

Determinants of Cost Efficiency among Cassava Processors in Oyo State, Nigeria

¹Akande, R. O., ¹Bello, J. A., ²Fajobi, D. T., ¹Oladejo, J.

¹Department of Agricultural Economics, Ladoké Akintola University of Technology, Oyo State, Nigeria.

²Department of Agricultural Economics, ODLCL, Ladoké Akintola University of Technology, Oyo State, Nigeria

Abstract: One of the emerging trends for national sustainable development is striving to attain efficiency in production and marketing of agricultural produce. Cost efficiency is crucial in ensuring productivity and profitability, especially in competitive sectors like agriculture where input cost can significantly affect both productivity and profitability. Most of the cost efficiency studies that were available on cassava focused on farmers alone, neglecting other actors in cassava value chain. This study investigated the cost efficiency level of cassava processors and its determinants in Oyo state. The study was based on primary data obtained from 256 processors drawn through multi-stage sampling procedure. Data were analysed using descriptive statistics, budgetary analysis and stochastic frontier analysis (SFA). The result showed that 98.9% of the respondents were female with average age of 50 years. Most of the processors (93.4%) were married with average household size of 6. The result also showed that 34% of the respondents were educated, 96.5% were members of cooperative societies and 94.9% had access to credit. The average processing experience was 16.8 years among respondents. The benefit cost ratio was 1.30 indicating that cassava processing was a profitable enterprise in the study area. The average cost efficiency among the respondents was 0.98. Labour cost, cassava tuber cost, firewood cost and water cost were found to influence total cost of processing. Socio-economic variables influencing cost of efficiency were household size, processing experience, credit access and cassava farm ownership. The study recommended that the government should make affordable credit facilities available to cassava processors. This will empower the processors for competitive advantage, resulting in improved cost efficiency.

Keywords: Cassava processors, Cost efficiency, Budgetary analysis, Stochastic frontier analysis.

INTRODUCTION

In Nigeria, agriculture has continued to play a dominant role in the provision of food, raw materials for industries, employment, and foreign exchange earnings, which are used in financing developmental activities (Chijioke et al., 2021). However, instead of adopting the global agribusiness approach and practices, agriculture in Nigeria has been largely considered as a development programme, without drive for effective and efficient resource management (Ikueomonisan et al., 2020). Root and tuber crops such as cassava (*Manihot* spp.) have a significant place in the economy. These crops not only contribute to the share of agriculture in Nigeria economy but possess a great potential and comparative advantage to compete in the liberalised economy (Akinola et al., 2020). As a food crop, cassava has some significant inherent characteristics that make it attractive to farmers, processors, marketers and consumers in Nigeria. Firstly, it is rich in carbohydrates, especially starch, and consequently has multiplicity of end uses (Okoye et al., 2021). Secondly, it is available all year round, making it preferable to other more seasonal crops such as grains, peas, beans, and other crops for food security (Akinola et al., 2020).

The demand for cassava roots and products is high and fast rising. However, the current food production is far from being able to meet the food needs of the geometrically growing population in the sub-region. Despite its contribution to the economy, Nigeria's agricultural sector faces many challenges that affect its profitability (FAO, 2023). A key challenge for the majority of farmers and processors is access to finance, and it is a key impediment to

improving the efficiency of their production and adopting better technologies in the cassava processing activities. The challenges facing cassava processing and marketing increase by degrees on a yearly basis even though the subsector is experiencing a production boom. The huge cassava output in Nigeria, which was put at about 34 million metric tons (FAO, 2023), was produced by thousands of small-scale farmers in the remote rural areas. These farmers were faced with myriad problems, which ranged from high transportation costs, lack of knowledge of the products market, lack of rural market infrastructures, and inaccessibility to market information, resulting in cost inefficiency (Akinwalere, 2022). Other problems included lack of standard weights and measures in the cassava products market.

