PROFITABILITY OF CASSAVA PRODUCTION IN ANAMBRA STATE OF NIGERIA

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Abstract

Cassava (Manihot spp.) is a very important and ubiquitous staple crop that plays a vital role in the food security of rural Nigeria. The youths in Anambra State are not willing to take cassava production as a means of livelihood because it is considered a non-profitable enterprise. This study estimated the gross margin of cassava farming in Anambra State as a second-best approach to determine the profit level of the enterprise. The specific objectives were to determine the expected input and output values of an average cassava farmer and apply Simulation technique to estimate the expected minimum, maximum and average gross margin of a typical cassava farmer in the state. Knowledge of the profitability of cassava production will assist the youths and prospective entrepreneurs in ranking cassava production properly among other candidate enterprises (for selection) for undertaking as a means of livelihood. The study used secondary cross-sectional data. The survey design was a multistage stratified sampling design. From the 21 LGAs of the state, 8 LGAs were selected for further sampling. The sample size of 543 was apportioned to the selected LGAs in proportionality to their sizes. In each of the selected LGA, systematic sampling was used to select the desired number of farmers from the sampling frame which was constructed by updating the listing of all VCDP beneficiary farmers in the LGA. The cassava producers in the sample were 244 farmers located in 7 LGAs. The data was collated and managed with Microsoft excel spread sheet and statistical analysis was carried out using the Statistical Package for the Social Sciences (SPSS). This study estimated the gross margin (GM) as total revenue (TR) minus total variable costs (TVC) that is GM = TR – TVC. Total revenue was calculated as the value of cassava sold plus the value of cassava consumed at home or given out as gifts. The variable costs in this study included values of: cassava cuttings, fertilizers applied, agrochemicals applied and aggregated labour. The cost of packaging and transportation were imputed because they were not captured in survey. The prices used were current market prices obtained during the survey. After 2000 iterations the resultant expected gross margin was estimated at ₦ 1,976,559.78 only with an average of the expected gross margins at ₦1,715,734.49; Simulation of the gross margin enabled important decisions namely; despite the fluctuations in yield and prices, the expected gross margin showed that the variable cost was fully covered in the cropping enterprise; since the average expected gross margin was ₦1,715,734.49, it indicated that the cassava production enterprise was profitable in Anambra state; the estimation of the expected minimum and the maximum values of the gross margin enabled visual presentation of the distribution; and enabled comparison of any amount with the classes of the distribution of the expected gross margin. Cassava production in the State was constrained by: advanced age of the farmers; the limited number of extension visits; very exorbitant cost of fertilizers, agrochemicals and labor; and nonavailability of farming loans. The study recommended that government should formulate policies that will attract youths into cassava farming and increase extension to farmer ratio, to improve the number of extension visits to cassava farmers in Anambra State.

Key words: Cassava, Monte Carlo Simulation, Iteration, Expected, Gross Margin

Background

Cassava (M*anihot spp.)* is a very important and ubiquitous staple crop that plays a vital role in the food security of rural Nigeria. It thrives in poor soils where other crops fail and it is tolerant to drought. Cassava's ability to flourish in various soil types, including those with low fertility and high acidity that are unsuitable for many other crops, is further enhanced by its climate resilience, tolerance to drought, and resistance to pests and diseases (Cock, J. H., and Connor, D. J. 2021). in addition, its unique ability to store roots underground post-maturity has augmented its popularity among smallholder farmers. The food and agriculture organization of the united nation database (FAOSTAT, 2009) indicated that Nigeria was the largest producer of cassava with 45,721,000, 43,410,000 and 44,582,000 tons in 2006, 2007, and 2008 respectively, and 59 million tons in 2017, making it the world's largest producer (apparently, 20 percent of global production (IITA, 2017)). The Federal Government of Nigeria (FGN), the states and local governments have been promoting the production of the crop through various agricultural development programmes. Since 2015, the Value Chain Development Programme (VCDP) which is a commercially oriented, market-led, demand-driven project designed to help farmers and processors respond to market needs of end-users of cassava commodities assisted by the International Fund for Agricultural Development (IFAD) has been supporting the production, processing and marketing of cassava and its bye-products in nine states of the Federation namely: Anambra, Benue, Ebonyi, Niger, Ogun, Enugu, Kogi, Nasarawa and Taraba states. In spite of the governments' support to encourage cassava production in Anambra State no study has been conducted to determine the profitability of cassava production in the VCDP areas of intervention in the state.

