African Multidisciplinary
Journal of Sciences and Artificial Intelligence

ISSN : 3434-9871

Index: Harvard, Boston, Sydney University, Dimensions, Lens, ResearchGet Scilit, Semantic, Google Scholar, Base etc

https://doi.org/10.58578/AMJSAI.v1i1.3629

# Farm Level Productivity and Profitability of Records Keeping Cassava Farmers in Udenu Local Government Area, Enugu State, Nigeria

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**Article Info:**

| Submitted: | Revised: | Accepted: | Published: |
|---|---|---|---|
| Jun 26, 2024 | Jul 12, 2024 | Jul 26, 2024 | Jul 31, 2024 |

**Abstract**

Record keeping plays a crucial role in various aspects of organizational functioning. Maintaining accurate records is essential for effective financial management and serves as a valuable resource for operational management and decision-making. This study assessed the farm-level productivity and profitability of cassava farmers who keep records in Udenu Local Government Area of Enugu State, Nigeria. The specific objectives were to analyze the productivity of these cassava farmers, evaluate their profitability, and describe the constraints they face. A multistage sampling procedure, incorporating simple random sampling, was used to collect data from 77 cassava farmers who keep records. The data were analyzed using descriptive statistics, ordinary least squares regression, and gross margin analysis. The findings indicated that labor significantly increased cassava productivity, while the amount of credit used, stem cuttings, and farm size negatively impacted productivity. Additionally, cassava production was found to be profitable, with a gross margin of ₦115,331.95 per hectare of land cultivated and a return on investment of


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₦1.47 for every Naira invested. The constraints faced by cassava farmers included high labor costs, limited farmland, a lack of improved varieties, poor road networks, and insufficient access to extension agents. To address these issues, it is recommended to tailor credit products to meet the specific needs of farmers, such as offering seasonal loans, working capital loans, or loans for specific farming activities. Furthermore, efficient land use planning, considering factors like crop rotation and diversified crops, could help maximize the land's potential.

**Keywords:** Cassava, Profitability, Productivity, Records Keeping

## INTRODUCTION

Financial record keeping is crucial to the production of important reports for business development. Financial statements can be used, for instance, as a condition of applications for business capital loans to financial institutions (Wulandari *et al.*, 2023). As Mwebesa *et al.* (2018) revealed, the financial record is an important practice in the tracking of debtor records, which leads to profit. However, the majority of agricultural business actors performed manual financial recording that is still difficult to produce due to the limited knowledge of accounting science and the complexity of the accounting process (Savitri and Saifudin, 2018; Wulandari *et al.*, 2023).

Financial records in small businesses are still limited to income and expenses, in which the difference is considered as profit, even though many other factors can be applied to determine profit. This could be due to the unknown benefits and importance of implementing financial reports and bookkeeping in the development of a business (Rizal et al. 2019; Wulandari *et al.,* 2023). Findings from this research can be used to design capacity-building programs and training for farmers, with a specific focus on record-keeping practices. This is an area where support and education are often lacking. Also, the focus on records keeping by cassava farmers can uncover innovative practices and best approaches that can be shared and adopted not only in the study area but also in other cassava-producing states.

Cassava (Manihot esculenta) is a vital crop in Nigeria, serving as a staple food for millions of people and a source of income for farmers. The productivity and profitability of cassava

production at the farm level have significant implications for food security, rural livelihoods, and the overall agricultural sector in Nigeria (FAO, 2018).

Cassava farming is predominantly carried out by smallholder farmers, with over 80% of the production coming from these rural households. It not only provides a source of sustenance but also an essential income stream. As such, cassava holds the potential to alleviate rural poverty, contribute to job creation, and reduce urban migration (Federal Ministry of Agriculture and Rural Development (FMARD), 2016).

Cassava's significance in Nigeria is underscored by its versatility and adaptability to various agro-ecological zones. With a wide range of applications, including food products, livestock feed, and industrial purposes such as starch and ethanol production, cassava serves as a strategic crop. The crop's resilience to adverse environmental conditions, such as drought and low soil fertility, further cements its role in ensuring food availability in the face of changing climate patterns (Otekunrin and Sawicka, 2019).

