frac{\text{Total quantity of value added product}}{\text{Total quantity of cassava produced}}$$

Ordinary Least Squares Regression Model

Ordinary least square regression analysis was used to determine the various socio-economic, institutional and market factors determining the decision to add value to cassava and also the extent to which value is added to cassava by the respondents.

It is expressed as follows:
$Y = \beta_i X_i + \varepsilon_i$
Where Y= intensity of value addition as the dependent variable,
$X_{(i)}$= smallholder characteristics and
ε_i is the error term.
X_1=age of the respondents
$X_{(2)}$=household size
X_3=cooperative society
X_4=cassava farming experience
X_5=proximity to the nearest market
X_6=sex
X_7=farmland size
X_8=credit access
X_9=access to market information
X_{10} =level of education
X_{11}=extension access

In the second step the Inverse Mills ratio (IMR) is added as a regressor in the extent of value addition equation to correct for potential selection bias. After estimating the determinants of the decision to add value, then the mills ratio from the selected equation is used as an independent variable in the target equation to assess the determinants of the extent of value addition. This is expressed as follows:

$$E(Z_i| Y=1) = f(x_i\beta) + y\lambda + u_i$$

Where E is the expectation operator
Z_i is the extent of value addition measured by the proportion of cassava output to which value was added.
x is a vector of independent variables influencing the extent of cassava value addition.
B is a vector of the corresponding coefficients to be estimated.

Gross Margin Analysis

Gross margin analysis was computed to evaluate the profitability of both the value added cassava products and the unprocessed raw tubers to assess the level of profitability. The gross margin was determined using the data obtained on variable cost incurred and the revenue realized.

The cost and return analysis of the cassava value addition enterprise was carried out using the GM= TR-TVC of production. This was done in order to ascertain the profitability of cassava processors in the study area. Profitability measures how profitable the cassava value addition enterprises are; a profitable enterprise must have TR>TVC with a positive Gross Margin. This further explains that cassava processing is profitable supporting the study conducted by Achem et al., (2013).

RESULTS AND DISCUSSION

Table 1: Socio-economic Characteristics of the Respondents

Variable	Frequency	Percentage
Age of respondent		
≤ 30	16	10.7
31-40	55	36.7
41-50	42	28.0
51-60	24	16.8
> 60	13	8.7
Total	150	100
Mean	44.21(±11.73)	918.47
Sex		
Male	55	47.3
Female	95	52.7
Total	150	100
Mean	1.53(±0.501)	
Marital status		
Never married	6	4.0
Married	140	93.3
Widowed	3	2.0
Divorced	1	0.7
Educational Attainment		
No formal education	10	6.7
Vocational	12	8.0
Primary	57	38.0
Secondary	49	32.7
NCE	13	8.7
OND	4	2.7
Degree	5	3.3
Total	150	100
Household Size		
1-5	67	44.7
6-10	79	52.7

>10	4	2.7
Mean	5.88	
Total	150	100
Years of farming experience		
<10	46	30.7
11-20	49	32.7
21-30	38	25.3
31-40	15	10.0
>40	2	1.3
Total	150	100
Farm size (acres)		
1-5	86	57.3
6-10	27	18.0
11-15	11	7.3
>15	26	17.3
Total	150	100
Major crop produced		
Cassava	138	92.0
Maize	6	4.0
Yam and others	6	4.0
Total	150	100
System of production		
Mixed farming	56	37.3
Mixed cropping	60	40.0
Mono cropping	34	22.7
Total	150	100
Size of farmland allocated for cassava		
1-5	111	74.0
6-10	26	17.3
11-15	9	6.0
>15	4	2.7
Total	150	100
Formal training		
Yes	37	24.7
No	113	75.3
Total	150	100
Years of experience in value addition		
1-10	87	58.0
11-20	44	29.3
21-30	14	9.3
>30	5	3.3
Total	150	100
Cooperative society		
Yes	31	20.7
No	119	79.3
Total	150	100
Primary occupation		
Farming and processing	80	53.3
Artisan	38	25.3
Trading	21	14.0
Civil servant	11	7.3
Total	150	100
Secondary occupation		
None	51	34.0
Farming and processing	69	46.0
Artisan	11	7.3
Trading	15	10.0
Civil servant	4	2.7
Total	150	100

Source: own construction based on questionnaire, 2022

The results obtained in Table 1 showed that the mean age of the respondents in the study area is 44.21years with a standard deviation of 11.73years. Majority of the respondents (36.7%) were between 31 and 40 years old. This implication of this result is that a large number of the respondents are not too old and are in their productive and working age population.