Statement of the Problem

Nigeria has been a leading producer of cassava. The crop and the bye products were mainly consumed as food by the populace. Urbanization and population explosion coupled with the concomitant pressure on land for food and aging of the farming population, increased the demand, but the youths were not willing to taking cassava production as a means of livelihood in Anambra State. It was considered as a non-profitable enterprise. This line of thought coupled to some non-salutary economic policies have unleashed hunger on the State. If the development is left unchecked, not only will the scarce foreign exchange be depleted on food importation, but the problems of youth unemployment, the menace of ingesting hard drugs, robberies, kidnappings and insecurity will be aggravated in the state. This study was aimed at determining the profitability of cassava farming in Anambra State to show that in spite of fluctuating input and output prices cassava production was still profitable and worthy of undertaking as a means of livelihood by the youths in the state. If adequate provisions are made for land and necessary input acquisition it is expected that the teeming population of unemployed youths will take up cassava farming as a means of livelihood.

The Objective

The main objective of this study was to carry out a gross margin analysis of cassava farming in Anambra State as a second-best approach to determine the profit level of the enterprise. The specific objectives were to determine the expected input and output values of an average cassava farmer and apply Monte Carlo Simulation techniques to estimate the expected minimum, maximum and average gross margin of a typical cassava farmer in the state.

Scope and Limitations of the Study

The Scope of the Study was limited to VCDP cassava farmers in Anambra State that participated in the rain-fed cropping season of 2024. The primary survey carried out by the VCDP in Anambra State did not have this study in mind, consequently some variables such as labour were overly aggregated and the value of production used at home or given out as gift, cost of packaging and transportation were not captured in the survey.

Significance of the Study

Adequate knowledge of the profitability of cassava production will assist the youths and prospective entrepreneurs in ranking cassava production properly among other candidate enterprises (for selection) for undertaking as a means of livelihood. The pursuit of cassava farming as a means of livelihood will assist in ameliorating the scourge of unemployment, which is one of the underlying causes of insecurity, robbery, kidnapping, prostitution, and other vices bedeviling the Anambra State.

Methodology

Study Area

Anambra is a state in the Southeastern region of Nigeria bordered by Delta to the west, Imo and Rivers to the south, Enugu to the east and Kogi to the north. The State is located between latitude 5^0 30' ' and 6^0 40' ' North of the equator and also between longitude 6^0 40' ' and 7^0 20' ' East of the Prime Meridian The state's capital is Awka and its most populous city is Onitsha. Its second most populous commercial city is Nnewi. The state covers a land area of 4,844 km^2 and the main languages of the State are Igbo and English. Anambra State has the following 21 local government areas (LGAs) namely: Anambra East, Anambra West, Ayamelum, Ogbaru, Onitsha North, Onitsha South, Oyi, Awka North, Awka South, Anaocha, Dunukofia, Idemili North, Idemili South, Njikoka, Aguata, Ekwusigo, Ihiala, Nnewi North, Nnewi South, Orumba North and Orumba South. (Nnamdi Azikiwe University, 2025). Agriculture is an important economic sector in Anambra. Oil palms, maize, rice, yams and cassava are among the crops grown. Fishing is also part of the economic mainstay of Anambra State more especially for communities along the riverine areas. Anambra is a home of innovation and creativity.

Sampling Design

This study used secondary cross-sectional data. The data was primarily collected in a survey carried out in eight LGAs in the state during the 2024 rain-fed cropping season by the state's VCDP. The LGAs were: Anambra East, Anambra West, Awka North, Ayamelum, Orumba North, Orumba South, Ihiala, and Ogbaru. The survey was referred to as, "Productivity and Gross Margin Analysis Survey". The survey was conducted electronically using a structured questionnaire and the electronic application was called "kobo application".

Table 1: Selected Cassava farmers by LGAs

LGA	Respondents	Percent
Anambra East	32	13
Anambra West	30	12
Awka North	26	11
Ihiala	38	16
Ogbaru	41	17
Orumba North	40	16
Orumba South	37	15
Total	244	100%

The survey design was a multistage stratified sampling design. In the first stage, 8 LGAs out of the 21 LGAs in the state were selected for further sampling. The sample size of 543 was apportioned to the selected LGAs in

proportionality to their sizes. In each of the selected LGA (stratum), systematic sampling was used to select the desired number of farmers from the sampling frame. The sampling frame was the updated listing of all VCDP beneficiary farmers in the LGA. The cassava producers in the sample were 244 farmers located in 7 LGAs namely: Anambra East, Anambra West, Awka North, Orumba North, Orumba South, Ihiala, and Ogbaru.. The data was collated and managed with Microsoft excel spread sheet and statistical analysis was carried out using the Statistical Package for the Social Sciences (SPSS). The sample cassava farmers were presented by their LGAs in table 1.