While there have been studies conducted on farm-level productivity (Omodara *et al.,* 2023; Obi-Egbedi *et al*., 2022; Kolapo and Adeyera, 2021; Balogun *et al.,* 2017) and profitability (Obayelu *et al*., 2014; Obayelu *et al*., 2021; Omotayo and Oladejo, 2016) of cassava production in Nigeria, the specific focus on records keeping farmers is relatively underexplored. Understanding the role of record-keeping practices in cassava farming is essential for promoting data-driven decision-making and enhancing productivity. The originality of this study lies in its specific focus on cassava records keeping farmers, which is a critical yet understudied aspect of cassava farming in Nigeria. It has the potential to contribute to agricultural knowledge, improve farmer practices, and enhance the sustainability and profitability of cassava production.

There are still research gaps that need to be addressed to further enhance our understanding of this important crop in the agricultural sector. There is a research gap in understanding the dynamics of farm-level profitability in different agro-ecological zones and socio-economic contexts within Nigeria. Cassava production varies across regions in terms of cultivation and management practices, market access, input availability, and infrastructure.

However, the cassava sector in Nigeria faces multifaceted challenges. Yield gaps, largely attributed to low adoption of improved varieties and farming practices, as well as pest and disease pressures, limit farm-level productivity. Furthermore, post-harvest losses due to

inadequate storage facilities and market access constraints undermine the profitability of cassava farming (Onasanya *et al.,* 2021; Kintché *et al.,* 2017; De Souza *et al.,* 2017).

Conducting a study that consider key feature would allow for a more nuanced understanding of the factors influencing farm-level profitability and provide context-specific recommendations for improving profitability in different states of Nigeria.

The justification for conducting further research in this area is evident. Enhancing farm-level productivity and profitability in cassava production can contribute to improved food security, increased rural incomes, and the overall economic development of Nigeria. By identifying the key determinants and barriers to productivity and profitability, policymakers and stakeholders can design targeted interventions and policies to support cassava farmers, promote sustainable farming practices, and foster market linkages.

Analyzing productivity and profitability can reveal opportunities for value addition, processing, and market development, leading to increased income generation and employment opportunities. Enhancing productivity and profitability in cassava production requires sustainable agricultural practices. Analyzing farm-level factors can help identify areas where sustainable practices can be implemented, such as improved soil management, efficient use of inputs, and pest and disease control. Promoting sustainable agriculture in cassava production can reduce environmental impacts and improve long-term productivity.

Evidence-based policymaking is crucial for effective agricultural development. Analyzing farm-level productivity and profitability can provide policymakers with valuable insights to formulate targeted policies and interventions. It can help identify areas where support is needed, such as access to credit, improved agricultural extension services, market infrastructure, and research and development investment. Finally, examining productivity and profitability at the farm level is essential for understanding the entire cassava value chain. It can help identify constraints and inefficiencies in various stages, including production, processing, storage, and marketing. This knowledge can guide efforts to improve value chain integration, enhance market linkages, and promote value addition, thereby increasing the overall competitiveness and profitability of the cassava sector.

This study aims to explore the intricate dynamics of cassava production in Nigeria, with a specific focus on farm-level productivity and profitability of cassava records keeping farmers. By analyzing the challenges, opportunities, and potential strategies for improvement, this research seeks to offer valuable insights for policymakers, farmers, and

stakeholders in the cassava value chain. These insights are instrumental in realizing the full potential of cassava as a driver of rural development, economic growth, and food security in Nigeria.

## METHODS

### Study Area

Udenu Local Government Area is one of the seventeen local government areas that make up Enugu State, located in the South-East geopolitical zone of Nigeria. It is situated approximately at latitude 6°55'N and longitude 7°31'E. The area features semitropical rainforest vegetation, complemented by typical grassy vegetation (Ezeaku and Egbemba, 2014). According to the 2006 census, Udenu LGA has an estimated population of 178,687 (Asogwa et al., 2020). The residents primarily engage in farming crops such as yam, cassava, maize, beans, and cashew. Additionally, they trade in various commodities, including palm oil, palm nuts, and plantains (Odo, 2014).

