# TECHNICAL EFFICIENCY OF CASSAVA FEMALE FARMERS IN SURULERE LOCAL GOVERNMENT AREA OF OYO STATE, NIGERIA.


## ABSTRACT

The low growth rate in productivity in the agricultural sector have been widely considered as one of the most important causes of current high poverty rates, food insecurity and discouragement in farming among youths particularly in rural areas**.** This study analyzed the technical efficiency of female cassava-based farmers in Surulere local government area of Oyo state. Primary data was used and it was collected through the use of well-structured questionnaire and interview schedule. Descriptive statistics, gross margin analysis and stochastic frontier model were used to analyze the objectives of the study.

The socioeconomic characteristics of the respondents revealed that the mean age was 42 years which implies that the farmers are in an active age, majority of the female cassava farmers were married with most having a household size of 4 – 6. Larger percentage of the female farmers had secondary education, most had farming experience of 20 years and below, majority had farm size less than and equals to 3 hectares of land which indicates most are small scale farmers, Most of the respondents in the study area obtained their farmlands by inheritance, majority of the respondents in the study area produced for both family and market.

The study showed the total variable cost, total fixed cost and the total cost were found to be ₦93,500.63, ₦40,806.25 and ₦134,306.88 respectively. Also the total revenue, gross margin and profit were found to be ₦462,373.50, ₦368,872.8 and ₦328,066.62 respectively. This indicates that cassava production is profitable in the study area. The stochastic frontier model revealed that cassava production was affected by the variables representing farm size, planting material, Agro-chemical, herbicide, fertilizer and labour and they are all significant at 1% level of significant. For the inefficiency model, educational level and membership of farmers' association were the variables affecting technical inefficiency of female cassava and they were found to be positive and significant at 1%. The study also showed that the female cassava farmers were faced with variability in price of cassava, low productivity, pest and diseases, poor access to market, inadequate storage facilities, poor access to production credit, among others.

This study therefore recommended that farmers should ensure to join farmers' association which will enable then to have access to inputs so as to increase their technical efficiency.

## 1.0 INTRODUCTION

Agriculture plays a significant role in the Nigerian economy despite the strategic importance and reliance on the oil sector. Agricultural sector provides employment for about 70% of Nigerian and accounts for more than one-third of total Gross Domestic product (Hussaini*et al.*, 2019). The decline in the contribution of agriculture to the country's GDP overtime was as a result of the slow growth of the sector relative to other sectors of the economy. The country agricultural system is characterized by multitude of small scale farmers scattered over wide expanse of land area with small holding ranging from 0.05 to 3.0 hectares per farm land, low capitalization, low productivity and low yield per hectare (Aboki*et al.*, 2013)..

Nigeria is one of the most developed countries in Africa. Agriculture is the largest sector of the economy, accounting for about 42 percent of total GDP (Trading Economics, 2012). This is because it offers employment to the vast majority of our people (almost 70 to 75 per cent of the working population) and it is an activity that permeates the length and breadth of this country (Osinowo, 2012).

Cassava (*Manihotesculenta*Crantz) is one of the most important food sources in tropical countries, with over 500 million people consuming it as their main source of calories (IITA, 2011). In Nigeria, the role of cassava is not limited to food, as it also serves as cash crop, while its derivatives are applicable in many types of products such as confectioneries, monosodium glutamate, drugs, and chips, amongst others.

Due to these constraints, Nigerian farmers having a yield estimate of 11 tonnes per hectare are unable to complete with its counterpart in some other countries such as India, which has a yield estimate of 34.8 tonnes per hectare (FAOSTAT 2015).

The root can be processed for human food and livestock feed. The leaves are consumed as vegetable while some of its cultivars that have low cyanogenic glucocides can be eaten as salad or snacks (Osundare and Igbalajobi, 2012). Recently, cassava has also been of more importance to the economy as a result of ethanol derived from it which is being used by some industries.