Literature Review

There were several studies related to Profitability Analysis of Cassava Production in Nigeria and elsewhere and notable ones include: Zakari, H.U et. al. (2016); Temitope O B (2025**),** Joyce D. M.et. al. (2023), and Audu, S.I., (2019). These studies used primary data collected from a sample of farmers using multistage sampling and purposive sampling designs. They adopted a comprehensive research approach by incorporating structured surveys and interviews such that data were gathered using a structured questionnaire from cassava farmers in their selected communities. Their sample sizes were greater than 150 respondents. The data were collated and processed using spread sheets and were analyzed using statistical packages. They generated descriptive statistics which were further analyzed by construction of farm budget, specification of production functions including the Stochastic Frontier Production Model. Zakari, H.U et. al. (2016) estimated the gross margin per hectare at ₦ 1, 615,812.72. The study concluded that cassava production was profitable in the study area.

Temitope O. B. et.al. (2025), evaluated the economic viability and production efficiency of cassava crop within smallholder farming systems in Ekiti State, Nigeria. The study captured information on socio-economic characteristics, cassava farming inputs and outputs, input costs, and tuber prices. Results of the study highlighted diverse profitability levels among cassava farmers and identified factors contributing to production inefficiencies. The results of the study showed that the total revenue generated by cassava farmers was ₦595,203.37, with a gross margin of ₦483,387.97 and a net profit of ₦482,488.08. The Net Return on Investment (NROI) indicated that for every naira spent on cassava production, farmers earned ₦4.28 in return. Joyce D. M.et. al. (2023), indicated that cassava farming among small scale farmers was a profitable and economically viable means of earning livelihood in Mubi metropolitan area. The gross margin was estimated at ₦127, 200.00 and net farm income was ₦107, 615.12. The study also noted that for every N1.00 invested in cassava farming there was a return of N1.40. The study revealed that the main constraints encountered by cassava farmers in the study area were inadequate capital, lack of improved post-harvest processing and storage facilities, lack of improved planting materials and poor access road to markets. Audu, S.I., (2019), indicated that from their study in Kogi State, the revenue recorded per hectare was ₦183,242.00 while variable and fixed costs were ₦67,616.00 and ₦2,522.00 respectively.

The gross margin and the net margin per hectare were ₦115,626.00 and ₦113,104.00 respectively. From studies conducted by the international Institute for Tropical Agriculture (IITA) in 2005, it was apparent that cassava was the staple food for over 50 million Nigerians; it provided more than 70% of their energy requirement. IITA also noted that over two- thirds of the total cassava produced in Nigeria was consumed in various forms that apart from its use as food, it was an important industrial raw material for the production of starch, flour, alcohol, chips, gum, paper, pellets, adhesive, confectionaries, pharmaceuticals and livestock feeds (IITA, 2005). As indicated by

IITA, the major constraints to cassava production were pests such as cassava green mite, cassava mealy bugs, and variegated grass hoppers among others (IITA, 2017). Mosaic, bacterial blight, anthracnose, and root rot were diseases that commonly affect cassava too. These in combination with poor cultural norms, can result in production losses of up to 50% in Africa (IITA, 2017). It was observed that in casting the enterprise budget to estimate the gross margin, these studies explicitly included the estimate of cassava consumed at home.

This estimate is very important bearing in mind that cassava is a staple food crop and was mainly consumed at home. The estimate of produce used in the farm was not captured in the "Productivity and Gross Margin Analysis Survey, 2025" in Anambra State. This study will adopt the methodology applied in these studies; however, it will impute the value of cassava consumed at home by assigning to it 50 percent of the difference in revenue between mean yield and quantity sold in the market. The other 50 percent will be attributed to losses such as post-harvest and storage losses. Secondly, it was observed that all the studies estimated the revenues, costs and gross margin deterministically as if there were no variations or fluctuations in prices and yields. This study will take into consideration the prices and yields' fluctuations, consequently will apply Monte Carlo Simulation techniques to take care of fluctuating prices and yields and estimate expected gross margin and its distribution.

Analytical Framework

The analytical framework of this study wsa secured on the theory of the firm specifically the Farm income analysis. Farm income analysis was well documented in economic text books. Notable among them include; Gittinger J.P. (1983), and Upton M. (2005). These authors have classical presentations on farm income analysis. According to Gittinger J.P. (1983) the objective of farm income analysis was to assess the current performance of the farm; the analytical period was usually one years or a production season; the numeraire was current market prices; capital items were incorporated through annual depreciation charges; the off-farm income was excluded while the production consumed at home was included and the value of money over time was undiscounted. The performance criteria /indicators included the gross margin and profits which could be estimated as a percentage of net worth; and return to capital and labour engaged on farm. This study assessed the average farm via the gross margin.