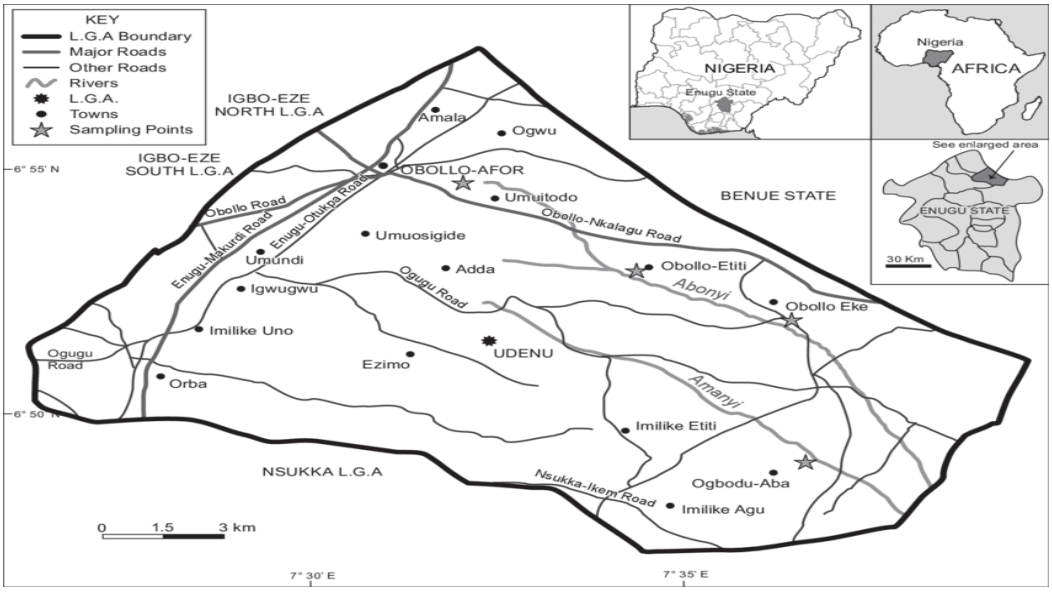


**Figure 1:** Map of Udenu Local Government Area

**Source:** Department of Geography University of Nsukka

**Sampling Procedure**

A multistage and simple random sampling procedure was employed to select respondents in the study area. In the first stage, five wards—Imilike, Obollo-Eke, Obollo-Etiti, Ezimo, and Ogbodu-Aba—were chosen from the ten wards in the local government area, based on their level of production. The second stage involved purposively selecting two villages from each of these wards, resulting in a total of 10 villages. In the third stage, 5% of cassava record-keeping producers were randomly selected from each village, leading to a total sample size of 77 respondents.

**Data collection**

Primary data were collected with the aid of structured questionnaire on socioeconomic characteristics of the farmers, input costs and returns, factors influencing the production of cassava, and constraints faced by cassava farmers.

**Model Specification**

**Ordinary Least Square Regression**

Ordinary least square regression was used to ascertain factors affecting the productivity of cassava farmers. The implicit model is as follows:

$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, U)$

Where Y = Cassava output (Kg)

$X_1$ = Farm size in hectares

$X_2$ = Amount of credit use (N)

$X_3$ = Labour (man-days)

$X_4$ = Cassava cuttings (N)

$X_5$ = Farming experience (years)

$X_6$ = Educational level (Number of schooling years)

$X_7$ = Fertilizer (Kg)

U =error term

Four functional forms namely linear, semi-log, exponential and double log was fitted to the data generated from the field using ordinary least square technique under the notion that

data fulfilled the assumption of the multiple regression models. The explicit forms of these models are as follows:

