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Comparative Analysis of the Profitability of Cassava Value Added products in Ondo State, Nigeria

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Abstract: Value addition in agriculture remains an icing on the cake, and a sustainable pathway to economic growth and investment. However, in the quest to add value to agricultural produce, profitability is a great criterion to the choice and preference of various value additions. This study compared the profitability of value-added cassava products in Ondo state, Southwest Nigeria. Multistage sampling procedure was used to select 110 respondents. Primary data were collected and analyzed using both descriptive and inferential statistic (Profitability/Budgetary analysis and ANOVA). The results revealed that cassava roasted granules, Fufu and cassava flour were the common cassava value addition. Results of the profitability analysis revealed that processing cassava to pupuru (GM = ₦11,520) and cassava flour (GM = ₦10,860) were the most profitable cassava value addition. Lack of adequate technologies ($\bar{x}$ = 0.96) and poor extension services ($\bar{x}$ =0.93) were the major constraint to cassava value addition. Also, there was no significant differences (F = 3.107, $\rho \geq 0.05$) in the profits from the value-added products across the communities. The study therefore concluded that value addition is profitable in cassava, hence concerted efforts should be made by stakeholders in encouraging and enhancing value addition policies for agricultural produce especially cassava.

Keywords: bioeconomy; Cassava; economic growth, investment, value-addition; profitability analysis; Gross Margin;

I. Introduction

Cassava *(Manihot esculanta)* is one of the world's most important food crops appreciated as a 21st century crop mostly grown by smallholder farmers [1,2] as a result of its high drought resistance and profitability. In Africa, it is second most important staple food in terms of per capita calories consumed which makes it hold great promise for feeding Africa's growing population [1]. Apparently in Nigeria, as it is in most developing countries, it is one of the most important carbohydrate sources. Cassava is ranked very high among the most important root crops in Nigeria and is of great importance for resource poor farmers.[3] reported that even though cassava is handled differently, cassava remains a popular staple crop in Nigerian families across all cultural and social groups. It gives a carbohydrate production, which is about 40% higher than rice and 25% more than maize which are both common in the Southwest region of Nigeria.

Cassava is one of the resourceful agricultural produce with holistic utilization. The peels of the tubers are used in ruminant livestock feeding while the tuber (white part) can be processed into several end products often referred to as value addition. In addition to the traditional food recipes, which include *garri (roasted granules), foo-foo*, *lafun*, flour and tapioca[4], cassava can be processed into other products like dried chips and pellets, starch, glucose syrup, ethanol, high quality cassava flour (HQCF), and glue for industrial use[5,6]. Some of these value-added products are highly demanded by some countries which forms basis for exportation and inclusion in the world market for countries like, Thailand (being the leading exporter of cassava), Vietnam and Cambodia [7].

The implementation of an agricultural promotion policy "Agricultural Transformation Agenda" (ATA), with the guiding philosophy of viewing agriculture as a business in Nigeria, conceptualize the cassava value addition as an agribusiness within the agricultural value chain [8]. However, in any business or investment with agribusiness inclusive, profit making is a top-ranked goal for any investor or entrepreneur as it is directly proportional to the survival of the business [9]. According to [10], profitability is a measure of the relationship between the level of profits earned during an accounting period and the level of resources committed to earn those profits, so it is an important analysis in any business or enterprise. Therefore, considering the numerous forms of cassava value added products of cassava in South West region of Nigeria, which the famers and investors are left with choice of investment or involvement in, there is need to evaluate and compare the profitability of these multiple choice value addition.

Despite the government and other stakeholders attempt to encourage value addition of agricultural produce as a strategy to post-harvest loss reduction, food security enhancement and income diversification, many studies have focused on conducting

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research on the profitability of cassava production and processing generally such as efficiency and profitability of small-scale cassava production [11]; comparative cost and return analysis of cassava production by adopters of various species [10] and profitability of cassava processing [12] with little or no research on the profitability of the cassava value addition.

It is based on this interest that the broad objective of this study was to comparatively analyze the profitability of value addition to cassava in Ondo State, Southwest Nigeria. The specific objectives of the study include to:

i. ascertain the socio economic characteristics of the respondents;
ii. identify the types of value addition to cassava in the study area;
iii. Compare the profitability of the different types of value addition to cassava; and
iv. identify the constraints to cassava value addition.

