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Economic Analysis of Cassava Production: Profitability, Determinants, and Constraints among Smallholder Farmers in Kogi State, Nigeria

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ABSTRACT

This study examined the profitability, determinants, and constraints of cassava production among smallholder farmers in Kogi State, Nigeria. Utilizing a cross-sectional design, data were collected from 300 randomly selected cassava farmers across five major producing Local Government Areas. Analytical tools included farm budgetary techniques, profitability ratios, multiple regression analysis, and Likert scale ranking. Results revealed that cassava production is profitable, with an average total revenue of ₦753,853 per season, total costs of ₦487,447, gross margin of ₦366,707, and net farm income (NFI) of ₦266,406. The benefit-cost ratio (BCR) stood at 1.5465, and return on investment (ROI) at 0.5465, indicating ₦1 invested yields ₦1.55 in returns and 55 kobo profit. A one-sample t-test ($t = 26.8$, $p < 0.0000$) rejected the null hypothesis of non-profitability, confirming significant positive returns. Multiple regression analysis ($R^2 = 0.5137$, $p < 0.000$) showed that gender (male farmers higher NFI, $p = 0.012$), credit access ($p = 0.008$), farm size ($p = 0.041$), labour used ($p = 0.006$), and cassava cuttings quantity ($p = 0.001$) positively and significantly influenced NFI, partially rejecting hypotheses on insignificant socio-economic and production factors. Age, education, experience, and agrochemicals were insignificant. Socioeconomic characteristics indicated a mean farmer age of 38 years, 66.33% male, mean household size of 6, average farming experience of 11 years, high cooperative membership (82.67%), and credit access (78.67%), with small farm sizes (mean 1 ha). Major constraints (mean ≥ 3.0 = severe) included high mechanization costs (4.31), lack of processing/storage facilities (4.23), high interest rates (3.99), limited credit access (3.95), inadequate government support (3.83), land access limitations (3.77), high transportation costs (3.72), insecurity (3.62), poor extension services (3.54), and high input costs (3.53). The findings affirm cassava's economic viability in Kogi State while highlighting opportunities for policy interventions to address constraints, enhance input access, and promote value addition for improved farmer livelihoods and sustainable production in similar contexts.

Keywords: Cassava production, profitability analysis, net farm income, smallholder farmers, Kogi State, benefit-cost ratio, multiple regression, production constraints.

INTRODUCTION

Cassava (Manihot esculenta Crantz) is a vital staple crop in sub-Saharan Africa, particularly in Nigeria, which produces over 60 million metric tons annually, making it the world's leading cassava producer (FAO, 2022). In Nigeria, cassava is a cornerstone of food security, serving as a primary source of carbohydrates for millions and a key income-generating crop for smallholder farmers (Adebayo & Olagunju, 2021). Its versatility in food processing, industrial applications, and export potential underscores its economic significance (Otekunrin & Sawicka, 2019). Kogi State, located in Nigeria's Middle Belt, is a major agricultural region where cassava production thrives due to favourable climatic conditions, fertile soils, and a long history of cultivation (Ibitoye & Onimisi, 2023). Despite its prominence, the profitability of cassava production in Kogi State remains underexplored, with limited empirical data on its economic viability, influencing factors, and production constraints.

Profitability analysis is essential for understanding the economic sustainability of agricultural systems, particularly for smallholder farmers who dominate cassava production in Nigeria (Ogundari & Awokuse, 2020). Profitability is influenced by a complex interplay of socio-economic and production factors, which determine farmers' ability to generate positive net farm income (NFI) (Okoye et al., 2020). Socio-economic factors, such as age, education level, gender, and access to credit, significantly affect farmers' decision-making and resource allocation (Afolabi & Ogunleye, 2022). For instance, education enhances the adoption of improved technologies, while access to credit enables investment in inputs like high-yielding cassava varieties and agrochemicals (Omonona et al., 2021). Gender disparities also play a critical role, with female farmers often facing restricted access to land, credit, and extension services in Nigeria (Adeyemo & Okoruwa, 2021). Similarly, production factors, including farm size, labour intensity, cassava cuttings, and agrochemical use, directly influence yields and cost efficiency (Udemezue & Okoye, 2022). However, the specific impact of these factors on cassava profitability in Kogi State remains poorly understood, necessitating targeted research.