Cassava is the most widely cultivated crop in the southern part of the country in terms of area devoted to its production and the number of people employed. Indeed, almost every household grows it. The consumption of cassava cuts across all parts of the country. Its

adaptability to climatic and soil conditions even in marginal soils has endeared cassava to most people that have to do continuous cultivation on limited available land.

Given the various cassava programmes and policies implemented over the years to raise farmers' efficiency and productivity in cassava production, farmers have not yet attained the desired technical efficiency in cassava production as a result of insufficient access to farm inputs such as fertilizers and herbicides (Ezedinma, 2006).Ogundari and Burner (2011) in their study revealed that cassava farmers in Nigeria are not technically efficient with a mean score of 72.14 percent. In a similarly study by Adewuyi*et al.* (2013) observed that the mean technical efficiency level of cassava farmers in Ogun State, Nigeria stood at about 79 percent. In a study by Taiwo *et al.* (2014) observed that despite the fact that Nigeria is the largest producer of cassava in the world, production lags behind the increasing local demand for food and industrial usage, and cassava products are not price competitive in the global market. Also in a similar studies by Isitor*et al.* (2017) reported that despite the several efforts been made by the Nigerian government to improve the efficiency and productivity of cassava, yet, the farmers have not yet attained the desired technical efficiency in cassava production which may possibly be associated with poor access to agricultural farm inputs such as fertilizers, access to credit, herbicides, among others.

The low growth rate in productivity in the agricultural sector have been widely considered as one of the most important causes of current high poverty rates, food insecurity and discouragement in farming among youths particularly in rural areas. Yields on plots managed by female are lower than those managed by male. This is not because they are worse farmers than male; indeed, evidence (Timothy and Adeoti, 2006; Adeleke *et al*., 2008; World Bank, 2012; Kilic*et al.*, 2013) shows that adult female are just as efficient as adult male. They spend considerable amount of time in farm activities, while also doing their regular chores. However, they are often found to produce less on their plots of land and thus less productive than their male counterparts in the agricultural sector. This is because of inadequate accessibility to fertilizer and low applications of modern inputs such as chemicals, fertilizer, improved seeds and pesticides (Mukasa and Salami, 2016). Furthermore, inputs are more difficult for female to access than male. Cultural norms often influence the use of machinery. Adult female access to inputs such as improved seeds, fertilizers and pesticides is limited by their access to extension services and paucity of resources. Government-subsidized inputs to small-scale farmers are also often distributed through cooperatives. While adult female are rarely members of cooperative,

they often lack the funds needed to purchase inputs even when they are subsidized (FAO and CARE, 2019).

Based on the aforementioned, this study gives answers to the following research questions:

1) What are the socioeconomic characteristics of female cassava farmers in the study area?
2) What is the technical efficiency of cassava female farmers in the study area?
3) What are the factors affecting technical efficiency of cassava female farmers in the study area?
4) What is the profitability of cassava female farmers in the study area?
5) What are the constraints facing cassava female farmers in the study area?

## 2.0 METHODOLOGY

### 2.1 The Study area

This study was carried out in Surulere's local government area of Oyo state.

### 2.2 Population of the study

The population of the study comprised female cassava farmers in the study area.

### 2.3 Sampling Techniques and Sample Size

Multistage sampling technique was used to select respondents in the study area. The first stage involved purposive selection of Surulere Local Government Area of Oyo State due to the dominance of cassava based farmers in the study area. The second stage was the random selection of 2 wards from the local government area, the third stage was the random selection of four villages from the two wards selected. And in the fourth and last stage, 80 female cassava farmers were selected from the eight villages which constitute the sample size.

### 2.4 Source of data and method of data collection

Primary data was used and data was collected through the use of well-structured questionnaire and interview schedule.

### 2.5 Method of data analysis

Descriptive statistics, stochastic frontier model and Gross margin analysis were used to analyze the objectives for the study.

### 2.5.1 Descriptive Statistics

Descriptive statistics such as mean, percentage, frequency etc was used to describe the socioeconomic characteristics of cassava female farmers and identify the constraints facing cassava female farmers in the study area.