In Nigeria, cassava market is unstable because of price fluctuation with the risk of soaring prices due to lack of market information or when the market in a certain place is not connected to markets in other places thus declining their income (Suryani et al. 2023). Several policies related to the development of cassava production and processing have been initiated such as the Presidential Initiative on Cassava and the FADAMA projects. However, these initiatives have failed to adequately incorporate strategies for combating perennial constraints to effective and efficient cassava product marketing in Nigeria. There is also the problem of the exploitative tendencies of the middlemen in the cassava product marketing chain (Isitor et al., 2019; Suryani et al. 2023).

Despite the contribution of cassava products to human diet, its production, processing

and marketing are in the hands of smallholder farmers and processors who are resource poor and as such, cannot afford all it takes to boost the sector. These cassava processors and marketers are constrained with diverse problems that range from production to marketing. However, research on cassava has focused more on pre-production issues to the neglect of post-harvest issues like processing, marketing, storage and consumer demand. Ali et al., (2023) investigated the determinants of the output of cassava products in an attempt to bridge the rapidly increasing demand and supply gap in cassava processing in Ogun State and concluded that there is need for an intervention to have a cassava production efficiency and also provision of a good road network for cassava farmers which will reduce the cost of cassava roots at both the farm gate and retail markets.

Cost efficiency, also known as economic efficiency, results from both technical efficiency and allocative efficiency. It refers to a producer's ability to produce the maximum possible output from a given quantity of inputs at the lowest possible cost. Cost efficiency measures the effectiveness or competence with which the physical aspects of marketing are performed. Cassava processing is mainly a small-scale operation, with current small-scale technologies still suboptimal, resulting in high use of resources (energy, water, firewood, product losses) and high production costs (Nzudie et al. 2020). Improving the efficiency of small-scale equipment, their design, safety, and ergonomics is therefore essential for the competitiveness of cassava value chains (Edeh et al. 2020), together with the ability of small-scale processors to access investment capital (Nzudie et al. 2020).

Cost efficiency is also concerned with how effectively price reflects the costs of moving the output through the marketing system. It is suggested that the inefficiency of farmers in the use of various farm resources and farm inputs led to unprofitable production. This therefore made it necessary for empirical measures of efficiency to determine the profit that could be obtained by improving performance in cassava production with a given technology (Ologbon et al., 2021). For cassava products, lowering the costs through efficient processing and marketing systems may be as important as increasing cassava production. Expansion of processing and marketing must greatly enhance productivity, income, and employment opportunities for the cassava sector. This study aimed to identify the key determinants of cost efficiency among cassava processors in Oyo State, Nigeria.

METHODOLOGY

The study was carried out in Oyo State on Latitude 8o00' North and Longitude 4o00' East. The total landmass area is about 28,454 square kilometre

and total population which is estimated at 5,591,58 as of 2006 census provision figures. Oyo state is an inland state with its capital in Ibadan. The state has four agricultural zones and has thirty-three (33) Local Government Areas (LGAs). The population of this study include all the processors of cassava (into Garri) in Oyo State Nigeria. However, a representative sample of the population were drawn to cover the study area.

Multistage sampling technique was used for select respondents for the study. At stage one, purposive selection of Oyo State, due to high presence of cassava processing activities. Stage two involved a purposive selection of twelve percent (12%) of the thirty-three (33) local government areas (LGAs) in the selected state to give a total of four (4) LGA(s): which are Surulere, Orire, Ogo-Oluwa, and Oyo West. This is based on the knowledge that there exist high level of cassava processing activities (Oladele, 2001).

At stage three, two wards were randomly selected to give a total number of sixteen (16) villages and at stage four, sixteen (16) respondents were randomly selected from a list generated from cassava processor association groups in each of the 16 selected villages, which resulted in a total of 256 respondents for the study.