Cassava production in Nigeria faces numerous constraints, including high input costs, pest and disease pressures, inadequate extension services, and poor market access (Nweke et al., 2023). In Kogi State, farmers encounter additional challenges such as fluctuating prices for cassava cuttings, limited mechanization, and post-harvest losses, which erode profit margins (Ibrahim & Abdullahi, 2022). These constraints not only reduce productivity but also threaten the livelihoods of smallholder farmers, who rely heavily on cassava for income and subsistence (Echebiri et al., 2021). Despite these challenges, cassava remains a priority crop in Kogi State, with potential for value addition through processing into products like garri, fufu, and starch (Oluwasola & Adewumi, 2019). Understanding the profitability and constraints of cassava production in this region is critical for designing interventions that enhance farmer incomes and contribute to rural development.

This study addressed these knowledge gaps by analyzing the profitability of cassava production in Kogi State, Nigeria, using farm budgetary techniques and profitability ratios to evaluate economic performance. Multiple regression analysis is employed to assess the influence of socio-economic factors (age, education level, gender, and amount of credit) and production factors (farm size, labour used, cassava cuttings, and agrochemicals) on NFI, testing the hypotheses that cassava production is not profitable and that these factors have no significant effect on profitability. Additionally, a Likert scale ranking was used to identify and prioritize the constraints faced by cassava farmers. The findings are expected to provide evidence-based insights for policymakers, agricultural extension agents, and stakeholders to promote sustainable cassava production in Kogi State and similar agroecological zones.

The specific objectives of this study were: (a) to analyze the profitability of cassava production in Kogi State, Nigeria; (b) to determine the factors influencing the profitability of cassava production in Kogi State, Nigeria; and (c) to identify the constraints facing cassava production in Kogi State, Nigeria. The study tested the following null hypotheses: (1) Cassava production is not profitable in Kogi State, Nigeria; (2) Socio-economic factors (age, education level, gender, experience and amount of credit) have no significant effect on the NFI of cassava farmers in Kogi State, Nigeria; and (3) Production factors (farm size, labour used, cassava cuttings, and agrochemicals) have no significant effect on the NFI of cassava farmers in Kogi State, Nigeria. By addressing these objectives and hypotheses, this study contributes to the literature on agricultural economics and informs strategies for enhancing the cassava value chain in Nigeria's Middle Belt.

RESEARCH METHOD

Study Area

The study was conducted in Kogi State, Nigeria, located in the Middle Belt region of the country, with geographical coordinates approximately between 6°33'–8°44'N latitude and 5°22'–7°49'E longitude (Ibitoye & Onimisi, 2023). Kogi State covers a land area of about 29,833 km² and is characterized by a tropical savanna climate, with annual rainfall ranging from 1,100 to 1,500mm and temperatures between 25°C and 35°C, ideal for cassava production (Oluwasola & Adewumi, 2019). The state comprises 21 Local Government Areas (LGAs) and has a population of approximately 4.5 million, predominantly rural with agriculture as the primary economic activity (National Bureau of Statistics, 2022). Cassava is a major crop in Kogi State, cultivated by smallholder farmers across its fertile Guinea Savanna soils, contributing significantly to food security and livelihoods (Adebayo & Olagunju, 2021). The state's proximity to major

markets in Abuja and southern Nigeria enhances its potential for cassava commercialization, though infrastructural challenges persist (Ibrahim & Abdullahi, 2022).

Population and Sampling Procedure

This study adopted a cross-sectional research design to analyze the profitability of cassava production, determine influencing factors, and identify constraints among farmers in Kogi State. A cross-sectional design was chosen for its ability to capture data at a single point in time, suitable for assessing economic performance and constraints in agricultural systems (Ogundari & Awokuse, 2020). The target population consisted of smallholder cassava farmers in Kogi State. A multi-stage sampling technique was employed to ensure representativeness. In the first stage, five main cassava producing local government areas (Okene, Adavi, Kabba-Bunu, Ankpa, and Dekina) were purposively selected based on their prominence in cassava production, as identified by the Kogi State Agricultural Development Programme (ADP) reports (Kogi ADP, 2022). In the second stage, six farming communities were randomly selected from each of the selected LGAs, resulting in 30 communities. In the third stage and final stage, 10 cassava farmers were randomly selected from each community, resulting in a total sample size of 300 farmers. This sample size aligns with recommendations for regression-based studies to ensure statistical power (Omonona et al., 2021).