Gross Margin Analysis

According to (Upton, 1978), the gross margin (GM) is a measure of profitability in the short run. It is a very useful tool for comparative analysis of enterprises and farm planning. Economic theory asserted that the firm will stay in production once it was able to cover the variable costs hoping that over time as the surplus accumulates it will off-set the fixed costs (Henderson and Quandt, 2010). In line with Olukosi and Erhabor (2004) this study estimated the gross margin (GM) as total revenue (TR) minus total variable costs (TVC) that is GM = TR – TVC. Total revenue was calculated as the value of cassava sold plus the value of cassava consumed at home or given out as gifts (these were imputed and added). The variable costs were the costs that vary with the scale of operation. They were regarded as avoidable costs (Olukosi and Erhabor, 2004). The variable costs in this study included values of: cassava cuttings, fertilizers applied, agrochemicals applied and aggregated labour. The cost of packaging and transportation were imputed because they were not captured in survey. The prices used were current market prices obtained during the survey.

Monte Carlo Simulation and Risk Analysis

Monte Carlo simulation relies on repeated random sampling and statistical analysis to compute results. It is a type of random experiments. It may be considered as a methodical way of doing so- called "what-if" analysis. It overcomes the shortcomings of sensitivity analysis; the simulation involves three steps namely: (a) Specifying the probability distribution of the important uncertain components (prices and yields); (b) Specifying the correlations between the components; and (c) combining this information to generate the expected gross margin and the underlying probability distribution. Monte Carlo Simulation therefore involved:

i. identifying key determinant factors or variables of project costs and benefits;
ii. establishing the probability distributions of these variables;
iii. randomly selecting values of these variables from their probability distributions;
iv. combining these selected values with base case values of all other variables and parameters to estimate the expected gross margin;
v. repeating steps (3) and (4) numerous times to provide a large number of expected gross margin estimates and to establish their respective probability distribution.

When probability distributions of variables are unknown, the triangular distribution is applied as the second best. Three parameters completely describe the triangular distribution: the most likely value (the mode), the lowest possible value, and the highest possible value. The expected value of a triangular distribution is one-third of the sum of the three parameters. Simulation has the advantages of overcoming the shortcomings of sensitivity analysis and estimating more reliable expected gross margin. This study applied the Monte Carlo Simulation Analysis.

Results and Discussion

The frequency of response to some of the questions in the survey was computed using the SPSS analytical package. The variables were: gender of the respondents; ability of the respondents; marital status; highest educational qualification; secondary occupations; receipt of agricultural extension services; the variety of cassava planted and the month cassava crop planted. The results were summarized below.

Gender of the Respondents

Out of the 240 valid responses 85 (35%) were males and 155 (65%) were females. This observation was not surprising because traditionally in Anambra state cassava is a woman's crop while yam is a man's crop. Within the 240 cassava farmers' sample respondents 239 were "able bodied" while only one respondent was "persons with disability (PWD)". On marital status, there were 239 valid responses in the sample and 186 or 78% were married, 30 or 13% were single and 23 or 10% were widowed. On the highest educational qualification attained by the cassava farmers, 9 respondents or 4% had no formal education; 54 respondents or 23% had primary education; 141 respondents or 59% had secondary education and 36 respondents or 15% attained tertiary educational qualification.

Secondary Occupation

Secondary occupation keeps the farmer busy during the farming off-season and it generates additional income as well as serving as an insurance against hunger. The main secondary occupations engaged in by the cassava farmers was trading practiced by 32 percent of the farmers and artisanship involved in by 17 percent of the farmers and 24 percent of the cassava farmers had

no secondary occupation.

The details are in table 2. Concerning the variety of Cassava planted during the farming season, there were 224 responses and 194 farmers or 87% planted TME 419, 18 farmers or 8% planted Obasanjo 2 cassava variety while 12 farmers or 5% planted provitamin A cassava variety. On the receipt of agricultural extension services, out of the 240 respondents, 236 farmers or 98% indicated that they received agricultural extension services while only 4 respondents or 2% did not receive agricultural extension services.