### 2.5.2 The stochastic frontier production function analysis

This study specified the stochastic frontier production function using the Cobb-Douglass frontier production function. The Cobb-Douglass stochastic frontier model is specified as;

$ln\ Yi = \beta o + \beta 1 lnX1 + \beta 2 lnX2 + \beta 3 lnX3 + \beta 4 lnX4 + \beta 5 lnX5 + Vi - Ui$

Where; *ln*= Natural Logarithm

Yi = Output of cassava produced (kg)

X1 = Farm size (ha)

X2 = Quantity of seed used (kg)

X3 = Labor input used (man days)

X4 = Quantity of fertilizer (kg)

X5 = Agrochemicals (Liters)

X6 = Cost of planting (Naira)

Vi = Error term which are random variables

Ui = Error term which are non-random variables or technical inefficiency effect

$\beta o$= Intercept

$\beta 1$-$\beta 5$= Regression coefficient

The technical inefficiency model is defined by; $Ui = \delta o + \delta 1 Z1 + \delta 2 Z2 + \delta 3 Z3 + \delta 4 Z4 + \delta 5 Z5 + \delta 6 Z6 + \delta 7 Z7 + ei$

Where,

Ui = Technical inefficiency effect of the ith farm

Z1 = Age (years)

Z2 = Household size (Number of persons)

Z3 = Education level

Z4 = Access to credit (amount borrowed in N)

Z5 = Extension contact (Number of visit per year)

Z6 = Gender

Z7 = Farming experience (years)

*δ1-δ7*= Parameters to be estimated

ei= Error term

### 2.5.3 Gross Margin Analysis

Gross Margin Analysis was used to estimate the profitability of the respondents in the study area. The gross margin analysis tells us the profit a farmer makes on its cost of sales, or cost of goods sold. In other words, it indicates how efficiently the management uses labor and supplies in the production process. Gross Margin analysis is a great way to understand the profitability of farmers. It tells us how effectively management can wring profits from sales.

However, the Gross margin (GM) analysis of cassava production in the study area can be expressed as;

GM = TR – TVC

TR = P x Q

$\pi$ = GM - TFC

Where GM = Gross Margin in Naira

TR = Total Revenue in Naira

TVC = Total Variable cost in Naira

P = Price of rice in Naira

Q = Quantity of rice in Kg

$\pi$= Profit

## 3.0 RESULT AND DISCUSSION

### 3.1 Profitability of Female Cassava Farmers in the Study area

The result on Table 1,presents the cost and return analysis of female cassava farmers in the study area. This involve the estimation of the Total cost (Total variable cost and Total fixed cost) of maize production, Total revenue (TR) and net revenue (NR) incurred from production which in pure economic term represents the profit. Gross margin analysis was used to estimate this. It involve the addition of total variable cost (TVC) and total fixed cost (TFC) to get the total cost (TC), then the total revenue gotten from the sales of cassava produced by the farmers was

calculated. Subsequently, the total variable cost was deducted from the total revenue to obtain the gross margin. Finally, the net revenue (profit) was calculated by deducting the total cost from the total revenue which gave the profit made by the female cassava farmers from their production. The table revealed the cost of variable items (hoe, cutlass, shovel, labour, fertilizer, herbicide, pesticides, rake etc), cost of fixed items (depreciated land, equipment and buildings), the total cost (which the sum of the variable and fixed cost), the total revenue gotten from cassava production, the gross margin and profit. The total variable cost, total fixed cost and the total cost were found to be ₦93,500.63, ₦40,806.25 and ₦134,306.88 respectively. Also the total revenue, gross margin and profit were found to be ₦462,373.50, ₦368,872.87 and ₦167,596.66 respectively. This indicates that cassava production is profitable in the study area.

