



PROFITABILITY AND RESOURCE USE EFFICIENCY OF CASSAVA FARMING IN MAKURDI LOCAL GOVERNMENT AREA OF BENUE STATE, NIGERIA

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ABSTRACT

The study was conducted to assess the profitability and resource use efficiency of cassava farming in Makurdi Local Government Area of Benue State, Nigeria. A total of 122 respondents were selected through multistage sampling technique. Data for the study were collected with the use of structured questionnaire and analysed using both descriptive and inferential statistics. The results showed that, majority (64.75%) of the respondents were males with mean age of 37 years, 80.33% were married and had primary education (49.18%). The major occupation was farming (72.95%) with an average farm size of 1.22 hectares, annual output of 2831.148 kg, annual income of ₦319,557.4, 85.25% were members of cooperatives and about 72.95% had access to credit. The major findings on varieties of cassava produced revealed TME 419 (44.26%), TMS 0581 (14.75%), NR 8082 (13.11%) and TMS 0505 (11.48%). The gross margin result on profitability of cassava farming showed an average total variable cost (TVC) of ₦40,819.67, total revenue (TR) of ₦319,557.4 and profit of ₦278,737.7. The major findings on the factors affecting resource use efficiency in cassava farming revealed age of farmers (37.70%), sex of farmers (13.11%), household size (12.30%), marital status (11.48%) and educational qualification (10.66%). The study concludes that cassava farming is a highly profitable enterprise. It was recommended that; agricultural extension agencies and research institutes should intensify the multiplication and distribution of high-yielding and disease-resistant cassava varieties to ensure sustained productivity and profitability.

Keywords: Profitability, Resource use efficiency, Cassava farming

INTRODUCTION

Agriculture is the cornerstone of Nigeria's economy, providing food, employment and economic growth. Cassava (*Manihot esculenta*) stands out as a vital crop within the agriculture sector, renowned for its resilience and adaptability to diverse climatic conditions. Cassava's significance is underscored by its role in food security and as a source of income for smallholder farmers. By production, IITA (2017) reported that Nigeria is the world's leading producer of cassava and ranked second after yam with about 54.0 million metric tonnes. Food and Agricultural Organization (2024) reported that cassava production increased to about 63 million metric tonnes surpassing DR Congo, Ghana, Angola and Tanzania. The cultivation of cassava requires a well-planned allocation of key resources to ensure optimal productivity and profitability. Land, labour, capital are major inputs relevant in cassava farming which must be technically managed. Additionally, inputs such as fertilizers, pesticides, and improved planting materials significantly impact cassava yield and quality (Igbe, 2024). Efficient allocation of these resources determines the success and sustainability of cassava farming, affecting both yield levels and overall farm profitability. Smallholder farmers often rely on traditional farming practices, which may limit the optimal utilization of these resources (Ume *et al.*, 2016). According to Ani *et al.* (2019), access to quality inputs and modern farming techniques remains a challenge, impacting the overall productivity of cassava farms. Efficient resource use is critical to enhancing yield and ensuring the sustainability of cassava farming (Chikoye *et al.*, 2021).

According to Odekina *et al.* (2024), resource use efficiency in cassava farming encourages the effective allocation and utilization of inputs to maximize output while minimizing waste and costs. The technical, allocative and economic efficiency are considered by farmers for optimum production.



Cassava farmers has to choose the least cost combinations so as to achieve maximum output with minimal cost considerations (Adebayo, 2023). Factors such as limited access to credit, inadequate extension services, and insufficient knowledge of improved agricultural practices hinder farmers' ability to achieve optimal efficiency. Addressing these issues through targeted interventions can lead to better resource management and increased productivity. For instance, the adoption of improved cassava varieties and mechanized farming tools has been linked to higher efficiency levels among smallholder farmers which has made cassava farming a profitable and lucrative enterprise (Okorie *et al.*, 2021). The profitability of cassava farming is influenced by various factors, including production costs, market prices, and yield levels. Cassava roots are sold fresh or processing into various products such as garri, akpu, pallets, flour etc to earn appreciable market value (Adebayo, 2023). Most cassava farmers chose to processes their cassava roots into products that command most market value so as to achieve the most optimum profit to be economically efficient. Smallholder cassava farmers often face challenges such as fluctuating market prices and high input costs, which can affect their profit margins (Odekina *et al.*, 2024). Despite these challenges, cassava remains a profitable venture due to its diverse applications in food and industrial products. Enhancing profitability requires strategies that reduce production costs and improve market access, enabling farmers to secure better returns on their investments. Economic analyses have demonstrated that with efficient resource use and access to markets, cassava farming can yield substantial profits for smallholder farmers (Igbe, 2024).

