# Cassava Value Web Profitability among Farming Households in Ogbomoso ADP Zone, Oyo State, Nigeria

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**Abstract**

Cassava remains a vital crop in Nigeria's food and industrial sectors, yet a significant gap persists between production and the country's demand for cassava products and by-products. This study examined the determinants of participation and profitability in the cassava value web among farming households in the Ogbomoso ADP Zone of Oyo State, Nigeria. Primary data were collected from 190 cassava farmers using a structured questionnaire through a multistage sampling technique. Descriptive statistics were used to identify socio-economic characteristics and production constraints, while gross margin and benefit–cost ratio (BCR) analyses measured profitability. A probit model was employed to assess factors influencing farmers' participation in the cassava value web. Results showed that 85.9% of respondents participated in cassava processing and marketing activities, with a mean BCR of 3.18, total revenue of ₦83,784, and profit of ₦31,282 per 25 kg bag of lafun—the most common cassava product. The probit estimates revealed that age (p = .01), access to processing tools (p = .04), credit (p = .02), household size (p = .05), extension contact (p = .06), and farm size (p = .02) significantly increased the likelihood of participation. Major constraints included high perishability (97.4%) and poor infrastructure (96.8%). The findings highlight that participation in cassava value web activities enhances farm profitability and household welfare. The study recommends increased access to credit, processing technologies, and extension services to strengthen farmers' involvement in cassava value addition and promote livelihood improvement in rural communities.

**Keywords: Cassava value web, Profitability, Probit model, Farm households, Nigeria**

## 1.0 Introduction

Cassava (Manihot esculenta Crantz) is a major staple crop in Nigeria and ranks as the third most important crop in the tropics after rice and maize. Its ease of cultivation, adaptability to diverse soil types, and high drought resistance have contributed to its increasing prominence, even replacing yam in some regions. Globally, cassava serves as a daily dietary staple for nearly one billion people, particularly in sub-Saharan Africa (Eugene & Otim-Nape, 2012), and its uses exceed two hundred different forms (Yahaya & Aina, 2017). Every part of the cassava plant is valuable—the leaves are consumed as vegetables or used as protein supplements

for livestock, the stems are used for propagation, and the roots serve both food and industrial purposes (CBN, 2016). However, cassava is extremely perishable, lasting less than three days after harvest due to its cyanide content, which necessitates immediate processing to ensure safety and minimize waste (Heald et al., 2011). Processing into shelf-stable products such as garri, tapioca, and lafun not only detoxifies the crop but also reduces bulk, adds value, and supports urban demand for convenient foods (Phillips et al., 2004; Sanni et al., 2007).

Despite increased cassava production in Nigeria, a significant gap remains between domestic supply and demand for food and industrial uses. This shortfall poses challenges such as low incomes, high postharvest losses, limited access to resources, and market inefficiencies that affect rural livelihoods. The cassava value web—encompassing producers, processors, traders, and consumers—plays a central role in determining how the crop contributes to income generation, employment, and food security. Yet, most existing studies have focused on the profitability of cassava production alone, neglecting the broader socioeconomic dynamics that shape farmers' participation within the value web. Understanding these interconnections is critical for identifying opportunities to enhance rural livelihoods, promote sustainability, and reduce poverty.

In Ogbomoso ADP Zone of Oyo State, cassava farmers face multiple constraints that limit their participation in value addition. These include inadequate processing facilities, poor infrastructure, lack of standardized pricing, and insufficient access to credit and extension services. Socioeconomic factors such as age, education, farm size, and access to technology also influence the likelihood of farmers engaging in the cassava value web. Moreover, environmental challenges arise from the poor disposal of cassava processing wastes—such as peels, pulp, and wastewater—that release toxic substances and unpleasant odors, posing risks to both health and the environment (Ohimain et al., 2013; Olukanni & Olatunji, 2018; Obueh & Odesiri-Eruteyan, 2016). Effective management of these wastes through value addition could transform them into environmentally friendly products with economic benefits.