Budgetary analysis

Budgetary analysis was used to determine the profitability of Garri production in the study area. The gross margin was represented as:

$$GM = TR - TVC \dots\dots\dots (1)$$

Rate of Returns on Investment (ROI) analysis was used to determine the amount of profit made when one Naira is spent on cassava processing. It is the ratio of Net Return to the Total Cost of processing. The bigger it is, the better the profit made on Garri. It is expressed as:

$$ROI = (N.R.)/(T.C) \times 100/1 \dots\dots\dots (2)$$

Where G.M = Gross margin; TR = Total revenue; TVC = Total variable cost and T.C. = Total cost

Net revenue (N.R.) = Total revenue – Total cost
Stochastic Frontier Analysis (SFA) was used to analyse the cost efficiency of the processors. SFA can help understand the cost efficiency of the respondents by considering both random errors and inefficiencies when applied to cassava processing operations (Coelli et al., 1997).

The inefficiency term was modelled as a function of factors that influence inefficiency in cassava processing operations. The cost frontier function was modelled as:

$$\ln C = \beta_0 + \sum_{i=1}^6 \beta_i \ln P_i + \beta_7 \ln Y^* + V_i U_i$$

Where C = the cost of cassava processing (₦); P1= the price per kg of cassava tubers processed (₦); P2 = the average wage rate per man day of labour (₦); P3 = the average price per bundle of firewood (₦); P4 = the average price per litre of

water (₦); P_5 = the depreciated cost of processing tools and equipment (₦); Y^* = the total output (Garri) measured in kg; V_i = a normally distributed random error and U_i = efficiency component.

Where U_i is defined by:

$$U_i = \delta_0 + \sum \delta_i Z_i$$

Where: Z_1 = age; Z_2 = gender; Z_3 = household size;

Z_4 = education; Z_5 = processing experience (in years); Z_6 = credit access and Z_7 = farm ownership.

δ_0 and δ_i are parameters to be estimated ($i = 1, 2, \dots, 7$) together with the variance parameter.

RESULTS AND DISCUSSION

Socioeconomic characteristics of Respondents

The age distribution of respondents as presented in Table 1 reveals 0.8% of cassava

processors were between the ages of 20-30 years, while the highest 41.0 % were between 51-60 years. The age group is closely followed by 41-50 with 40.2%, while those above 60 years' account for only 6.6% of processors. The mean age of Garri processors in the study area is 50.34 years. The study revealed cassava processors are young, active and agile.

Most cassava processors in the study area are female (98.9%) and only 1.2% are male. This result is like that of Isitor et al., (2019) and Aungwa et al., (2019). The male counterparts are probably involved in the production process while female is dominant in the processing and marketing enterprises (Adeosun et al., 2023).

Table 1: Distribution of Cassava Processors according to the socioeconomic characteristics (n=256)

Variables	Response categories	Frequency	Percentage (%)	Mean
Age (Years)	≤ 30	2	0.8	50.34
	31- 40	29	11.3	
	41-50	103	40.2	
	51- 60	105	41.0	
	> 60	17	6.6	
Gender	Male	3	1.2	6
	Female	253	98.8	
Marital Status	Single	8	3.1	
	Married	239	93.4	
	Separated	1	0.4	
	Widow	8	3.1	
Household Size	≤ 5	105	41.0	6
	6-10	151	59.0	
Educational level	Non-formal education	43	16.8	
	Primary school uncompleted	6	2.3	
	Primary school completed	87	34.0	
	Secondary school uncompleted	36	14.1	
	Secondary school completed	70	27.3	
	Tertiary	14	5.5	
Membership of Cooperative Society	Yes	247	96.5	
	No	9	3.5	
Credit Access	Yes	243	94.9	
	No	13	5.1	
Amount of credit obtained	< ₦200,000	18	7.0	₦320,000
	₦200,000-₦500,000	163	63.7	
	₦500,001-₦1,000,000	69	27.0	
	>₦1,000,000	6	2.3	
Processing Experience (years)	≤ 5	3	1.17	16.8
	6-10	55	21.48	
	11-15	68	26.56	
	15-20	72	28.13	
	>20	58	22.66	

Source: Field Data Survey, 2025

Cost and Returns Analysis of Garri Processing

The costs and return of cassava processing is presented in Table 2. The table highlights key processing indicators such as the variable cost, total revenue, gross margin, net returns and benefit cost ratio. The total cost of cassava tubers (35.20%)

forms a significant portion of the total cost of processing cassava in the study area. The cost of labour constituted 7.17% followed by the cost of firewood 1.89%. The cost of transport, water, and rent constituted 1.02%, 0.43% and 0.20% of the total cost respectively.