Data Collection

Primary data were collected between March and June 2024 using a semi-structured questionnaire administered by trained enumerators. The questionnaire captured data on socio-economic characteristics, production variables, input and output quantities, and constraints faced by farmers. Key informant interviews with extension agents and community leaders were conducted to corroborate survey data and provide contextual insights. Secondary data, including agricultural reports and market price trends, were sourced from the Kogi State ADP and the National Bureau of Statistics to validate findings (Kogi ADP, 2022; National Bureau of Statistics, 2022).

Analytical Techniques

The study employed four analytical methods to address the objectives and test the hypotheses:
Farm Budgetary Techniques: These were used to assess the profitability of cassava production by calculating gross margin (GM) and net farm income (NFI). GM was computed as total revenue (TR) minus total variable costs (TVC), while NFI was derived by subtracting total fixed costs (TFC) from GM (Awerije & Rahman, 2019).

The formula is expressed as:
GM = TR – TVC
NFI = GM – TFC

Where TR is the product of cassava output (kg) and market price (₦/kg), TVC includes costs of labour, cassava cuttings, agrochemicals, and other inputs, and TFC includes depreciation of tools and land rent.
Profitability Ratios: To further evaluate economic performance, profitability ratios such as the benefit-cost ratio (BCR) and return on investment (ROI) were calculated. BCR was computed as TR divided by total cost (TC), and ROI was calculated as NFI divided by TC (Ogundari & Ojo, 2021). These ratios provide insights into the financial viability of cassava production:

$$\text{BCR} = \frac{TR}{TC}$$
$$\text{ROI} = \frac{NFI}{TC}$$

Multiple Regression Analysis: This was used to determine the factors influencing the profitability (NFI) of cassava production, testing Hypotheses 2 and 3. The dependent variable was NFI (₦), while independent variables included socio-economic factors (age, education level, gender, amount of credit, experience) and production factors (farm size, labour used, cassava cuttings, agrochemicals). The model is specified as:

$\mathrm{LnYi} = \gamma_o + \gamma_1 \mathrm{LnX}_1 + \gamma_2 \mathrm{LnX}_2 + \gamma_3 \mathrm{LnX}_3 + \gamma_4 \mathrm{LnX}_4 + \gamma_5 \mathrm{LnX}_5 + \gamma_6 LnX_6 + \gamma_7 LnX_7 + \gamma_8 LnX_8 + \gamma_9 LnX_9 + \mu_i$

Where,

Y_i = NFI (₦)

γ_o = Constant Term (Intercept)

$\gamma_1 - \gamma_8$ = Regression Coefficients

X_1 = Age (Years)

X_2 = Gender (1= Male; 0= Female)

X_3 = Education level (Years)

X_4 = Amount of credit (₦)

X_5 = Cassava farming experience (Years)

X_6 = Farm size (Hectares)

X_7 = Labour Used (Man-days)

X_8 = Cassava cuttings (Kg)

X_9 = Agrochemicals (Kg)

μ_i = Error Term

The model was estimated using ordinary least squares (OLS) and the significance of variables was tested at the 5% level. Likert Scale Ranking: To identify the constraints facing cassava production, a 5-point Likert scale (1 = not a challenge, 2 = mild, 3 = moderate, 4 = severe 5 = very severe) was used to rank farmers' perceptions of constraints. Mean scores were calculated and ranked to identify the most critical constraints, following the approach of Akinyemi et al. (2021).