While cassava farming holds significant potential for profitability, several challenges impede optimal resource use efficiency and financial gains. These challenges include inadequate access to modern farming inputs, limited knowledge of best agronomic practices, and infrastructural deficits such as poor road networks affecting market accessibility (Ani *et al.*, 2019). Additionally, Adebayo (2023) pointed out that, environmental factors like soil degradation and pest infestations pose threats to cassava productivity. Addressing these challenges necessitates a multifaceted approach, encompassing policy interventions, capacity building for farmers, and investment in rural infrastructure to create an enabling environment for sustainable cassava production.

MATERIALS AND METHODS

The Study Area

The research was conducted in the Makurdi Local Government Area of Benue State. Makurdi, the capital city, was established in the early 1920s and gained importance in 1927 when it became the headquarters of the Benue Province. In 1976, it became the capital of Benue State. The estimated population of Makurdi in 2015 was 500,797 (NPC, 2015). The major ethnic groups in the area are the Tiv, Idoma, Iggede, and Etulo. Makurdi is located between latitudes 7°40'N and 7°50'N and longitudes 8°20'E and 8°40'E, covering a total area of approximately 670 km². It falls within the guinea savanna vegetation zone, with some patches of forest. The Local Government shares boundaries with Guma to the north, Gwer to the south, Tarka to the east, and Gwer West Local Government Area to the west. A prominent geographical feature of the area is the River Benue, which divides the Local Government into two parts: the northern part called North Bank and the southern part called South Bank (BNARDA, 2020).

The primary occupation of the people in Makurdi is farming, with approximately 75% of the population engaged in subsistence farming. Other important occupations include fishing, civil services, artisans, and marketing. Makurdi consists of eleven council wards, namely Mbalagh, Agan, North Bank I, North Bank II, Fiidi, Wailomayo, Baa, Modern Market, Ankpa/Wadata, Clerk Market, and Central/South Mission.

Sampling Technique and Sample Size

The population of the study comprised of 8750 registered cassava farmers in Makurdi Local Government Area of Benue State.

The sample for this study consisted of 122 cassava farmers in Makurdi Local Government Area of Benue State. The sampling techniques for the study was multistage sampling techniques. Multistage sampling techniques is a sampling procedure whereby sampling is done in stages until required sample size is obtained. This sampling was suitable for this study because sampling for the selection cassava



farmers is done in stages. This helped the researcher to arrive at a better representative sample to enhance generalization. First stage was the random sampling of six (6) council wards out of the 11 council wards in the study area. This was done to avail each council ward the opportunity of being selected. Second stage was the proportionate selection of cassava farmers based 0.014% of the registered cassava farmers from selected council wards to acquire the required sample size for the study. A total number of 122 cassava farmers were considered from the multistage sampling as a representative sample for the study.

Table 1: Sample Size Selection Plan

Selected council wards	Total number of registered cassava farmers	Sample percentage (1.4%)	Sample Size
Ankpa/Wadata	1480	0.014	21
Modern Market	1400	0.014	19
Fiidi	1450	0.014	20
Mbalagh	1480	0.014	21
North Bank II	1440	0.014	20
North Bank I	1500	0.014	21
	8750		122

Source: BNARDA, 2024

Data Collection and Analysis

Data were collected with the use of structured questionnaire and analysed using both descriptive and inferential statistics, descriptive statistics such as frequencies, percentages were used, while gross margin analysis and multiple linear regression were used as the inferential statistics.