Table 2: Secondary Occupation

Secondary Occupation	Frequency	Percent
Artisan	41	17%
Marketer	22	9%
Civil Servant	5	2%
Farming	7	3%
Fishing	18	8%
Nil	57	24%
Teacher	13	5%
Trading	76	32%
Total	239	100%

Month of the year the cassava crop was planted

There are particular months of the year during which if one plants the cassava crop, it will perform well relative to other months in Anambra State. Out of the 225 valid responses on this issue, 68 farmers or 30% planted cassava in the month of April; 51 farmers or 23% planted cassava in the month of November; 30 farmers or 13% planted cassava in the month of May while only 2 farmers or one percent planted cassava in the month of December. The details are in table 3.

Table 3: Cassava Planting Month

Month	Frequency	Percent
April	68	30%
August	14	6%
December	2	1%
July	9	4%
June	14	6%
March	25	11%
May	30	13%
November	51	23%
October	9	4%
September	3	1%
Total	225	100%

Descriptive Statistics of variables

The mean, maximum, minimum and standard deviations of the variables applied in the Gross Margin analysis and Simulation are presented in table 4. In table 4, the range and the estimated standard deviations of the variables were wide indicating wide spread of the values. This was not unexpected of survey data; however, it was hoped that the estimates were unbiased. From table 4 the age of the average sample respondent was 44 years. This was not unexpected; it corroborated the findings of Temitope O B (2025) and Joyce D. M.et. al. (2023) which indicated that the cassava farmers were old and that the youths were not taking cassava farming as a means of livelihood. The average size of a typical household in the sample cassava farmers was 6 persons with a standard deviation of 2 persons. This value was in agreement with the estimates of the authors in the literature reviewed. The farming experience of a typical cassava farmer in Anambra State was

Table 4: Descriptive Statistics of selected Variables

Variable	Min	Max	Mean	Std. Dev.
Age	18.0	75.0	44.2	11.3
Size of the Household	1.0	15.0	6.1	2.2
Experience in Years	3.0	45.0	17.0	8.4
No extension contacts	1.0	45.0	10.1	11.1
Loan amount accessed	0.0	800000.0	12987.0	66301.0
Bundle of cuttings planted	10.0	200.0	48.1	21.4
Cost per bundle of Cuttings	0.5	5000.0	2559.4	948.7
Quantity Fertilizer 50kg bag	0.0	5.0	3.3	1.4
Cost of Fertilizer per bag	0.0	40000.0	29058.3	12451.6
Quantity Agro-Chemicals Lt.	0.0	6.0	3.9	1.8
Cost Agrochemical per Lt.	0.0	5000.0	4074.6	1219.6
Size of land planted (Ha)	0.0	2.0	0.9	0.5
Aggregate Labour used	0.0	20.0	11.8	6.9
Labour cost per man-day	0.0	8000.0	5694.6	2129.8
Yield from the Farm (MT)	0.0	23.0	14.5	7.1
Quantity produce sold (MT)	0.0	28.0	12.7	6.6
Price of produce sold per MT	0.0	300000.0	167025.0	75869.8
Home Use Mt (Imputed)	0.0	0.5	0.1	0.2
Packaging (Imputed)	0.0	140000.0	63579.2	32930.4
Transportation (Imputed)	0.0	56000.0	25431.7	13172.2
Home Use Value (Naira)	0.0	125000.0	9583.3	28779.8

estimated at 17 years with a standard deviation of 8 years. This finding reinforced the opinion that the youths were not taking up cassava farming as a means of livelihood. Policies need to be formulated to attract youths into cassava farming in Anambra State.

The number of extension visits had by a typical cassava producer was 10 visits with a standard deviation of 11 visits. The wide standard deviation indicated that many farmers may not have no extension contact during the farming season. The size of loan accessed by a typical farmer was ₦12,987.0 with a standard deviation of ₦ 66,301.0. With the standard deviation that is several times higher than the mean value of ₦12,987.0, it would be expected that only very few farmers received farming loan. It was apparent from literature review that the value of cassava used at home for consumption and gifts, value of packaging of cassava for sale; and cost of transportation to and from the farm were very important in estimating the gross margin, this study had to impute them from the existing variables. Cassava production in the State was constrained by: (1) advanced age of the farmers; (2) the limited number of extension visits; (3) very exorbitant cost of fertilizers, agrochemicals and labour; and (4) nonavailability of farming loans.