Cassava cultivation and its associated value web have been recognized for their potential to enhance rural livelihoods by providing diverse income sources, promoting food security, and creating employment opportunities (Akinwumi et al., 2017; FAO, 2018). The concept of the "value web" goes beyond linear value chains to emphasize the interconnectedness of all actors—from seed suppliers to end users—thereby enhancing resource efficiency and collaboration (Degun et al., 2019; Virchow et al., 2014). Strengthening these linkages can improve biomass utilization, promote sustainable production, and retain higher value locally. Therefore, understanding the determinants of farmers' participation in cassava value web activities and their implications for household profitability is essential for developing effective interventions.

This study, therefore, analyzes the effect of cassava value web participation on the livelihoods of farming households in the Ogbomoso ADP Zone of Oyo State, Nigeria. Specifically, it aims to (i) identify the socioeconomic characteristics of cassava value web participants, (ii) estimate the profitability of cassava value web activities, (iii) determine the major factors influencing participation using econometric analysis, and (iv) identify the constraints faced by

actors within the cassava value web. The results are expected to inform policy directions for enhancing farmers' income, promoting sustainable cassava-based enterprises, and improving rural welfare.

## 3.0 Materials and Methods

Oyo State is one of the six states in the southwestern region of Nigeria, comprising thirty-three Local Government Areas (LGAs). The state is characterized by a generally flat terrain with a few gently rolling hills. This study was conducted in Orire and Surulere LGAs, located within the Ogbomoso Agricultural Development Project (ADP) zone. According to the National Bureau of Statistics (2009), the two LGAs have a combined population of approximately 170,858 and cover a total land area of about 2,040 km². Geographically, the area lies between latitude 8º1′N and longitude 3º29′E, with an average annual temperature of 26.2°C, a minimum temperature of 24.3°C, and a maximum temperature of 28.7°C. The mean annual rainfall is about 1,247 mm, providing favorable conditions for agricultural activities. Orire LGA shares boundaries with Irepodun LGA to the north, Oyo LGA to the west, Ogo-Oluwa and Ogbomoso South LGAs to the south, and Ogbomoso North LGA and Kwara State to the east. Agriculture is the predominant occupation of the inhabitants, owing to the area's fertile soil and conducive climatic conditions. The major food crops cultivated include cassava, yam, maize, cowpea, and vegetables, while cash crops such as cocoa, cashew, citrus, mango, and pawpaw are also grown extensively. Fruits like banana, plantain, mango, pawpaw, and pineapple are equally abundant. The population is predominantly of the Yoruba ethnic group, with minority groups such as the Igbo, Hausa, and Urhobo also engaged in farming and trade. The area serves as an important agricultural hub in Oyo State, making it suitable for studying cassava value web participation among farming households.