Model Specification

Gross margin

$$GM = TR - TVC$$

Where

GM= gross margin from cassava farming

TR=Total revenue from cassava farming

TVC= Total variable cost from cassava farming

Multiple regression

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + u_i$$

where:

Y = Cassava output (kg or ₦)

β_0 = Intercept (constant term)

$\beta_1, \beta_2, \dots, \beta_n$ = Regression coefficients (measuring the effect of each independent variable)

X_1 = sex (male=0, female=1)

X_2 = age (years)

X_3 = Marital status (single=1, married=2, divorce=3, widow=4)

X_4 = Education (years spent in school)

X_5 = Household size (number of people in the house)

X_6 = Farm size (hectares)

X_7 = Cooperative membership (yes=0, no=1)

X_8 = Annual output (kg)



X_9 = Annual income (N)

ε = Error term (capturing unexplained variations)

RESULTS AND DISCUSSION

Socioeconomic Characteristics of Cassava Farmers

The result on socioeconomic characteristics of cassava farmers is presented in Table 2. The results on sex revealed that majority (64.75%) of the cassava farmers were males while 35.25% were females. This indicates that majority of the cassava farmers were male, this is because most farm resources are owned by male. This has limited women potentials in carrying out farming effectively. This is in line with the findings of Bojande (2021) and Tagher *et al.* (2024) who reported that, male are more involved in cassava farming in Benue State. The result of age showed that majority (56.78%) of respondents were between the age bracket of 29 – 39years, 16.10% were more than 51years, 15.25% were between 40 – 50 years, 11.86% were less than 28years. The average age of cassava farmers was 37.0years which indicates that cassava farmer are still in their productive age to cultivate cassava and manage effectively the enterprise. This is in line with the findings of Bojande (2021) who reported that most cassava farmers were between 30-40years of age.

The results also showed that majority (80.33%) of the respondents were married, while 9.84% were single and 9.84% divorced. The predominance of married individuals suggests a high level of family responsibility and access to family labor, which is advantageous for cassava farming. This finding concurs with Ikuemonisan *et al.* (2021), who emphasized that married farmers often benefit from spousal cooperation and household labor, thereby improving production efficiency. Conversely, Eze and Anyanwu (2020) found that unmarried farmers sometimes exhibit higher mobility and openness to market and innovation opportunities. The result on major occupation revealed that, majority (72.95%) of the respondents were involved in farming, 13.93% were civil servants, 59.84% were traders and 3.28% were artisans. This indicates that Benue state is agrarian state dominated by farmers predominantly who engage in cropping and livestock rearing. This is in line with the findings of Igbaifuna *et al.* (2021) who reported that the most occupation in Benue State is farming. This was supported by Onyemma *et al.* (2020) who agree the farming is the most predominant occupation in Benue State.

In terms of education, 49.18% of the farmers had First School Leaving Certificate (FSLC), 14.75% had Senior Secondary School Certificate Examination (SSCE), 23.96% had tertiary education, and 13.11% had non-formal education. The high proportion of farmers with basic education suggests moderate literacy levels, which could positively influence record-keeping, adoption of improved technologies, and understanding of extension messages. This finding aligns with Nwaobiala *et al.* (2019), who noted that education enhances farmers' decision-making and productivity. The findings on farm size showed that majority (94.26%) of respondents cultivate between 1-2hectares while 5.74% cultivated between 3-4hectares. The average farm size 1.22 hectares, which implies that most of the cassava farmers operates on small scale which made them to cultivate on small land holdings. This practice deprive large scale production as farm machineries could not be used in farming. This coincide with the findings of Gbigbi and Chuks-Okonta (2021) and Igbaifua *et al.* (2021) who reported that, most cassava farmers operate on small scale and cultivate between 1-2hectares of land. The result on annual output showed an average of 2,831.148 kg which indicates that, cassava farming produces appreciable output considering the scale of production. This s in line with the findings of Ekong and Udoh (2021) who reported cassava output per hectare of between 1500kg to 2500kg.