**Linear function**

$$Y=b_0 +b_1 X_1+ b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + U_i$$

**Semi-log function**

$$Y= b_0 +b_1 L_n X_1+ b_2 L_n X_2 + b_3 L_n X_3 + b_4 L_n X_4 + b_5 L_n X_5 + b_6 L_n X_6 + b_7 L_n X_7 + U_i$$

**Double log function**

$$L_nY = b_0 +b_1 L_n X_1+ b_2 L_n X_2 +b_3 L_n X_3 + b_4 L_n X_4 + b_5 L_n X_5 + b_6 L_n X_6 + b_7 L_n X_7 + U_i$$

**Exponential function**

$$Y = aX_1^{\ b1}+ X_2^{\ b2}+ X_2^{\ b2} + X_3^{\ b3} + X_4^{\ b4} + X_5^{\ b5} + X_6^{\ b6} + X_7^{\ b7} U$$

$$LogY=a +b_1 X_1+ b_2X_2 +b_3X_3 + b_4X_4 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + U$$

**Gross margin Analysis**

The gross margin analysis for the study is specified as follow:

GM = TR –TVC

Where

GM= Gross Margin (₦/ha)

TR= Total Revenue (₦/ha) where TR = P*Q (P = Price, Q = Quantity)

TVC= Total variable Cost incurred (₦/ha)

## RESULTS AND DISCUSSION

The socioeconomic characteristics of cassava farmers in the study area are presented in Table 1. The results reveal that the mean age of the respondents is 40 years, indicating that most of them are in their active and productive years, which facilitates their engagement in farm activities. This finding aligns with, but is slightly lower than, the findings of Omodara et al. (2023). A significant majority (67.53%) of the respondents were male, highlighting a higher participation of men in cassava production compared to women. This may be due to cultural norms where men are typically seen as the primary providers, and women might be

engaged in other occupations. This observation is consistent with Obayelu et al. (2014). Additionally, 53.25% of the respondents were married, suggesting that married individuals dominate cassava production in the area, likely benefiting from the availability of family labor. This result corresponds with the findings of Obi-Egbedi et al. (2022). Furthermore, 94.81% of the respondents had received some form of education, indicating a high level of functional literacy among the farmers, similar to the findings of Angba and Iton (2020) in their study on cassava production in Akpabuyo Local Government Area, which reported that 55.2% of cassava farmers had primary education.

The mean farming experience among the respondents was 7 years, suggesting that many cassava farmers possess a substantial amount of experience. This finding is supported by the study conducted by Owoeye (2020). Farm size is a critical factor in cassava production, with larger farms generally associated with increased production, a greater capacity for risk-taking, and more opportunities for experimenting with new technologies. However, only 15.58% of the farmers had farm sizes greater than 2 hectares, indicating that most operate on a small scale. This observation is consistent with the findings of Obi-Egbedi et al. (2022). Lastly, 61.04% of cassava farmers in the study area had access to credit, suggesting that a majority of the respondents could secure financial resources for their farming activities. This finding, however, does not align with the observations of Silong and Gadanakis (2020).

**Table 1: Socioeconomic Characteristics**

| | Frequency | Percentage | Mean |
|---|---|---|---|
| **Age** | | | |
| ≤30 | 27 | 35 | |
| 31-40 | 20 | 25.9 | |
| 41-50 | 15 | 19.4 | |
| 51-60 | 13 | 16.8 | |
| ≥61 | 2 | 2.59 | |
| Total | 77 | 100.00 | 40 |
| **Sex** | | | |
| Male | 52 | 67.53 | |
| Female | 25 | 32.47 | |
| Total | 77 | 100.0 | |
| **Marital status** | | | |
| Single | 36 | 46.75 | |
| Married | 41 | 53.25 | |
| **Educational level** | | | |
| No formal education | 4 | 5.19 | |
| Primary school | 13 | 16.88 | |

| | | | |
|---|---|---|---|
| education | | | |
| Secondary school education | 14 | 18.18 | |
| Tertiary education | 46 | 59.74 | |
| **Farming experience** | | | |
| 1-10 | 68 | 88.31 | |
| 11-20 | 6 | 7.79 | |
| ≥21 | 3 | 3.90 | **7** |
| **Farm size** | | | |
| 0 - 2 | 55 | 84.42 | |
| > 2 | 12 | 15.58 | **1** |
| **Access to credit** | | | |
| Yes | 47 | 61.04 | |
| No | 30 | 38.96 | |