II. Methodology

Study area

The study was carried out in Akure South and Akure North Local Government Areas of Ondo State. Ondo State is located in the South West part of Nigeria which lies between latitudes 5º45' and 7º52'N and longitudes 4º20' and 6º5'E. Its land area is about 15,500 square kilometres. The state has a total population of about 3.4 million inhabitants [13] and with a predominant occupation of farming especially in the rural communities following its favourable climatic condition. The tropical climate of the state is mainly of two seasons; rainy season (April-October) and dry season (November-March). The temperature ranges between 21℃ and 29℃ and humidity is relatively high.

Sampling Technique

Multi-stage sampling procedure was used to select the respondents for the study. At the first stage, two (2) Local Government Areas (Akure South and Akure North) with a high presence of cassava processors was chosen purposely for this study. At the second stage, purposive sampling techniques was used to select two communities (Iju and Ogbese (Akure North) and Shagari and Oda (Akure South) from each of the Local Government Areas, thus we have four (4) communities. At the third stage, snowballing sampling technique was used to select thirty (30) cassava processors in each of the four (4) communities, thus making a total of one hundred and twenty (120) cassava processors for the study. However, after proper scrutiny and evaluation, only one hundred and ten (110) instruments retrieved from the respondents was found fit for achieving the objective of the study. Hence, this made up the eventual sample size for the study. Primary data was used for the study and were collected through an interview schedule.

Conceptual Framework

The concept of this study is drawn on the premise that profitability accentuates the decision to engage or invest in any cassava value addition. The study comprised of three variables; the independent variables, dependent variable and intervening variables (figure 1). The independent variables of the study were the socioeconomic characteristics of the respondents; the types of value addition engaged in; the constraints faced in the value addition process and the production variables which also served as the parameters to measure the dependent variables (profitability of the value addition). The socio-economic characteristics could predict the type of value addition respondents engages in and the type of value addition will inform the constraints that will be faced by the individual as well as the production variables and profitability measurement indicators. The utilization of the profitability analysis shown below now helps to classify the value addition as been profitable (high or low) or not profitable.

Data Analysis

The data were analyzed using both descriptive (frequency distribution, means, standard deviation) and inferential statistics. Inferential statistics (Profitability/Budgetary analysis and Analysis of variance).

Budgetary Analysis

Farm gross margins (GM) analysis is a straightforward method for comparing the performance (profitability) of enterprises with similar requirements for capital and labour. The gross margin is calculated as follows:

GM= GR - TVC

TVC= TOC + TLC

TC= TVC + TFC = TOC + TLC + TFC

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The farm net margin (NM) and the return on investment (ROI) are calculated as:

NM= GM – TFC; and

ROI = NM/TC

Where;

GM=Gross Margin; GR= Gross Revenue or Gross Income;

TVC= Total Variable Cost; TOC= Total Operating Cost; and TLC= Total Labour Cost

Total cost of production (TC); TFC= Total Fixed Cost;

NM= Net Margin; ROI= Return on Investment.