Gender distribution of the respondents in the study area showed that 52.7% were females while 47.3% were males. This agrees with the study of Falola et al., (2015), which claims that value addition is female-dominated. The results also gave the statistics on the marital status of the respondents as (93.3%) married, while rest are either single, divorced or widowed. The results also indicated that 38.0% of the respondents acquired only primary education while 32.7% were educated up to secondary school level, 8.0% acquired vocational education and only 3.3% had degree. The low level of education among the respondents could have a serious implication on their ability to access information, use new technological innovations and even access to credit facilities from financial institutions. Majority of the respondents (97.4%) have their household size ranging between 1 to 10 members, these results suggest the availability of family labour that could engage in cassava value addition and hence saving the cost of hiring labour by the respondents.

The results on Table 1 revealed that 30.7% of the respondents had 1 to 10 years of farming experience, 32.7% had 11 to 20 years of farming experience, 25.3% had 21 to 30 years farming experience while 13.3% had 31 and above years of farming experience. This could be an indication of a higher involvement in cassava value addition. Majority of the households in the study area (57.3) own between 1 to 5 acres of land, 18.0% own between 6 to 10 acres, 7.3% own between 11 to 15 acres while 17.3% own above 15 acres of land. Of the total acreage own by these farmers, 74.0% allocated between 1 to 5 acres for cassava production while 17.3% allocated between 6 to 10 acres for cassava production. These figures indicated that majority of the respondents in the study area are smallholder farmers which could negatively affect the level of produce available for value addition.

The major crop produced by the farmers in the study area was cassava with a percentage of 92 while maize was the next after cassava. The system f production adopted by majority of the respondents in the study area was mixed cropping 60%, followed by mixed farming 56% while only a few of

the respondents practiced mono-cropping. From the analysis, 75.3% of the respondents had no formal training in agriculture while 24.4% had formal training in agriculture. This may be attributed to the low level of education among the respondents. Out of the 150 respondents that took part in this study, only 20.7% belong to a cooperative society while 79.3% do not belong to a cooperative society. This may be a result of social constraints encountered in the society as belonging to a cooperative society will avail them the opportunities to access loans, credits and improved inputs easily.

Intensity of Cassava Value Addition

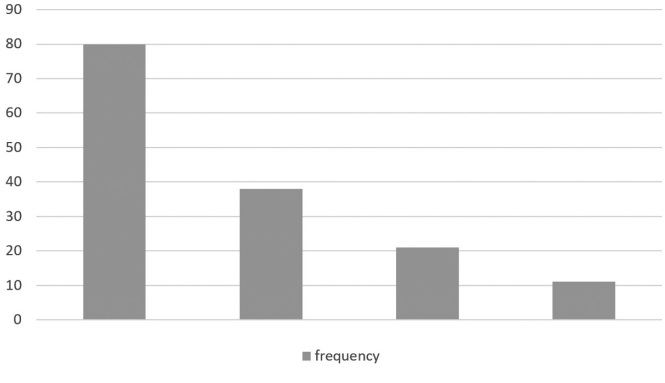
Table 2 represents the distribution of the respondents based on the total quantity of cassava processed to total value of cassava produced. The result in Table 2 showed that majority (47.3%) of the respondents in the study area were highly involved in cassava value addition, 28.7% processed above average while 24% processed between less than 0.25% and 0.5%. This is an indication that a large number of the farmers processed above half of the quantity produced and hence a high involvement in value addition. The farmers' high level of involvement in cassava value addition offers the opportunities for increasing their farm income.

Table 2: Distribution of the Intensity of Value Addition by Respondents

Variable	Frequency	Percentage
Intensity ratio		
0-0.25	6	4.0
0.251-0.50	30	20.0
0.51-0.75	43	28.7
0.751-1.0	71	47.3
Total	150	100

Source: own construction based on questionnaire, 2022

Figure 2: Distribution of the intensity of value addition by respondents



Source: own construction based on questionnaire, 2022

Profitability of Cassava Value Addition Enterprise

Table 3: Total Cost and Returns of Cassava Value Addition Enterprise

Variable	Values
Total revenue (TR)	90,823,640
Total cost (TVC)	23,854,000
Gross margin (GM)	66,969,640

Source: own construction based on questionnaire, 2022

Table 4: Gross Margin Analysis of the Enterprise

Variables	Observation	Minimum	Maximum	Mean	Std. deviation
Total revenue	150	39,000	5,010,000	688,495.30	812,650.80
Total cost	150	10,000	1,296,000	175,380.00	165,714.00
Gross margin	150	23,500	3,960,000	489,479.20	627,133.18

Source: own construction based on questionnaire, 2022

The result of the Gross Margin analysis revealed that the cassava processors make huge profits per season. This could be inferred from the returns on variable costs being positive. These findings matched other studies conducted on gross margin where the authors found the returns on cost for value added cassava products (Achem et al., 2013). All the value added products were profitable from the result of the analysis and gari was the most profitable.