**Source:** Data analysis (2022)

**Profitability of Cassava Production**

The profitability of the cassava farmers in the study area is presented on Table 2. The result shows that the total variable cost per hectare by cassava farmers was ₦242,207.01 and the total revenue was ₦357,538.96. Thus, the gross margin obtained was ₦115,331.95 per hectare. The return on investment was ₦1.47 implying that for every ₦1 invested by the farmers in cassava production, ₦1.47 was realized in return. It can therefore be concluded that cassava production in Udenu Local Government Area, Enugu State, Nigeria was profitable. The finding is lower than of Omotayo and Oladejo (2016). In the percentage of TVC, labour cost constituted 45.41%, operational cost constituted 42.92% and transportation cost constituted 11.67% of the total variable cost.

**Table 2: Profitability of cassava production in Udenu LGA, Enugu State**

| Items | Cost | Percentage on TVC |
|---|---|---|
| **Yield** | 22.55kg | |
| **Total revenue** | ₦357,538.96 | |
| Labor cost | ₦109,997.40 | 45.41% |
| Operational cost | ₦103,951.82 | 42.92% |
| Transportation cost | ₦282,57.79 | 11.67% |
| Total variable cost(TVC) | ₦242,207.01 | |
| Gross margin(GM) | ₦115,331.95 | |
| Return on investment | ₦1.476 | |

**Source:** Data analysis (2022)

**Productivity of cassava farmers**

The result of factors influencing cassava production in the study area is presented on Table 3. Among the four functional forms that were estimated, the choice of exponential form came up as a lead equation due to a high $R^2$ (73%), there are three significant variables and F statistic value is significant at 1%. and the estimated R-squared shows that the independent variables explain 73% of variations in the total output of cassava. The result shows that labour, farm size, amount of credit use, and stem cuttings are the significant factors that affect cassava productivity. Specifically, the coefficient of labour was positive and statistically significant at 1%. This implies that a unit increase in labour will result to an increase in cassava output. This could be explained by the skill and the experienced of cassava farmers in their assigned tasks that can make them to complete it more quickly and with greater precision, leading to increased productivity. The result is contrary to Balogun and Akinyemi (2017). The coefficient of amount of credit use was negative and is statistically significant at 1%. This implies that a unit increase in credit use will decrease in cassava output. This could be explained by the poor loan management, including the misallocation of borrowed funds and a lack of tracking or accountability that could result in reduced productivity due to inefficient resource utilization. This is contrary to Adeosun *et al.* (2022). Finally, the coefficient of farm size is negative and significant at 10%. This could be due to poor land use that can lead to soil degradation, nutrient depletion, and increased pest and disease pressures. These factors can negatively affect cassava productivity. This is contrary to Obi-Egbedi *et al.* (2022).

**Table 3: Productivity of cassava farmers**

| **Variable** | **Double log** | **Exponential++** | **Linear** | **Semi log** |
|---|---|---|---|---|
| Constant | 4.243267*** | 3.508408*** | 3073.837*** | 7862.81*** |
| | (17.29) | (47.20) | (8.26) | (4.67) |
| Access to credit | -1.042883*** | -.0000376*** | -.1308433*** | -3947.232*** |
| | (-17.71) | (-10.71) | (-7.45) | (-9.78) |
| Labour | .6874221*** | 2.94e-06*** | .0093623*** | 2174.811*** |
| | (21.64) | (10.64) | (6.77) | (-9.98) |
| Stem cuttings (N) | -.0225852 | -4.96e-08 | -.0006649 | -105.9473 |
| | (-0.95) | (-0.03) | (-0.09) | (-0.65) |
| Farming experience | -.0265955 | -.0019457 | -20.26139 | -226.7117 |