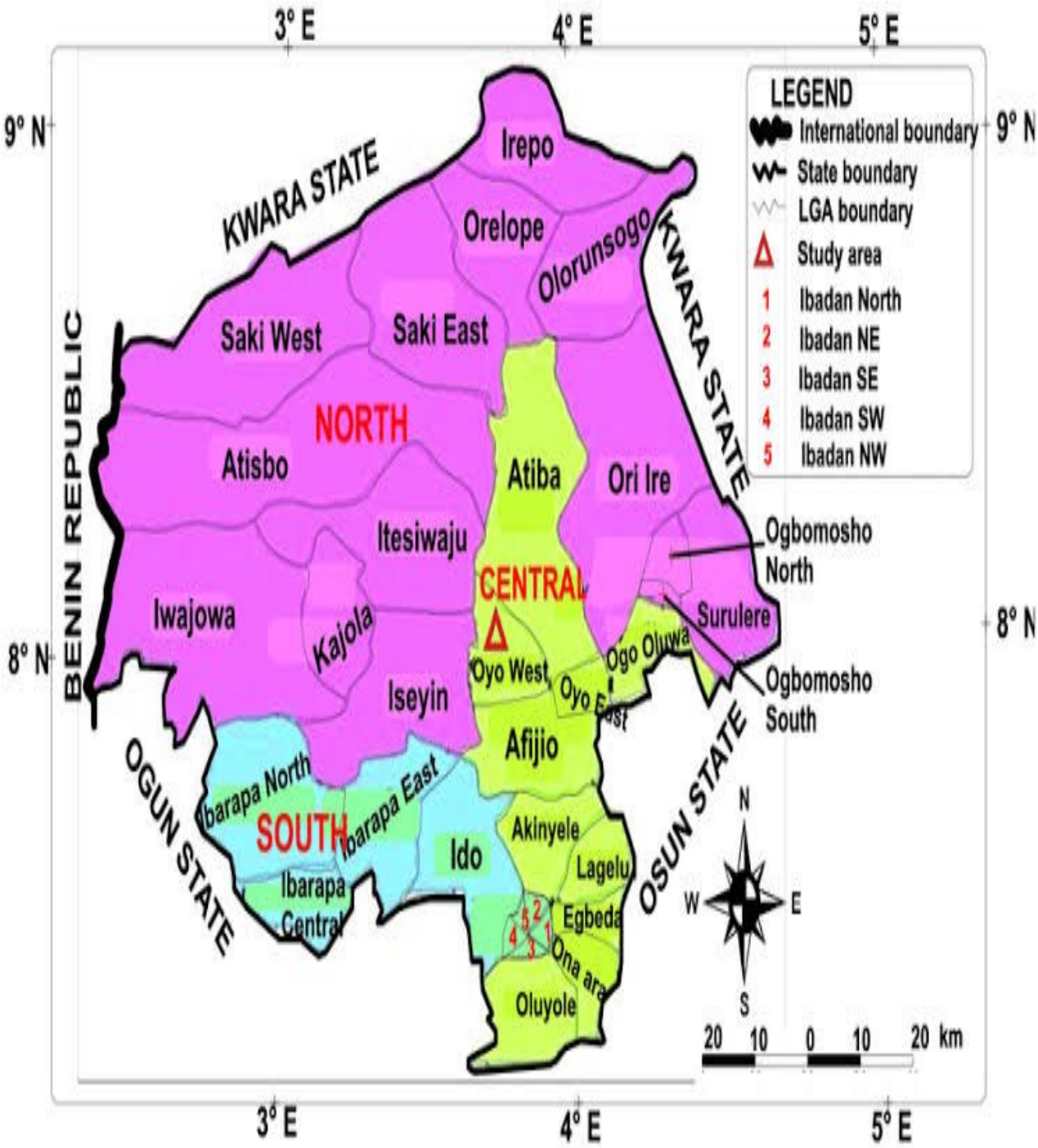


Figure 3: Map showing the study area in the context of Oyo State.
Source: Adapted from Oyo State Map provide the web link

A multistage sampling technique was adopted in selecting the respondents. In the first stage, one agricultural-intensive LGA was randomly selected from the thirty-three LGAs in the state. The second stage involved the random selection of two LGAs—Oriire and Surulere—from the Ogbomoso ADP zone. In the third stage, 30% of the villages or cells were randomly selected from each of the chosen LGAs. Iluju and Tewure were selected from Oriire, while Gambari and Orile Igbon were

selected from Surulere, giving a total of four villages. In the final stage, about 5% of registered cassava-based food crop farmers participating in the cassava value web were randomly chosen from each selected village, giving a total sample size of 190 respondents.

Structured questionnaires were used to collect primary data from the farmers.
The study employed both descriptive and inferential statistical analyses. Descriptive statistics such as frequency distributions and percentages were used to summarize the socio-economic characteristics of respondents and constraints faced within the cassava value web. Inferential statistics, including Probit regression and budgetary (gross margin) analysis, were used to determine profitability and identify factors influencing farmers' participation in the cassava value web. The gross margin (GM) was computed as the difference between total revenue (TR) and total variable cost (TVC), expressed as:

$$GM = TR - TVC$$

where total revenue represents the product of the price per unit and quantity of cassava sold, while total variable cost includes expenses on land preparation, ridging, weeding, transportation, and labour. The benefit–cost ratio (BCR) was also computed to assess the economic viability of cassava value web activities and is given as:

$$BCR = \sum TR / \sum TVC$$

A BCR less than 1 indicates loss, while a value greater than 1 indicates profitability.