Estimation of the Gross Margin

Following the findings from literature review and the theoretical framework, the gross margin was estimated as the difference between total revenue and total variable cost. The estimated value was ₦ 1,758,364.3 and the details were presented in table 5. However, in farm planning, gross margin was usually expressed in terms of gross margin per hectare for easy comparison between farms or enterprises (Upton M., 2005). In line with this convention, the estimated gross margin per hectare was ₦ 2,023,337.20 The magnitude of the estimated gross margins indicate that cassava farming in Anambra state was profitable. Since the quantity of cassava consumed at home or given out as gift, cost of packaging and the cost of transportation of inputs and outputs to and from the farm were not captured in the survey, this study had to impute values to them in order to estimate a reliable gross margin.

Table 5: The Estimation of the Gross Margin

	Unit	Unit price N	Quantity	Amount
Sales	MT	167025.0	12.7	2,121,217.50
Home Use	MT			9,583.33
Total Revenue	Naira			2,130,800.83
Variable Cost				
Cassava cuttings	Bundle	2559.4	48.1	123,107.14
Fertilizer applied	50kg bag	23058.3	3.3	76,092.39
Agrochemical	Liters	4074.6	3.9	15,890.94
Labour Aggregated	Manday	5694.6	12.0	68,335.20
Packaging	Naira			63,579.17
Transport	Naira			25,431.67
Value Variable Inputs	Naira			372,436.50
Gross Margin				1,758,364.33

Cassava consumed at home or given out as gift was imputed as 50 percent of the difference between the naira value of the total cassava produced in the farm and the naira value of the quantity of cassava sold. The imputed value was ₦ 9,583.33. The cost of packaging was imputed as 2 percent of the value of cassava sold while the cost of transportation of inputs and outputs to and from the farm was imputed as one percent of the value of cassava sold. The gross margin estimated in table 5 was purely deterministic: it did not take into consideration the fluctuations of yield and prices which was inevitable in traditional agriculture in Anambra State. Being realistic, this study took into consideration the fluctuations of yield and prices consequently, it applied Monte Carlo simulation technique to estimate a more reliable expected gross margin and the

associated distribution.

Applying Monte Carlo Simulation to Estimate the Gross Margin

This study employed the mean and standard deviation of the variables which were estimated from the descriptive analysis to specify theprobability distribution of the quantities and prices of cassava sold, cassava cuttings, fertilizer applied, agrochemicals, and aggregate labour which were applied in the computation of minimum was ₦ 818,674.77 and the expected maximum was ₦ 2609087.85 and the expected class interval was estimated at ₦ 179,041.31. the details are presented in table 6. the expected gross margin. After 2000 iterations the resultant expected gross margin was estimated at ₦ 1,976,559.78 only. The average of the expected gross margin was ₦1,715,734.49; the expected

Table 6: Monte Carlo Simulation for Cassava Gross Margin

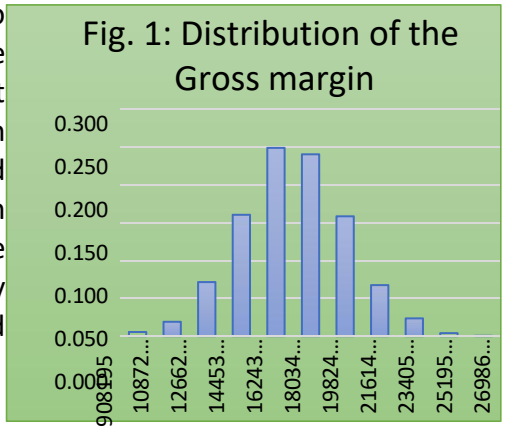
	Unit	Price	Quantity	Amount
Revenue				
Sales	MT	167097.6	14.9	2,488,444.36
Home Use	MT			9,583.33
Total Revenue	Naira			**2,498,027.70**
Variable Cost				
Cassava cuttings	Bundle	5630.0	46.16	259,863.79
Fertilizer applied	50kg bag	29336.9	3.9	114,268.27
Agrochemical	**Liters**	3892.2	2.0	7,972.80
Labour Aggregated	**Manday**	5599.4	9.0	50,352.22
Packaging	**Naira**			63,579.17
Transport	**Naira**			25,431.67
Value Variable Inputs	**Naira**			**521,467.92**
Gross Margin				1,976,559.78

Graphical Presentation of the Distribution of the Expected Gross Margin

Visual perception was aided by presenting the distribution of the expected gross margin in table 7 and figure 1. The range between the maximum and the minimum values of the expected gross margin was distributed into 10 classes and the percentage frequency of each mid class was presented in table 7. If the minimum wage in Anambra state which is ₦ 70,000 is multiplied by 12 months, the product amounted to ₦ 840,000 and this falls below the first class of the frequency distribution. The implication was that the established minimum wage in Anambra state was covered by the first class of the expected gross margin. The simulation of the gross margin enables four important decisions namely; (1) despite the fluctuations in yield and prices, the expected gross margin shows that the variable cost was adequately covered (no losses) in the cropping enterprise. (2) since the average expected gross margin was ₦1,715,734.49, it indicated that the cassava production enterprise was profitable in Anambra state. (3) the estimation of the expected minimum and the maximum values of the gross margin enabled visual presentation of the distribution of the expected gross margin. (4) It enables comparison of any amount with the classes of the distribution of the expected gross margin.