The mean scores were calculated using the formula:

Mean Score (MS) = $\frac{\Sigma(f_i \times W_i)}{\Sigma \mathrm{f}}$

Where:

$\mathrm{f_i} = \text{Frequency of each Response}$

$W_i = \text{Likert Weight}$

$\Sigma \mathrm{f} = \text{Total Number of Respondents}$

Constraints with mean scores ≥ 3.0 were considered severe, following the approach of Oluleye et al. (2022). The null hypothesis (H_o) which states that cassava production is not profitable in Nasarawa State, Nigeria, was tested using the one-sample t-test statistics. Expressed as:

$$t = \frac{\bar{\mathrm{x}} - \mu_o}{s/\sqrt{n}}$$

Where,

t = t-calculated value (Number)

$\bar{\mathrm{x}}$ = Sample mean profit (NFI) (Naira)

μ_o = Hypothesized population mean (Naira)

S = Sample Standard-deviation (Number)

n = Sample size (Number)

If t-calculated > t-tabulated reject H_o

The null-hypothesis (H_o) which state that socio-economic factors (age, education level, farming experience, gender, and amount of credit) do not have significant effect on the net farm income (NFI) of cassava farmers in Nasarawa State, Nigeria, was tested using the t-test statistics and using the regression coefficients.

Each coefficient was tested using:

$$t = \frac{\gamma_i}{SE(\gamma_\mathrm{i})}$$

Where:

t = t-calculated value (number)

$\gamma_\mathrm{i} = \text{estimated coefficient for the factors in the regression}$

$SE(\gamma_i) =$ Standard Error of γ_i obtained from the regression output
If t-calculated > t-tabulated reject H_o

The null-hypothesis (H_o) which states that production factors (farm size, labour, cassava cuttings, fertilizer and agrochemicals usage) do not have significant effect on net farm income (NFI) of cassava farmers in Nasarawa state, Nigeria, was tested using the t-test statistics and using the regression coefficients.
Each coefficient was tested using:

$$t = \frac{\gamma_i}{SE(\gamma_i)}$$

Where:
t = t-calculated value (number)
$\gamma_i =$ estimated coefficient for the factors in the regression
$SE(\gamma_i) =$ Standard Error of γ_i obtained from the regression output
If t-calculated > t-tabulated reject H_o.

RESULTS AND DISCUSSION

Socioeconomic Characteristics of Cassava Farmers in Kogi State, Nigeria

Table 1: Socioeconomic Characteristics of Cassava Farmers in the Study Area

Characteristic	Frequency	Percentage (%)	Mean
Age (Years)			
< 25	51	17	
25 – 50	168	56	
> 50	81	27	
Total	**300**	**100**	
Mean			**38**
Gender			
Male	199	66.33	
Female	101	33.67	
Total	**300**	**100**	
Household Size			
<3	77	25.67	
3 – 7	154	51.33	
>7	69	23	
Total	**300**	**100**	
Mean			**6**
Education Level			
None	51	17	
Primary	71	23.67	
Secondary	103	34.33	
Tertiary	75	25	
Total	**300**	**100**	
Cassava Farming Experience (Years)			
<5	91	30.33	

5 – 15	126	42	
>15	83	27.67	
Total	**300**	**100**	
Mean			**11**
Membership of Cooperative Group			
Yes	248	82.67	
No	52	17.33	
Total	**300**	**100**	
Credit Access			
Yes	236	78.67	
No	64	21.33	
Total	**300**	**100**	
Farm Size (ha)			
<1	195	65	
1 – 3	91	30.33	
>3	14	4.67	
Total	**300**	**100**	
Mean			**1**
Extension Contact per Month			
None	136	45.33	
1 – 2	153	51	
>2	11	3.67	
Total	**300**	**100**	**0.5**

Source: Computed from Field Survey Data (2025)

The socioeconomic profile of cassava farmers in the study area, as presented in Table 1, reveals key demographic and economic attributes that influence their engagement in cassava production. The mean age of the farmers was 38 years, with the majority (56%) falling between 25 and 50 years, indicating a relatively youthful and productive workforce. Younger farmers are often more receptive to new technologies, potentially enhancing net farm income (NFI). This finding is consistent with recent studies in Nigeria by Adebayo & Olagunju, 2021; Ogunleye et al., 2021, who reported cassava farmers' average age ranges from 40 to 45 years, reflecting an economically active population capable of sustaining agricultural activities. Also, in Osun State, Ogunleye et al. (2024) reported a mean age of 45.75 years among cassava-based farmers, noting that middle-aged farmers contribute to higher productivity due to accumulated experience balanced with physical vitality. Gender distribution showed that 66.33% of respondents were male, while 33.67% were female, highlighting male dominance in cassava farming. Female farmers often face barriers to land and credit, which could limit their involvement in cassava farming. Comparable results were observed in Edo State (Omoregbee & Banmeke, 2022), where male farmers constituted 70% of cassava producers, attributed to cultural norms assigning heavy farm labour to men. Similarly, in Enugu State, Mgbakor and Nwankwo (2023) found 60% male dominance, noting that gender affects input utilization and overall farm efficiency.