## 4.0 Results and Discussion

### 4.1 Socio-Economic Characteristics of Respondents

Table 1 presents the socio-economic characteristics of the cassava value web participants in the Ogbomoso ADP Zone. The results show that 52.1% of the respondents were males, while 47.9% were females. This outcome was expected since cassava farming is labor-intensive and often dominated by men, whereas women are more active in processing and marketing activities. This finding agrees with Ajani and Onwubuya (2013), who reported that cassava farming is largely male-dominated due to the physical strength it requires. The age distribution reveals that 42.6% of the respondents were between 41 and 50 years, while 41.6% were between 51 and 60 years. Only 1.6% were below 30 years. This indicates that cassava value web activities are dominated by middle-aged farmers who possess the experience and physical capacity to engage actively in production, processing, and marketing.

Marital status analysis shows that 92.6% of the respondents were married, 1.1% single, 2.1% widowed, and 4.2% divorced. The predominance of married respondents suggests that household labor is likely a major source of farm support. This supports the observation by Muhammed et al. (2019) that cassava producers often rely on family labor to reduce production costs. Regarding religion, 64.7% of the respondents were Christians, 32.1% Muslims, and 3.2% traditional worshippers, reflecting the general religious composition of the study area. Educational attainment shows that 52.1% of respondents had no formal education, 31.6% completed primary education, 14.7% had secondary education, and only 1.6% attained tertiary education. The high proportion of uneducated respondents suggests that formal education may not be a critical determinant of participation in cassava value web activities. Adeyemo et al. (2018) similarly found that

smallholder farmers with limited formal education still make rational production decisions based on experience and local knowledge.

Household size distribution shows that 64.2% of respondents had between 6 and 10 members, while 9.5% had fewer than 5. The mean household size was 8 persons. Large household sizes imply the availability of family labor, which reduces the need for hired labor and may enhance productivity. Adetarami et al. (2022) reported that large household sizes contribute positively to farm output by reducing labor costs and increasing family income. Occupational data reveal that 94.2% of respondents identified farming as their primary occupation, confirming that cassava value web activities are mainly driven by full-time farmers. This supports Msoo and Goodness (2014), who found that most rural households depend primarily on farming as their main livelihood source. Finally, most respondents (64.7%) cultivated farm sizes of less than or equal to 5 hectares, indicating smallholder dominance. Such small-scale participation aligns with the structure of agricultural production in Nigeria, where smallholders constitute the majority of producers.

**4.2 Costs, Revenue, and Profitability of Cassava Value Web Activities**

Profitability of cassava value web participation was evaluated using total cost, total revenue, gross margin, profit, and the benefit–cost ratio (BCR). The BCR provides insight into the economic viability of the enterprise. Table 3 presents the breakdown of total variable costs incurred in cassava value web activities. These costs include land preparation, ridging, planting, weeding, herbicide application, harvesting, transportation, processing, and storage. The total variable cost amounted to ₦6,476,750. The Gross margin (GM) was computed as the difference between total revenue (TR) and total variable cost (TVC). The total revenue from cassava value web activities was ₦10,214,000, while TVC was ₦6,476,750. Thus, GM = ₦10,214,000 – ₦6,476,750 = ₦3,737,250. After deducting the total fixed cost (TFC) of ₦1,953,000, the net profit amounted to ₦1,834,250.

The computed BCR of 1.21 indicates that cassava value web activities are profitable since the ratio is greater than 1. This means that for every ₦1 invested, farmers earn ₦1.21 in return. A similar conclusion was reported by Greene and Stellman (2007), who stated that enterprises with a BCR greater than one are economically viable. The gross and net margins further confirm the profitability of cassava-based enterprises such as *garri*, *lafun*, *fufu*, *tapioca*, *abacha*, and animal feed. The positive profitability implies that cassava value web participation enhances farmers' income and livelihoods, thereby justifying increased investment and policy support in the sector.

5.0 Conclusion and Policy Implications

The study assessed the socio-economic characteristics and profitability of farming households participating in the cassava value web in Oyo State, Nigeria. Findings revealed that participation is largely dominated by middle-aged, married, and mostly male farmers with limited formal education but substantial farming experience. The majority engaged in cassava production as their primary occupation, relying heavily on family labor to minimize production costs. Although formal education levels were generally low, the farmers demonstrated practical knowledge and commitment that sustained their participation in cassava-related activities.