**Table 1: Cost and Returns Analysis of Cassava Production in the Study Area**

| Items | Costs (₦) |
|---|---|
| Total Variable cost | 93,500.63 |
| Total Fixed cost | 40,806.25 |
| Total cost | 134,306.88 |
| Total Revenue | 462,373.50 |
| Gross Margin | 368,872.87 |
| Profit | 328,066.62 |

**Source: Field survey, 2021**

### 3.2 Technical Efficiency of Cassava Farmers in the study area

The maximum likelihood estimates (MLE) for the stochastic production function used in explaining the influence of production inputs on the output of cassava among female farmers, and also in determining the effect of farmer specific characteristics on technical inefficiency, the parameters were estimated simultaneously using frontier 4.1c developed by Coelli (1996).The results show that the coefficients of farm size, agrochemical, herbicide, fertilizer were found to be positive and significant at 1% significantly affecting cassava output of the respondents as

revealed by the computed t-values. This implies that, any increase in the use of the variables would bring about increase in cassava output. While the variables representing planting material, and labour were found to be negative and significant at 1%. This implies that an increase in the quantity of labour and planting material will lead to an increase output of cassava of female farmers.

The result of the inefficiency model showed that the variables educational status and membership of farmer's association affect the Inefficiency of farmers in the study area and they are all significant at 1%. The variables representing educational level and membership of association were found to positive and significant at 1%. This implies that an increase in these variables will decrease farmers' inefficiency and increase farmers' technical efficiency.

**Table 2: Maximum Likelihood Estimates of Parameters of Stochastic Frontier Production Function**

| Variables | Parameters | Coefficients | T-Value |
|---|---|---|---|
| Constant | $\beta_0$ | 2.5174 | 18000*** |
| Farm size | X1 | 0.01397 | 1976.47*** |
| Planting Material | X2 | -0.1678 | -1300*** |
| Agro-Chemical | X3 | -0.04238 | -4579.02*** |
| Herbicide | X4 | 0.2315 | 1700*** |
| Fertilizer | X5 | 0.07884 | 2100*** |
| Labour | X6 | -0.1864 | -2400*** |
| **Inefficiency Model** | | | |
| Constant | $Z_0$ | 5.004 | 2.03** |
| Age | $Z_1$ | -0.4125 | -0.31 |
| Household size | $Z_2$ | -0.4010 | 0.620 |
| Educational level | $Z_3$ | 1.0386 | 3.57 |

| | | | |
|---|---|---|---|
| Farming Experience | $Z_4$ | -0.0298 | -0.89 |
| Cooperative member | $Z_5$ | 0.31743 | 0.18 |
| Association | $Z_6$ | 4.5443 | 2.93*** |
| Access to credit | $Z_7$ | 1.6510 | 1.00 |
| **Variance Parameters** | | | |
| Sigma-squared | | -39.3096 | -0.08 |

### 3.3 Technical Efficiency Distribution of Respondents

In the summary of the technical efficiency scores for the respondents, the technical efficiency is less than 1.0 indicating that all the farmers were producing below the maximum efficiency frontier. A range of technical efficiency is observed across the sampled farmers and the spread is large. The best farmer had technical efficiency of 0.99 (or 99.99%), while the worst farmer had a technical efficiency of 0.30 (or 30%). The mean technical efficiency is 0.744 (or 74.4%). This implies that, on the average, the farmers were 74% technically efficient; hence their observed output was about 26% less than the maximum frontier output.

**Table 3: Frequency Distribution of Technical Efficiency**

| Efficiency Level | Frequency | Percentage |
|---|---|---|
| <0.40 | 10 | 12.5 |
| 0.40 – 0.49 | 0 | 0.00 |
| 0.50 – 0.59 | 13 | 16.25 |
| 0.60 – 0.69 | 8 | 10 |
| 0.70 – 0.79 | 19 | 23.75 |
| 0.80 – 0.89 | 11 | 13.75 |
| 0.90 – 0.99 | 19 | 23.75 |
| Total | 80 | 100.00 |

| | | |
|---|---|---|
| Mean | 0.744 | |
| Maximum | 0.303 | |
| Minimum | 0.999 | |
| **Total** | **80** | **100.00** |