| | | | | |
|---|---|---|---|---|
| (years) | (-0.94) | (-0.73) | (-1.52) | (-1.17) |
| | .0548824 | -.0022652 | 74.50056 | 527.4793 |
| Educational level | (0.99) | (-0.11) | (0.73) | (1.39) |
| | -.0190894 | 9.08e-06 | .133959 | 10.07526 |
| Fertilizer (Kg) | (-0.66) | (0.29) | (0.84) | (0.05) |
| | -.076769 | -046349* | -221.5814* | -466.2694 |
| Farm size(ha) | (-1.23) | (-1.82) | (-1.74 ) | (-1.09) |
| Prob> F | 89.26(0.0000***) | 26.98(0.0000***) | (12.63)0.0000*** | 22.37(0.0000***) |
| R Square | 0.9006 | 0.7324 | 0.5617 | 0.6941 |
| Adjusted R square | 0.8905 | 0.7053 | 0.5173 | 0.6631 |
| Root MSE | .08716 | .14297 | 715.46 | 597.72 |

***,**,* =1%,5% and 10% level of significance respectively ++ lead equation

t-statistics are in bracket

**Source:** Data analysis (2022)

**Constraints Faced by Cassava farmers**

The constraints faced by cassava farmers is presented on Table 4 in order of their ranking. High cost of labor, limited farm land, bad road network and lack of improved varieties were the severe constraint faced by cassava farmers during cassava production in the study area. The result obtained is consistent with Itam *et al.* (2014), who obtained high cost of inputs as one of the major constraints faced by cassava farmers and Sangoyooni and Ayandiyi (2013) who identified high cost of labor, as one of the major constraints faced by cassava farmers. The least constraints were poor access to loan (5.5%), lack of access to extension service (11.9%), pest and disease (10.5%), low market prices (6.4%) and high cost of fertilizer (7.8%). This finding is in line with Onasanya *et al.* (2021).

**Table 4: Constraints faced by the farmers in their production activities**

| | Frequency | Percentage | Mean | Rank |
|---|---|---|---|---|
| High cost of labor | 38 | 17.4 | 0.4935 | 1st |
| Limited farm land | 33 | 15.1 | 0.4286 | 2nd |
| Lack of improved varieties | 28 | 12.8 | 0.3636 | 3rd |
| Bad road network | 28 | 12.8 | 0.3636 | 3rd |
| Lack of access to extension service | 26 | 11.9 | 0.3377 | 4th |
| Pest and disease | 23 | 10.5 | 0.2987 | 5th |
| High cost of fertilizer | 17 | 7.8 | 0.2208 | 6th |
| Low market prices | 14 | 6.4 | 0.1818 | 7th |
| Poor access to loan | 12 | 5.5 | 0.1558 | 8th |

**Source:** Data analysis (2022)

## CONCLUSION

This study assessed the farm level productivity and profitability of records keeping cassava farmers in Udenu Local Government Area of Enugu state, Nigeria. The study found that cassava records keeping farmers are making profit from their activity. Labour significantly increase cassava productivity while amount of credit use, stem cuttings and farm size negatively affect cassava productivity. High cost of labour, limited farm land, bad road network, lack of improved varieties, lack of access to extension services and pest and diseases were the severe constraints faced by cassava records keeping farmers in the study area. Based on the finding of the study, the following recommendations are made:

i. There is need to tailor credit products to meet the specific needs of farmers, such as seasonal loans, working capital loans or loan for specific farming activity.

ii. Provide farmers with training and education on financial management, including understanding the costs and implications of credit. This empowers farmers to make informed decisions regarding credit use.

iii. Invest in training programs to enhance laborers' skills. This can involve educating cassava farmers on modern farming practices and the use of agricultural implements.

iv. Plan the efficient use of available land by considering factors like crop rotation, diversified crops could maximize the potential of land.

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