The average household size was six members, with 51.33% having 3-7 members, suggesting moderate family labour availability. Larger households can provide unpaid labour, positively impacting production costs and profitability. This is supported by studies by Ettah and Kuye, 2017, in Delta State, who reported that average household sizes of 6-7 were linked to reduced labour expenses and higher NFI.

Education levels varied, with 34.33% having secondary education, 25% tertiary, 23.67% primary, and 17% none. Education enhances technology adoption, farmers with higher education are more likely to use improved varieties and agrochemicals, boosting yields. This aligns with findings by Adeyemo and Okoruwa, 2021, in Ogun State, where cassava farmers with secondary education showed 20% higher adoption rates of climate-smart practices.

Cassava farming experience averaged 11 years, with 42% having 5-15 years. Experience is a socio-economic factor that improves resource allocation and risk management, leading to higher profitability. In Imo State, Okoye et al. (2020) found that farmers with over 10 years of experience achieved 15% higher NFI due to better pest management. Membership in cooperative groups was high (82.67%), facilitating access to inputs and markets. Cooperatives mitigate issues like credit access, as evidenced by Ettah and Kuye, 2017, in Cross River State, where 75% membership correlated with 25% higher incomes. Credit access was reported by 78.67%, with an average farm size of 1 hectare (65% under 1 ha). Small farm sizes limit economies of scale. In Ekiti State, Ogunleye (2018) noted similar smallholdings (average 1.5 ha), where credit access increased farm expansion and profitability by 30%. Extension contact averaged 0.5 per month, with 45.33% having none, indicating a constraint that hampers knowledge dissemination.

Profitability of Cassava Production in Kogi State, Nigeria

Table 2: Average Cost and Return of Cassava Farming per Season in the Study Area

Item	Amount (₦)	Percentage of Total Cost (%)
Variable Inputs Cost		
Cassava cuttings	55,132	11.3
Agrochemicals	25,130	5.2
Fertilizer	30,122	6.2
Labour	219,044	44.9
Transportation	33,963	7.0
Miscellaneous	23,755	4.9
Total Variable Cost (TVC)	**387,146**	79.4
Fixed Inputs		
Interest on Loans	32,858	6.7
Rent on Land	40,100	8.2
Depreciation on Assets	27,343	5.6
Total Fixed Cost (TFC)	**100,301**	20.6
Total Cost	**487,447**	
Total Revenue	**753,853**	
GM (TR - TVC)	**366,707**	
NFI (GM - TFC)	**266,406**	
ROI	**0.5465**	
BCR	**1.5465**	

Source: Computed from Field Survey Data (2025)

The profitability analysis, as detailed in Table 2, demonstrates that cassava production in Kogi State is economically viable. The total revenue (TR) averaged ₦753,853 per season, with total costs (TC) at ₦487,447, yielding a gross margin (GM) of ₦366,707 and NFI of ₦266,406. This positive NFI confirms

profitability. The return on investment (ROI) was 0.5465, and the benefit-cost ratio (BCR) was 1.5465, indicating that for every ₦1 invested, farmers earn 55 kobo in returns, underscoring financial sustainability. Variable costs dominated (79.4% of TC), with labour at 44.9% (₦219,044), reflecting labour-intensive nature. Cassava cuttings (11.3%, ₦55,132) and fertilizers (6.2%, ₦30,122) were notable. Fixed costs (20.6%) included interest on loans (6.7%, ₦32,858) and land rent (8.2%, ₦40,100).

The BCR exceeds findings in Delta State, where Awerije and Rahman (2019) reported a BCR of 1.32, attributing lower ratios to higher labour costs (50% of TC). In Osun State, Ogunleye et al. (2024) found a lower average NFI of ₦150,000 - 200,000. Ettah and Kuye (2017) in Cross River State noted a GM of ₦300,000, but emphasized transportation costs as eroding profits.