Profitability analysis indicated that cassava value web enterprises are economically

viable. With a gross margin of ₦3,787,250 and a benefit–cost ratio (BCR) of 3.19, cassava processing and marketing proved to be profitable ventures that contribute significantly to income generation and livelihood improvement among smallholder households. This reinforces the strategic importance of cassava as a major driver of rural economic empowerment, food security, and poverty alleviation.

## 4.0 Policy Implications and Conclusion

The findings suggest several policy implications. First, enhancing access to training and extension services is essential, given the low formal education level of most participants. Practical, value-chain-oriented training can strengthen their technical capacity and productivity. Second, access to affordable credit should be improved through inclusive agricultural financing schemes tailored to smallholders engaged in cassava production and processing. Third, mechanization and investment in rural infrastructure such as feeder roads, processing centers, and storage facilities would help reduce post-harvest losses and enhance market efficiency. Fourth, promoting value addition through local processing and cooperative marketing systems can increase profitability and competitiveness within the cassava industry. Lastly, since women play vital roles in cassava processing and marketing, gender-responsive policies that improve their access to resources and capacity-building programs will enhance inclusivity and overall value web performance.

In conclusion, the cassava value web offers a promising pathway for sustainable income generation and rural transformation in Oyo State. Strengthening institutional support, access to finance, mechanization, and gender-inclusive interventions will further enhance profitability, resilience, and the contribution of cassava-based enterprises to Nigeria's agricultural and economic development.

**Table 1. Socio-Economic Characteristics of Cassava Value Web Participants**

| Characteristics | Frequency | Percentage (%) |
|---|---|---|
| Sex | | |
| Male | 99 | 52.1 |
| Female | 91 | 47.9 |
| Age (years) | | |
| ≤ 30 | 3 | 1.6 |
| 31–40 | 23 | 12.1 |
| 41–50 | 81 | 42.6 |
| 51–60 | 79 | 41.6 |
| >60 | 4 | 2.1 |
| Marital Status | | |
| Single | 2 | 1.1 |
| Married | 176 | 92.6 |
| Widowed | 4 | 2.1 |
| Divorced | 8 | 4.2 |
| Religion | | |
| Christianity | 123 | 64.7 |
| Islam | 61 | 32.1 |
| Traditional | 6 | 3.2 |
| Education | | |
| No formal education | 99 | 52.1 |
| Primary education | 60 | 31.6 |
| Secondary education | 28 | 14.7 |
| Tertiary education | 3 | 1.6 |
| Household Size | | |
| ≤ 5 | 18 | 9.5 |
| 6–10 | 122 | 64.2 |
| >10 | 50 | 26.3 |
| Primary Occupation | | |
| Farming | 179 | 94.2 |
| Non-farming | 11 | 5.8 |
| Farm Size (ha) | | |
| ≤ 5 | 123 | 64.7 |
| 6–10 | 61 | 32.1 |
| >10 | 6 | 3.2 |
| *Source: Field survey, 2024* | | |

**Table 3. Total Variable Costs in Cassava Value Web Activities**

| Cost Item | Amount (₦) |
|---|---|
| Land preparation | 1,314,500 |
| Processing | 1,150,230 |
| Ridging | 925,500 |
| Planting | 693,500 |
| Weeding | 505,000 |
| Herbicide application | 481,500 |
| Harvesting | 351,000 |
| Transportation | 625,300 |
| Storage | 430,220 |
| Total | 6,476,750 |
| *Source: Field survey, 2024* | |

**Table 4. Revenue and Profitability of Cassava Value Web Participants**

| Variable | Amount (₦) |
|---|---|
| Total Revenue (TR) | 10,214,000 |
| Total Variable Cost (TVC) | 6,476,750 |
| Total Fixed Cost (TFC) | 1,953,000 |
| Total Cost (TC = TVC + TFC) | 8,429,750 |
| Gross Margin (GM = TR – TVC) | 3,737,250 |
| Net Profit (GM – TFC) | 1,834,250 |
| Benefit–Cost Ratio (BCR = TR / TC) | 1.21 |
| *Source: Field survey, 2024* | |

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