**Source: Field survey, 2021**

### 3.4 Constraints Facing Female Cassava Farmers in the Study Area

The constraints facing female cassava farmers in the study area. The table showed that 61.25% of the respondents strongly agreed that variability in price of cassava is a problem, 58.75% agreed that low productivity was a problem facing them, 58.75% also agreed that pest and diseases is a problem faced by the respondents, and 77.50% of the respondents agreed that poor access to market was a problem faced by the female cassava farmers. The table further showed that 73.75% of the respondents agreed that inadequate storage facilities was a problem faced by the respondents, 5.25% strongly agreed that poor access to production credit was a problem faced by the female farmers in the study area, 55.00% of the respondents strongly agreed that poor access to inputs was a challenge they faced and 55% strongly agreed that they were faced with theft.

**TABLE 4.: CONSTRAINTS FACING FEMALE CASSAVA FARMERS IN THE STUDY AREA**

| Constraint | Strongly Agreed | Agreed | Undecided | Disagreed | Strongly Disagreed |
|---|---|---|---|---|---|
| Variability in prices of cassava | 49(61.25) | 31(38.75) | 0 (0.00) | 0 (0.00) | 0(0.00) |
| Low Productivity | 30(37.50) | 47(58.75) | 3(3.75) | 0 (0.00) | 0(0.00) |
| Pest and Diseases | 33(41.25) | 47(58.75) | 0 (0.00) | 0 (0.00) | 0(0.00) |
| Poor access to markets | 15(18.75) | 62(77.50) | 3(3.75) | 0 (0.00) | 0(0.00) |
| Inadequate storage facilities | 21(26.25) | 59(73.75) | 0 (0.00) | 0 (0.00) | 0 (0.00) |
| Poor access to production credit | 41(51.25) | 39(48.75) | 0 (0.00) | 0(0.00) | 0 (0.00) |
| Poor access to inputs | 44(55.00) | 28(35.00) | 5(6.25) | 3(3.75) | 0 (0.00) |
| Theft | 44(55.00) | 34(42.50) | 2(2.50) | 0 (0.00) | (0)0.00 |
| Poor access to roads | 27(33.75) | 51(63.75) | 2(2.50) | 0 (0.00) | 0 (0.00) |
| Lack of timely access to improved varieties | 39(48.75) | 41(51.25) | 0 (0.00) | 0 (0.00) | 0 (0.00) |
| Inadequate Farmland | 45(56.25) | 32(40.00) | 3(3.75) | 0 (0.00) | 0 (0.00) |
| Scarcity of | 36(45.00) | 41(51.25) | 3(3.75) | 0 (0.00) | 0 (0.00) |

| | | | | | |
|---|---|---|---|---|---|
| improved varieties | | | | | |
| High cost of agro-chemical | 50(62.50) | 30(37.50) | 0 (0.00) | 0 (0.00) | 0 (0.00) |
| Shortage of labour | 57(71.25) | 23(28.75) | 0 (0.00) | 0 (0.00) | 0 (0.00) |
| Scarcity and high cost of fertilizer | 40(50.00) | 31(38.75) | 9(11.25) | 0 (0.00) | 0 (0.00) |

**N.B: Figures in Parenthesis Were Percentage**

**Source: Field survey, 2021**

## 4.0 CONCLUSION

The study concluded that majority of respondents fall between the age of 46 – 55 year, most of the cassava farmers were married, majority had 4 – 6 members, most had secondary education, majority had farming experience of 20 years and below, most had farm size less than and equals to 3 hectares of land, most of the respondents in the study area obtained their farmlands by inheritance, majority of the respondents in the study area produced for both family and market.

The study concluded that cassava production is profitable in the study area. The study further concluded that farm size, planting material, Agro-chemical, herbicide, fertilizer and labour and they are significant factors affecting cassava production in the study area and the variables educational level and membership of farmers' association were the variables affecting technical inefficiency of female cassava farmers in the study area. The study finally concluded that the female cassava farmers were faced by variability in price of cassava, low productivity, pest and diseases, poor access to market, inadequate storage facilities, poor access to production credit, poor access to inputs, theft, poor access to roads and lack of timely access to improved varieties.

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