The result on annual income distribution showed that majority (59.84%) earned between N150,001 – N250,000; 20.49% earn between N250,001 – N350, 000; 8.20% earned more than N550,000; 4.10% earned less than N150,000 and N350,001-N450,000; while 3.28% earned N450,001 – N550,000. The average annual income was ₦319,557.40 which indicates that cassava farming is a small-scale enterprise with annual income below N1,500,000.00. This is in line with the findings of Bojande (2021) and Tagher *et al.* (2024) who reported that small scale cassava farmers earn low income. The result on membership of cooperative society revealed that majority (85.25%) of the respondents belong to cooperative while 14.75% do not belong to cooperatives. This indicates that cassava farmers



in the study are belong to cooperative societies which will enable them obtain timely information and cooperative benefits on credit facilities to carryout farming operations. This aligns with Ezech and Anyanwu (2020) who emphasized that cooperative membership enhances farmers' access to inputs and market opportunities. The result on access to credit showed that, majority (72.95%) of respondents have access to credits while only 27.05% do not have access to credit. This indicates that cassava farmer in the study area have access to credit facilities and loans which support their farming activities like herbicides and fertilizer application, payment for labour and postharvest operations to prevent postharvest losses and increase production capacity. This is in line with the findings of Tagher *et al.* (2024) who reported that, most cassava farmers have access to credit facilities in Benue State.

Table 2: Socioeconomic Characteristics of Cassava Farmers in the Study Area (n=122)

Socioeconomic characteristics	Frequency	Percentage	Mean
Sex			
Male	43	35.25	
Female	79	64.75	
Age (years)			
<28	14	11.86	37.75years
29-39	67	56.78	
40-50	18	15.25	
>51	19	16.10	
Marital status			
Single	12	9.84	
Married	98	80.33	
Divorced	12	9.84	
Educational qualification			
FSLC	60	49.18	
SSCE	18	14.75	
Tertiary	28	23.96	
Non-formal	16	13.11	
Major occupation			
Farming	89	72.95	
Trading	12	9.84	
Civil servants	17	13.93	
Artisans	4	3.28	
Farm size (hectares)			
1-2	115	94.26	1.22hectares
3-4	7	5.74	
Annual output (kg)			2831.148kg
Annual income (Naira)			
<150,000	5	4.10	319,557.4
150,001 – 250,000	73	59.84	
250,001 – 350,000	25	20.49	
350,001 – 450,000	5	4.10	
450,001 – 550,000	4	3.28	
>550,000	10	8.20	
Member of cooperative			
Yes	104	85.25	
No	18	14.75	
Access to credit			
Yes	89	72.95	
No	33	27.05	

Source: Field Survey, 2025



The Varieties of Cassava Produced in the Study Area

The result on varieties of cassava produced is presented in Table 3. The result showed that 44.26% of the respondents cultivate TME 419, while 14.75% TMS0581, 13.11% cultivate NR 8082, 11.48% cultivate TMS 0505, 10.66% cultivate TMS 96/1632, 5.74% cultivate TMS 01/1368. This indicates that, most cassava farmers cultivate TME 419 varieties. This dominance may be attributed to its high yield potential, early maturity, and resistance to pests and diseases. Other varieties were considered due to their good starch content, processing quality, and tolerance to drought. This is in line with the findings of Bojande (2021) and Tagher (2024) who reported that TME 419 has become the most preferred cassava variety among cassava farmers in Benue State due to its profitability and adaptability to diverse agro-ecological conditions.

Table 3: Varieties of Cassava Produced in the Study Area

Native name	Variety name	Frequency	Percentage
Akpu	TME 419	54	44.26
Danwali	TMS0581	18	14.75
Yakpe	TMS 96/1632	13	10.66
Akpu apupuu	TMS 0505	14	11.48
Akpu aii	NR 8082	16	13.11
Logo Vit. A.	TMS 01/1368	7	5.74

Source: Field Survey, 2025

Profitability of Cassava Farming in the Study Area

The gross margin result on profitability of cassava farming is presented in Table 4. The results showed total variable cost (TVC) of ₦40,819.67 and a total revenue (TR) of ₦319,557.40, resulting in a gross margin (GM) of ₦278,737.70. This clearly demonstrates that cassava farming is highly profitable, as revenue significantly outweighs the cost of production. The substantial profit margin suggests that cassava cultivation offers strong economic incentives for farmers, and with relatively low operational costs, it serves as an attractive livelihood option in the region. This aligns with the findings of Omonona *et al.* (2019); Ndukwu and Onyenweaku (2020), who also reported high profitability in cassava enterprises due to its low input requirement and strong market demand for both fresh roots and processed products such as gari, fufu, and starch.