Table 7: Distribution of the Gross Margin

Class No	Class Mid-point	Frequency
0	908195	0.006
1	1087237	0.019
2	1266278	0.072
3	1445319	0.161
4	1624361	0.249
5	1803402	0.241
6	1982443	0.159
7	2161485	0.068
8	2340526	0.024
9	2519567	0.004
10	2698609	0.001



Summary and Conclusions

The youths in Anambra State were not willing to take up cassava production as a means of livelihood because it is considered as a non-profitable enterprise. This study estimated the gross margin of cassava farming in Anambra State as a second-best approach to determine the profit level of the enterprise. It applied Monte Carlo Simulation techniques to estimate the expected minimum, maximum and average gross margin of a typical cassava farmer in the state. Knowledge of the profitability of cassava production will assist the youths and prospective entrepreneurs in ranking cassava production properly among other candidate enterprises to be undertaken as a means of livelihood. The study used secondary cross-sectional data. The survey design was a multistage stratified sampling design. From the 21 LGAs of the state 8 LGAs were selected for further sampling.

The sample size of 543 was apportioned to the selected LGAs in proportionality to their sizes. In each of the selected LGA, systematic sampling was used to select the desired number of farmers from the sampling frame. The sampling frame was the updated listing of all VCDP beneficiary farmers in the LGA. The cassava producers in the sample were 244 farmers located in 7 LGAs. The data was collated and managed with Microsoft excel spread sheet and statistical analysis was carried out using the Statistical Package for the Social Sciences (SPSS). This study estimated the gross margin (GM) as total revenue (TR) minus total variable costs (TVC) that is GM = TR – TVC. Total revenue was calculated as the value of cassava sold plus the value of cassava consumed at home or given out as gifts (these were imputed and added). The variable costs in this study included values of: cassava cuttings, fertilizers applied, agrochemicals applied and aggregated labour. The cost of packaging and transportation were imputed because they were not captured in survey. The prices used were current market prices obtained during the survey. Out of the 240 valid responses 85 (35%) were males and 155 (65%) were females. The main secondary occupations engaged in by the cassava farmers was trading practiced by 32 percent of the farmers. About 194 farmers or 87% planted TME 419. Out of the 240 respondents, 236 farmers or 98% indicated that they received agricultural extension services. About 68 farmers or 30% planted cassava in the month of April. The age of the average sample respondent was 44 years.

The average size of a typical household in the sample cassava farmers was 6 persons. The estimated gross margin was ₦ 1,758,364.3 and the estimated gross margin per hectare was ₦ 2,023,337.20. The size of the estimated gross margins indicate that cassava farming in Anambra state was profitable After 2000 iterations the resultant expected gross margin was estimated at ₦ 1,976,559.78 only. The average of the expected gross margin was ₦1,715,734.49; the expected minimum was ₦ 818,674.77 and the expected maximum was ₦ 2609087.85 and the expected class interval was estimated at ₦ 179041.31. Simulation of the gross margin enables four important decisions namely; (1) despite the fluctuations in yield and prices, the expected gross margin shows that the variable cost was overly covered (no losses) in the cropping enterprise. (2) since the average expected gross margin was ₦1,715,734.49, it indicates that the cassava production enterprise was profitable in Anambra state. (3) the estimation of the expected minimum and the maximum values of the gross margin enabled visual presentation of the distribution of the expected gross margin. (4) It enabled comparison of any amount with the classes of the distribution of the expected gross margin. Cassava production in the State was constrained by: (1) advanced age of the farmers; (2) the limited number of extension visits; (3) exorbitant cost of fertilizers, agrochemicals and labour and (4) nonavailability of farming loans.

Recommendations

From the foregoing this study recommends as follows:

i. Anambra state government and VCDP should publicize the profitability of cassava farming in the state in order to attract youths into cassava farming such that they take it as their means of livelihood.
ii. The VCDP should improve their extension services so that more cassava producers would be reached during the farming season.
iii. Anambra state government and their agencies should ensure that unadulterated farm inputs including fertilizers, agrochemicals and labour reach the cassava producers timely and at affordable prices.
iv. Anambra state government and VCDP should prevail on the banks to extend agricultural loans with favorable conditions to cassava producers during the farming seasons.
v. Analysis of agricultural production in the state should apply simulation techniques to take into consideration the fluctuations in prices and yields.