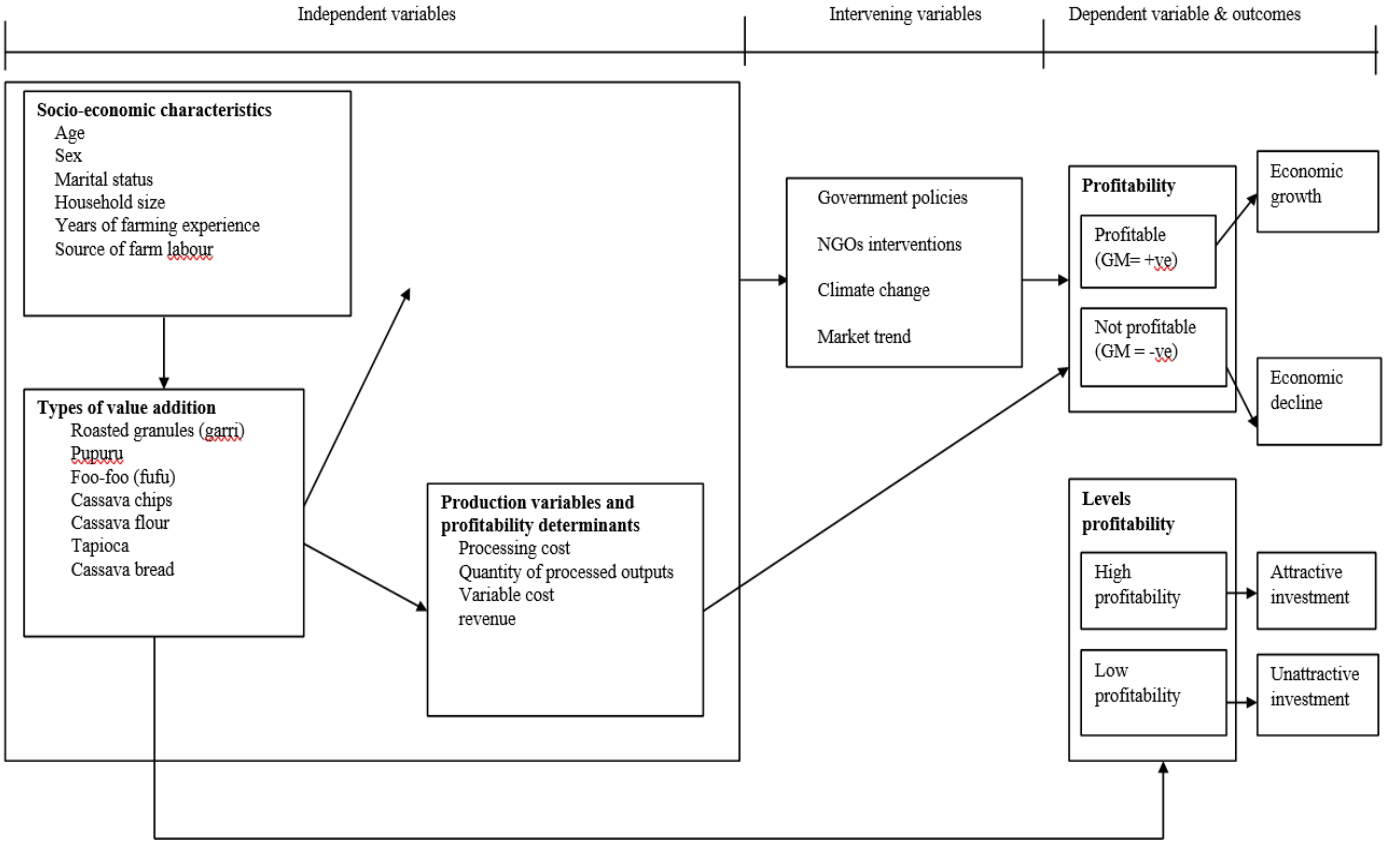

Figure 1: Conceptual framework for Comparative Analysis of the Profitability of Value Addition to Cassava in Ondo State, Nigeria

III. Results and Discussion

A. Socio-Economic Characteristics of Respondents

The results presented in Table 1 show that 60.9% of the respondents were female which implies that women dominates the cassava processing sector, the result is in agreement with [14], who reported that female dominates cassava production and processing in Ondo State, Nigeria. Majority (69.1%) of the respondents were married. The average age of the cassava processors in the study area was 49 years old which connotes that the processors involved in the cassava value addition were still young and in their productive age, hence technologies to enhance their productivity could be successfully introduced and adopted. This result also justifies the right population for the study as they could provide correct information for the achievement of the research objectives.

Furthermore, Table 1 indicates that about 76.0% of the respondents had formal education. The average household size of the respondents was also found to be 6 persons. This implies that the farmers had enough hands within their household that could

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serve as labour and help in their activities. This is also in tandem with the finding of [11] who found out that the average household size of cassava farmers and processors in Ondo state was 6 persons. Table 1 further reveals that the average years of experience in value addition (cassava processing) was 23 years, 37.3% of the respondents had between 21 and 30 years of experience, 31.8% had between 11- and 20 years while 66.4% and 14.5% of the respondents had been in the cassava processing business within 1-10 years and 31 years and above respectively. The long years of experience is tangible in sustainability of production and productivity in there processing as opined by [15] that long years of farming could enhance efficient utilization of farm resources by small scale cassava farmers. Also, majority (80.9%) of the respondents used hired system of labour in their processing activities.