Keeping all other factors constant, cassava value adding enterprise is a profitable enterprise.

Table 5: Ordinary Least Square Regression Results for the Factors Affecting the Intensity of Cassava Value Addition

Variables	Coefficients	Std. Error	T	P >/t/
Age	-.0088*	.0072502	-1.21	0.233
Sex	.0440832	.0890507	0.50	0.624
Marital status	.1680608	.1584007	1.06	0.296
Educational attainment	.00819502**	.0393544	2.08	0.044
Household size	.084295***	.0308763	2.73	0.010
Years of farming experience	-.0081752*	.0079605	-1.03	0.311
Farm size	-.0077364*	.0074526	-1.04	0.306
Farm size allocated for cassava	-.0105375	.0097527	-1.08	0.286.
Formal training	.0038168	.092937	0.04	0.967

Yrs of exp in value addition	.014928**	.0101403	1.47	0.150
Quantity of cassava produced	-9.93e-07*	3.59e-07	-2.77	0.006
Source of credit	.0437176*	.0372923	1.17	0.249
Nearness to market	.1921713	.0840588	-2.29	0.028
Extension contact	.092415	.1179392	0.78	0.438

*Note: ***=1%sig. level, **=5% sig. level; Prob>t=0.000;*
Source: own construction based on questionnaire, 2022

The results obtained from table above revealed that the level of involvement of smallholder farmers in cassava value addition is negatively influenced by the age of the respondents. This implies that the ability of the farmers to add value to more quantity of cassava declines as they get older.

The table also revealed that the educational attainment of the respondents is signifiant and positively related with the volume of cassava processed (β=.00819502, P=0.044). This is in line with the result obtained from the study conducted by Adeyemo et al., (2019). This means that the likelihood to process more volume of cassava increases with the level of education of the respondents.

There is a positive and highly significant relationship (P=0.010) between the quantity of cassava processed and the number of individuals in a household. This implies that an increase in the number of individuals per household increases the likelihood of the farming household to engage more in value addition process. This could also mean that a larger household size provides a greater opportunity for the household to engage more number of people in the value addition process.

The coefficient of farm size of the respondents was negatively and significantly related (P=0.3) to the level of involvement of smallholder cassava farmers in value addition. This explains that the larger the size of farmland available to the farmers for production processes, the lesser is the probability of the household to engage more in vale addition. This may also be related to the fact that farmers with a larger farm size would have to dedicate more of their time to production activities on the farm rather than engaging themselves in the value addition processes.

The quantity of cassava processed by the respondents in the study area is positively and significantly by year of experience of the respondents in cassava value addition. This means that as the number of years spent in the value addition chain increases, the likelihood of the respondents to increase their scale of production also increases. And hence the availability of more raw cassava tubers for processing.

The quantity of cassava produced is negatively and significantly related to the level of involvement of the respondents in the study area and this is against the findings from the study conducted by Falola et al., (2015). This means that the higher the quantity of cassava produced by the respondents in the study area, the leower is the probability of the respondent to participate more in cassava value addition. This may be a result of the fact that a farmer with a larger quantities of output may find it difficult to process all due to the perishability nature of cassava or labour shortage, and hence decides to sell it off at farm gate prices.

CONCLUSION AND RECOMMENDATIONS

The study revealed that the decisions to add value to cassava as well as the extent to which value was added to cassava were influenced by various factors which could be positive or negative. Age, years of farming experience, farm size, quantity of cassava produced all had negative impacts on the intensity of cassava value addition in the study area, meaning that they reduced the extent to which value was added to cassava in the study area. the positive factors such as educational attainment, household size, years of experience in cassava value addition. Extension contact and intensity ratio all increased the level of intensity of cassava value addition.

It can be inferred from the study that cassava processors with large intensity ratios had higher gross margin. This justifies the study conducted by Mugonola et al., (2017) that cassava processing enterprise was profitable. The study recorded high profit margin among respondents with high intensity ratios despite the fact that majority of these respondents operated using localized method of processing cassava. This is an indication that the respondents can do better in terms of their profit level if modernized method of processing was adopted since this has the potential for reducing costs incurred during the course of processing and improve the level of their output in terms of efficiency.

In light of the above conclusion, the following recommendations are made:

- More farmers, especially the youths should be encouraged to engage in farming and cassava value addition. As this will also influence greatly the volume of value added.
- There is need for all the stakeholders concerned to focus their attentions on proffering solutions to the challenges faced by cassava processors within the minimum time possible.
- It is also recommended that farmers should be more organized in order to develop integrated ways of obtaining production and marketing information system. This would militate against the problem associated with getting buyers for their products.
- It is also recommended that government should provide more funding for agricultural researches and increase the number of extension agents.

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