Table 4: Gross Margin Result on Profitability of Cassava Farming in the Study Area

Cost/revenue	Amount (₦)
Costs	40,819.67
Revenue	319,557.4
Profit	278,737.7

Source: Field Survey, 2025

Factors Affecting Resource Use Efficiency in the Study Area

The result on factors affecting resource use efficiency in cassava farming is presented in Table 5. The result showed that most (37.70%) of the respondents considered age of farmers as the most significant factor considering cassava farming. This indicates that experience acquired over time plays a major role in efficient use of farm inputs such as land, labour, and planting materials. Older farmers may possess better decision-making skills and indigenous knowledge that enhance productivity, a finding consistent with Onuk *et al.* (2015) and Olayemi *et al.* (2020) who reported that age significantly influences production efficiency among cassava farmers in Nasarawa State Nigeria. The result also showed that, sex of farmers (13.11%) and household size (12.30%) were also notable factors affecting resource use efficiency in cassava farming. The influence of sex implies that gender roles may affect resource allocation and labour availability, especially in rural farming systems where men often control access to land and capital. This aligns with Adewumi and Adesiyani (2019) who found that male farmers tend to be more resource-efficient due to higher access to productive inputs. Likewise Oggunniyi *et al.*



(2020) reported that, larger household sizes likely provide more family labour, which reduces production costs and improves efficiency among cassava farmers in Oyo State.

Marital status (11.48%) and educational qualification (10.66%) also contributed significantly. Married farmers may have stronger social support systems, which facilitate labour sharing and financial stability. Education enhances access to information and adoption of improved technologies, thereby improving input-use efficiency. This agrees with the findings of Igbaifua *et al.* (2021) who reported positive correlation between education and technical efficiency in cassava farming in Benue State.

The result again showed that, major occupation (5.74%), farm income (5.74%), and farm size (1.64%) were considerable factors in cassava farming. Farmers with cassava as their primary occupation or higher income levels may have better access to quality inputs and modern tools, improving efficiency. However, the low significance of farm size suggests that even smallholder farmers can achieve efficient resource use when other socioeconomic conditions are favourable. This is in line with the findings of Olayemi *et al.* (2020) who reported farm income as an important factor for re-investing in cassava production. Likewise, Gbigbi and Chuks-Okonta (2021) reported that cassava farming is positively influence by farm size in Delta State.

The least influential factors were membership of cooperatives (0.82%) and extension visits (0.82%), indicating weak institutional support. This suggests that farmers may not be benefiting adequately from extension services or cooperative structures, which are expected to enhance knowledge sharing and input accessibility. Similar challenges were highlighted by Ekong and Mbuk (2018), who reported low extension contact as a major limitation to efficiency improvement among cassava farmers.

Table 5: Factors Affecting Resource Use Efficiency in the Study Area

Factors affecting resource use		Frequency	Percentage
Age of farmers	46	37.70	
Sex of farmers	16	13.11	
Educational qualification of farmers	13	10.66	
Marital status of farmers	14	11.48	
Household size	15	12.30	
Major occupation	7	5.74	
Farm size	2	1.64	
Farm income	7	5.74	
Membership of cooperative	1	0.82	
Extension visits to cassava farmers	1	0.82	

Source: Field Survey, 2025

CONCLUSION AND RECOMMENDATIONS

In conclusion, the study established that cassava farming in the study area is a highly profitable enterprise, as evidenced by the substantial gross margin of ₦278,737.70 realized from an average output of 2831.15 kg and relatively low variable costs. Also improved cassava varieties such as TME 419 and TMS 0581 dominated cultivation, indicating a positive shift towards high-yielding and disease-resistant cultivars. However, resource use efficiency was significantly influenced by socioeconomic factors such as age, sex, household size, marital status, and education, implying that targeted interventions in capacity building and inclusive policy support could further enhance productivity. Overall, cassava farming holds strong potential for income generation and rural livelihood improvement in the area. The study recommends that Government should provide motor able roads for ease of transportation of cassava products to markets, Government should provide storage facilities to reduce post-harvest losses, extension agencies should support farmers with improved cassava varieties that are high yielding and resistant to pest and diseases, Government and relevant agencies should introduce price control measures to give cassava farmers the needed profit, farmers should leverage on the diverse cassava processing potentials to maximize profit from production.



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