Table 1: Distribution of Respondents according to Socio-economic Characteristics

Variables	Frequency	Percentage	Mean
Sex			
Male	43	39.1	
Female	67`	60.9	
Marital status			
Single	5	4.5	
Married	76	69.1	
Divorced	7	6.4	
Widowed	16	14.5	
Separated	6	5.5	
Age (in years)			
25-34	5	4.5	
35-44	26	23.6	
45-54	41	37.3	49
55-64	35	31.8	
65 and above	3	2.7	
Level of Education			
No formal education	27	24.5	
Attempted primary school	4	3.7	
Completed primary school	13	11.8	
Attempted secondary school	15	13.6	
Completed secondary school	41	37.4	
Attempted tertiary education	5	4.5	
Completed tertiary education	5	4.5	
Household size (in persons)			
1-5	55	50.0	
6-10	49	44.5	6
>10	6	5.5	
Years of experience in cassava processing (in years)			
1-10	18	16.4	
11-20	35	31.8	23
21-30	41	37.3	
31 and above	16	14.5	
Source of Labour			
Family	19	17.3	
Hired	89	80.9	
Communal	1	0.9	
Friends	1	0.9	

Source: Field survey, 2019

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B. Types of Value Addition to Cassava adopted

The result in Table 2 reveals the varieties of ways the sampled population processes their cassava tubers as a means of value addition. Among the various types of cassava value added products, Garri, Fufu, Pupuru and Cassava flour were identified as the major products, with 100.0%, 91.8%, 58.2% and 76.4% respectively. This could be because of the high demand for these products by the consumers and their popularity gained in the study area and its vicinity, especially in the Southwestern part of Nigeria state (among the Yoruba tribe). The pupuru originates from the Ikale tribe and the riverside areas of the state, with a widespread of the delicacy within the state, farmers are largely into its processing. The reason for the low or non-engagement in other cassava value added products could be because some are not edible (starch, adhesives and livestock feeds) by human or because they are not on high demand (such as cassava bread, tapioca and cassava chips) since they have close alternatives (flour bread and plantain chips which are more common).

Table 2: Percentage Distribution of Respondents according to types of value-added products adopted

Products	**Yes**	**No**
	Frequency (%)	**Frequency (%)**
Fufu	101 (91.8)	9 (8.2)
Garri	110 (100)	-
Pupuru	64 (58.2)	46 (41.8)
Cassava flour	84 (76.4)	26 (23.6)
Cassava Chips	-	110 (100)
Cassava bread	-	110 (100)
Livestock feeds	1 (0.9)	109 (99.1)
Tapioca	-	110 (100)
Starch	38 (34.5)	72 (65.5)
Adhesive	1 (0.9)	109 (99.1)

Source: Field survey, 2019

C. Profitability analysis of Value Addition to Cassava

Table 3 shows the profitability of the various cassava value added products through the budgetary analysis using the Gross Margin (GM) as criteria for the comparative profitability. The table shows the Gross margins of processing cassava to Garri, Fufu, Pupuru, starch and cassava flour at a uniform quantity of 200kg of harvested cassava tubers. It was discovered that all the products were profitable following the fact that all the products have greater revenue than the Total variable cost (TVC). This finding agrees with [16] and [12] who found that the value additions to cassava were profitable in Southwest of Nigeria and in Benue State respectively.

However, processing cassava to pupuru gave the highest gross margin (₦11,520), cassava flour gave an average gross margin of (₦10,860) while Fufu had a gross margin of (₦6,005) even though the other two products were affirmed to be profitable also.The high profitability of Pupuru and cassava flour (lafun) could be attributed to the fact that it is not common in the market despite the demand for it by consumers unlike garri, fufu and starch, hence the high sales price leading to itshigher profitability relative to the quantity of outputs from the 200kg tubers processed.