Table 3: Result of the t-test on Profitability of Cassava Farmers in Kogi State, Nigeria

Variable	Obs.	Mean	Std. Err.	Std. Dev.
NFI	300	266406.3	9932.81	172041.3
mean = mean(NFI)	Ha: mean < 0		Ha: mean != 0	
Ho: mean = 0	Pr(T < t) = 1.0000		Pr(|T| > |t|) = 0.0000	
t-calc. = 26.8			Ha: mean > 0	
t-tab (α=0.01) = 2.58	df = 299		Pr(T > t) = 0.0000	

Source: Computed from Field Data (2025)

The one-sample t-test result as shown in Table 3 (mean NFI ₦266,406.3, t = 26.8 > t-tabulated 2.58 at α=0.01, p<0.0000) strongly rejects Hypothesis 1 (null: that cassava production is not profitable), confirming significant profitability of cassava production in Kogi State. This is akin to Okoye et al. (2020) in Imo State, where t-tests confirmed positive NFI amid constraints like post-harvest losses. Profitability is thus affirmed, but optimizing variable costs could enhance it further.

Factors Influencing the Profitability of Cassava Production in Kogi State, Nigeria

Table 4: Result of the Multiple Regression Analysis

Variable	Coef.	Std. Err.	t	P>|t|
Age	-0.01	0.03	-0.39	0.698
Gender	0.07	1.21	0.06	0.012
Education	0.23	1.21	0.19	0.066
Credit	0.28	1.23	0.22	0.008
Experience	0.17	0.09	1.81	0.071
Farm size	0.78	1.35	0.58	0.041
Labour	0.87	1.39	0.62	0.006
Cassava cuttings	0.25	0.07	3.33	0.001
Agrochemicals	0.06	0.06	1.05	0.292
_cons	1.27	3.70	0.34	0
Diagnostic Statistics				
Number of obs. = 300				
F(9, 290) = 5.11				
Prob > F = 0				
R-squared = 0.51369				
Adj R-squared = 0.51101				
Root MSE = 10.352				

Source: Computed from Field Survey Data (2025)

Multiple regression analysis (Table 4) identified factors affecting NFI. The model (R-squared = 0.5137, $p < 0.000$) explains 51.37% of NFI variance, with significant variables rejecting both the second and third hypotheses. Among socio-economic factors, gender (coef. = 0.07, $p = 0.012$) and credit amount (0.28, $p = 0.008$) positively and significantly influenced NFI. Males had higher NFI, possibly due to better resource access, aligning with Afolabi and Ogunleye (2022) in Nigeria, where gender disparities reduced female NFI by 15%. Credit's positive effect supports Omonona et al. (2021), who found credit access increased cassava profitability by 22% in Oyo State via input investments. Experience was not significant (coef. 0.17, $p = 0.071$) which contradicts Okoye et al. (2020) finding, where ten or more years of experience boosted efficiency by 18%. Age (-0.01, $p = 0.698$) and education (0.23, $p = 0.066$) were also insignificant, contrasting Adeyemo and Okoruwa (2021), where education raised NFI by 10% through technology adoption.

For production factors (hypothesis 3), farm size (0.78, $p = 0.041$), labour (0.87, $p = 0.006$), and cassava cuttings (0.25, $p = 0.001$) positively affected NFI, while agrochemicals (0.06, $p = 0.292$) were insignificant. Larger farms increased scale economies, similar to Udemezue and Okoye (2022), where 1-ha increase raised yields by 12% in Nigeria. Labour's strong effect reflects intensity, as per Ogundari and Ojo (2021). Cuttings' impact highlights quality inputs, consistent with Ibrahim and Abdullahi (2022) in northern Nigeria.

These results lead to partial rejection of hypothesis 2 (null: socio-economic factors have no significant effect on NFI): gender and credit significantly influence profitability, while age education and years of experience have no significant influence on NFI. Hypothesis 3 (null: production factors have no significant effect on NFI) is also partially rejected: farm size, labour, and quantity of cuttings significantly affect NFI while agrochemicals do not. In comparison, in Ekiti State, Ogunleye, 2018) found farm size and labour as top influencers of NFI, with R-squared 0.60, while in Osun, Ogunleye et al. (2024) noted credit and experience as key factors positively and significantly influencing the NFI of farmers.