References

Audu, S.I., (2019), Profitability of Cassava Production in Kogi State, Nigeria. International Journal of Agricultural Economics, Management and Development (IJAEMD)

Cock, J. H., and Connor, D. J. (2021). Cassava. In Crop physiology case histories for major crops (pp. 588-633). Elsevier.

Ezedinma C.I., Kormawa P.M., Manyong V.M. and Dixon A.G.O. 2007), Challenges, opportunities, and strategy for cassava sub-sector development in Nigeria; International Institute of Tropical Agriculture, Ibadan, Nigeria, Proceedings of the 13th ISTRC Symposium, pp.627 - 640

Food and Agricultural Organization (FAO). (2015). Quarterly Bulletin Statistics. FAO, Rome, 2(3). P. 120.

Food and Agricultural Organization (FAOSTAT.,2010), Statistical Database of the Food and Agricultural Organization of the United Nations. FAO, Rome.

Henderson J.M. and Quandt R.E. (2010), Microeconomic Theory, A Mathematical Approach, Tata McGraw Hill Education Private Limited, New Delhi.

International Institute for Tropical Agriculture (IITA) Ibadan, (2015), Annual Report. -285. International Institute of Tropical Agriculture (IITA, 2017). Preemptive Management of the Virulent

Cassava Mosaic Disease through an Integrated Cassava Development Approach for Enhanced Rural Sector Economy in the South-south and South-east zones of Nigeria, IITA, Ibadan, Nigeria. P. 79.

International Institute of Tropical Agriculture, IITA (2005): Cassava production, present and future prospects. IITA Research Guide 29, pp10-15.

Joyce D. Moses1 & Titus Joshua (2023), Profitability Analysis of Cassava Production among Small-Scale Farmers in Mubi Area of Adamawa State, Nigeria, Adamawa State University Journal of Scientific Research (ADSUJSR) Volume 11 Issue 1, ISSN: 2705- 1900; ISSN: 2251-0702 (Print) http://www.adsu.edu.ng.

Molokwu, C.C. (2018), Profitability of Garri Production in South Eastern Nigeria Under Fadama III Project (2008 – 2014), Lokoja, Nigeria, *Salem Journal of Social Sciences* Vol1 No 2. Pp. 156 -165

Nnamdi Azikiwe University (2025), Centre for Community and Rural Development, Awka, Anambra State.

Ogunleye, A. S., Adeyemo, R., Bamire, A. S., and Kehinde, A. D. (2017). Assessment of profitability and efficiency of cassava production among government and non-government assisted farmers association in Osun State, Nigeria. *African Journal of Rural Development, 2*(2), 225-233.

Ojiako, I. A; Tarawali, G; Okechukwu, R. U; Chianu, J; Ezedinma, C. & Edet, M. (2018). Profitability of Cassava Production: comparing the actual and potential returns on investment among smallholders in Southern Nigeria. Journal of Biology, Agriculture and Healthcare. 8(16). Pp. 51-65.

Olukosi,J.O and Erhabor,P.O (2004) Introduction to Farm Management Economic. Pp77-85.

Profitability Analysis of Cassava Production in Three Local Government Areas of Taraba State, Nigeria. CARD International Journal of Agricultural Research and Food Production (IJARFP) ISSN: 2536-7293 Volume 1, Number 3, December 2016, http://www.casirmediapublishing.com

Temitope Olanrewaju Bello, Adegboyega Eyitayo Oguntade , Thomas Tope Afolayan, (2025), Profitability and Efficiency of Cassava Production in Ekiti State, Nigeria, Department of Agricultural and Resource Economics, Federal University of Technology, P.M.B. 704, Akure, Nigeria.

Upton M. (1978), Farm Management in Africa: The Principles of Production and Planning, Oxford University Press, Walton Street, Oxford OX2 6DP.

Upton M. (2005), African Farm Management. Farm management handbook of Kenya. Part A. Cambridge ... S562.K4 F37, West Kenya.

Zakari, H.U., Abubakar, R.U., Lawan, U.A., Bello, U.D., and Mohammed, U.S, (2016), Profitability Analysis of Cassava Production in Three Local Government Areas of Taraba State, Nigeria, https://casirmediapublishing.com/category/2016/international- journal-of-agricultural-research-and-food-production-2016.