Table 3: Profitability analysis of various value-added products according to their gross margin (at 200kg harvest rate)

Variables ($\bar{x}$)	**Products**				
	Garri	**Fufu**	**Pupuru**	**Starch**	**Cassava flour**
PC	₦3725	₦3100	₦3560	₦2950	₦3010
QO	125 congos	2 bags	110 congos	2.5 bags	108 congos
TVC	₦11600	₦11040	₦11610	₦10940	₦10695
R	₦15090	₦16730	₦22420	₦15110	₦21710
GM	₦2740	₦6005	₦11520	₦4020	₦10860

Note: PC= Processing cost, QO= Quantity of Output, TVC = Total Variable Cost, R = Revenue and GM = Gross Margin.

Source: Field survey, 2019

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D. Constraints to Cassava Value Addition

The result in Table 4reveals the constraints respondent's face in cassava value addition. It reveals that lack of adequate technology ($\bar{x}$ = 0.96), poor extension services ($\bar{x}$ = 0.93) and lack of modern processing facilities ($\bar{x}$ = 0.86) were identified as the three highly rated constraints faced by the respondents. This is in line with the findings of [17], who reported poor access to extension services and lack of adequate technologies/funding among others as constraints to cassava farmers production in Ondo state. This finding also corroborates the finding of [15] and [18] who found out that lack of processing facilities is a major constraint to cassava processor in Nigeria and inn Osun state of Nigeria respectively. It is therefore important to note that modern processing technology and dissemination by extension workers are essential to the improvement of cassava value addition in the state. Notably, unstable power supply ($\bar{x}$ =0.34) and inadequate cassava production ($\bar{x}$ =0.33) were not considered as constraints faced by respondents according to the study. This could be because power supply is not a major need for the products but rather heat energy (sunlight) and also the respondents had enough production from their farms because of access to land, free planting materials and less demanding management practices involved in cassava production unlike some other arable crops.

Table 4: Percentage Distribution of Respondents according to the constraints to cassava value addition (N=110)

Constraints	No	Yes	Mean	Rank
	Frequency (%)	Frequency (%)	$\bar{x}$	
Lack of adequate technologies	4(3.6)	106 (96.4)	0.96	1
Poor extension services	8 (7.3)	102 (92.7)	0.93	2
Lack of modern processing facilities	15 (13.6)	90 (81.8)	0.86	3
Lack of storage facilities	20(18.2)	90 (81.8)	0.82	4
Poor access to credit facilities	25 (22.7)	85 (77.3)	0.77	5
High cost of labour	23 (23.6)	84 (76.4)	0.76	6
High transport cost	31 (28.2)	79 (71.8)	0.72	7
Poor market prices	34 (30.9)	76 (69.1)	0.69	8
Poor transportation networks	35 (31.8)	75 (68.2)	0.68	9
Poor water supply	53 (48.2)	57 (51.8)	0.52	10
Inadequate cassava production	73 (66.4)	37 (33.6)	0.34*	11
Unstable power supply	74 (67.3)	36 (32.7)	0.33*	12

Note * connotes not a constraint ($\bar{x} \leq 0.5$)

Source: Field survey, 2019

IV. Conclusion and Recommendations

This study concludes that female dominates the cassava processing industry with majority of them still in their active age, possessing quality years of experience in the cassava processing firm. Fuu-fuu, Garri, cassava flour, pupuru and starch were the prominent cassava value added products engaged in by the farmers in the study area. This study also concludes that all the cassava value added products were profitable but however, the profitability compares shows that pupuru (GM = ₦11,520) and cassava flour (GM = ₦10,860) were the most profitable with highest ranking gross margin. Lack of adequate technologies, Poor extension services and Lack of modern processing facilities were the major constraints the processors encounter in their value addition activities.

Therefore, this study recommends that farmers, processors and even the youths should engage in agribusiness through value addition to cassava since they were found to be profitable in the study area. Also, extension service should be made available and accessible to the processors/ farmers with provision of adequate technologies and modern processing facilities to improve cassava value addition in the State.

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Conflicts of Interest: The authors declare no conflict of interest.

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