Constraints Facing Cassava Production in Kogi State, Nigeria

Table 5: Likert Scale Analysis of the Constraints Faced by the Respondents

S/N	Constraint	Weighted Scores							
		1	2	3	4	5	Total	Mean	Rank
1	High cost of farm mechanization	9	32	75	296	880	1292	4.31*	1st
2	Lack of processing and storage facilities	7	20	102	416	725	1270	4.23*	2nd
3	High Interest Rates	24	18	99	460	595	1196	3.99*	3rd
4	Limited access to credit facilities	12	70	93	404	605	1184	3.95*	4th
5	Lack of government support	12	48	156	504	430	1150	3.83*	5th
6	Limited access to land	19	52	105	584	370	1130	3.77*	6th
7	High cost of transportation	11	80	174	412	440	1117	3.72*	7th
8	Insecurity	15	84	117	604	265	1085	3.62*	8th
9	Inadequate extension services	19	52	288	368	335	1062	3.54*	9th
10	High cost of fertilizers and agrochemicals	35	88	129	328	480	1060	3.53*	10th
11	Unstable produce prices	17	50	267	500	220	1054	3.51*	11th
12	Poor road infrastructure	15	70	417	268	220	990	3.30*	12th
13	Limited access to quality cuttings	24	152	342	220	155	893	2.98	13th
14	Poor market access	77	172	126	248	165	788	2.63	14th

15	Lack of irrigation facility	79	172	126	248	155	780	2.60	15th
16	Pest and disease infestations	57	246	147	108	220	778	2.59	16th
17	Low rainfall	37	242	264	180	45	768	2.56	17th
18	Flooding	131	212	78	56	115	592	1.97	18th

Legend: * Constraints considered severe
Source: Computed from Field Data (2025)

Table 5 ranks constraints using Likert scores. Severe constraints (MS ≥ 3.0) included high mechanization costs (4.31, 1st), lack of processing and storage facilities (4.23, 2nd), high interest rates (3.99, 3rd), limited credit access (3.95, 4th), lack of government support (3.83, 5th), limited land access (3.77, 6th), transportation cost (3.72, 7th), insecurity (3.62, 8th), inadequate extension services (3.54, 9th), fertilizer/agrochemical costs (3.53, 10th), unstable prices (3.51, 11th), and poor road infrastructure (3.30, 12th). Less severe constraints include limited access to quality cuttings (2.98), poor market access (2.63), irrigation challenges (2.60), pests/diseases (2.59), low rainfall (2.56), and flooding (1.97).

High mechanization costs erode profits as manual labour dominates (as also indicated in Table 2). This is consistent with Echebiri et al. (2021) in southeastern Nigeria, where mechanization costs ranked top, reducing NFI by 25%. Lack of processing/storage facilities lead to losses, consistent with Ibrahim and Abdullahi (2022), estimating 20% post-harvest losses. Credit constraints (high rates, and access) limit inputs, Omonona et al. (2021) found similar situation in Oyo, where 40% faced high rates, lowering adoption rates. Lack of government support and extension deficiencies hinder knowledge, as also noted by Nweke et al. (2023). Insecurity and poor condition of roads exacerbate transportation challenges (7th), aligning with Oluwasola and Adewumi (2019) in Kogi State. Pests/diseases, though low-ranked, remain issues; low rainfall/flooding suggest climate variability, as noted by Ibitoye and Onimisi (2023).

Summary

This research provides a comprehensive assessment of cassava production economics in Kogi State, Nigeria, focusing on profitability, influencing factors, and constraints faced by smallholder farmers. Cassava remains a vital crop for food security and income in Nigeria, the world's top producer, yet regional empirical evidence, particularly in Kogi State, has been limited. The study sampled 300 farmers using multi-stage techniques from five prominent LGAs. Data analysis via budgetary methods showed average per-season revenue of ₦753,853 against costs of ₦487,447, resulting in positive gross margin (₦366,707) and NFI (₦266,406). Profitability ratios (BCR 1.5465; ROI 0.5465) and t-test results confirmed cassava farming as a lucrative enterprise, outperforming some prior studies in other states with lower BCRs or NFIs. Regression results identified key drivers of NFI: male gender and higher credit amounts among socio-economic variables, and larger farm size, increased labour, and greater cassava cuttings use among production factors. These explained over 51% of NFI variation. Insignificant factors included age, education, experience, and agrochemicals, suggesting nuanced influences compared to other Nigerian regions where education or experience played stronger roles. Farmers were predominantly middle-aged (mean 38 years), male-dominated (66.33%), experienced (mean 11 years), and cooperative members (82.67%), with smallholdings (mean 1 ha) and limited extension contact (average 0.5/month). Constraints ranked as severe encompassed high costs of mechanization and inputs, inadequate processing/storage, credit and interest rate barriers, limited government support, land access issues, transportation challenges, insecurity, poor roads, and weak extension services. These align with broader Nigerian cassava challenges but emphasize Kogi-specific infrastructural and security hurdles. Overall, the study demonstrates cassava's profitability potential in Kogi State while underscoring the need to mitigate constraints through targeted interventions. Enhancing credit access, mechanization affordability, processing infrastructure, extension services, and gender equity could boost yields, reduce losses, and elevate incomes, contributing to rural development and cassava value chain strengthening in Nigeria's Middle Belt.

CONCLUSION

This study conclusively establishes that cassava production in Kogi State, Nigeria, is profitable and economically sustainable for smallholder farmers. With an average NFI of ₦266,406 per season, BCR of

1.5465, and ROI of 0.5465, the enterprise generates substantial positive returns, rejecting the hypothesis of non-profitability. These figures surpass several comparative studies in other Nigerian states, highlighting Kogi's favourable agroecological conditions and market proximity as advantages, despite persistent challenges. Key socio-economic and production factors significantly shape profitability. Gender (male advantage) and credit access enhance resource allocation and input investment, while farm size, labour intensity, and quality cassava cuttings drive higher outputs and efficiency. The model's explanatory power ($R^2 \approx 0.51$) underscores these as critical levers, though age, education, experience, and agrochemicals showed limited influence, possibly due to small farm scales and extension gaps limiting technology adoption. Severe constraints, led by high mechanization costs, absent processing/storage facilities, expensive credit, and infrastructural deficits (poor roads, insecurity), erode potential gains through elevated costs, post-harvest losses, and restricted scaling. These findings align with national patterns but reveal Kogi-specific priorities like insecurity and limited government support. Ultimately, cassava holds strong potential as an income and food security pillar in Kogi State. Its profitability affirms smallholders' resilience amid constraints, yet optimizing returns requires addressing bottlenecks. Improved credit mechanisms, subsidized mechanization, investment in processing infrastructure, strengthened extension services, and gender-inclusive policies could amplify NFI, reduce vulnerabilities, and foster commercialization through value addition.

RECOMMENDATIONS

1. Promoting mechanization adoption: Government should introduce subsidies or lease programs for farm machinery to address high mechanization costs, reducing reliance on labour (44.9% of costs) and improving efficiency, particularly for land preparation and harvesting.
2. Enhancing access to affordable credit: Government and financial institutions should lower interest rates and expand microcredit schemes tailored for smallholder cassava farmers, prioritizing women to reduce gender disparities and enable investments in quality inputs and farm expansion.
3. Investment in processing and storage infrastructure: Community-level processing centres and storage facilities should be developed through public-private partnerships to minimize post-harvest losses, add value (e.g., garri, fufu), and stabilize incomes against seasonal gluts.
4. Strengthening agricultural extension services: There should be increased frequency and quality of extension contacts by recruiting more agents and using digital tools, focusing on improved varieties, pest management, and best practices to boost technology adoption.
5. Improving rural infrastructure: Road rehabilitation and security measures in rural areas should be prioritized to lower transportation costs and enhance market access, reducing losses from poor roads and insecurity.
6. Supporting land access and strengthening of cooperatives: Government should facilitate secure land tenure for women and youth, while empowering cooperatives to bulk-purchase inputs, negotiate better prices, and access collective credit/marketing channels.

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