The low cost of transport, water and rent can be attributed to the fact that most processors got water freely from nearby streams, wells or rivers and they sell their Garri around the processing plants which are usually in open spaces or by the roadside around other foodstuff sellers. The total variable cost incurred was ₦344,325.40 and represents 95.20% of the total processing cost. Depreciation on equipment was ₦829.48 and represented only 0.22% of the total cost while the total fixed cost incurred was ₦17,283.28. The total revenue generated indicates the amount of cassava processed to Garri and sold. The revenue generated from processing of cassava to Garri in the study area was ₦465,607.50.

The gross margin which is the Total revenue (TR) less the Total variable cost (TVC) deduced was ₦121,282.10 and the profit or net

returns which is the gross margin less the Total Fixed cost was ₦103,928.50 per processing cycle. The positive gross margin and positive net returns suggest the processors in the study area make a profit of ₦103,928.50 from the cassava processed and sold. This result is similar to the findings of Oladejo (2017), Obayelu et al., (2018) and Adeosun et al., (2023) who reported that cassava processing was a profitable venture.

The rate of return on investment (ROI) of 28.7% indicates the processors earned 28.7% profit on every naira invested. The benefit cost ratio of 1.30 implies that for every ₦1 invested in processing cassava to Garri, a return of ₦1.30 and profit of 0.29 is earned. This study thus affirmed that cassava processing to Garri is a profitable and viable business venture in the study area.

Table 2: Cost and returns of Garri process (₦/month)

Items	Amount (₦)	%TC
Variable cost		
Total cost of Cassava tubers	127,304.69	35.20
Labour cost	27,437.89	7.17
Total Cost of water	1,639.00	0.43
Transportation cost	3,910.45	1.02
Total cost of Firewood	7,239.84	1.89
Rent	197,000	0.20
Total Variable Cost (TVC)	344,325.40	95.20
Depreciation on equipment	829.48	0.22
Total Fixed Cost (TFC)	17,283.28	
TC (TFC + TVC)	361,679.68	
Total Revenue (TR)	465,607.50	
Gross Margin (TR - TVC)	121,282.10	
Profit	103,928.50	
ROI (NR/TC*100)	28.7%	
BCR (TR/TC)	1.30	

Source: Field Data Survey, 2025

Cost Efficiency of Cassava Processors by the Stochastic Frontier Analysis

The maximum likelihood estimates of the parameters of the stochastic cost frontier model in estimating the cost efficiency among cassava processors in the study area were presented in Table 3. The Wald chi-square statistic of 74062.43 with a p-value of 0.0000 indicated a strong model fit, suggesting that the variables collectively have a significant effect on cost efficiency. The log-likelihood function of 626.37 indicated that the value maximises the joint densities in the estimated model (Ogunwande and Adesokan, 2020).

Significant variables were identified at 1%, 5% and 10% significant levels, contributing significant insights to the cost efficiency of cassava processors. The model included the cost of labour, cost of cassava tuber, cost of firewood and cost of

water as cost function input variables. It also evaluated inefficiency model estimating the socio-economic variables of respondents.

Table 3 revealed that the cost of labour, cassava tuber, cost of firewood and cost of water were significant variables influencing the total cost of cassava processing. The magnitude of the price of labour, cassava tuber, firewood and water implied that one increase in the unit cost of these variables will lead to increase in the total cost of processing ceteris paribus. This finding conformed to the apriori expectation that the estimated factors had positive influence on the total cost incurred on cassava processing. This result is suggestive that the cost of variable inputs was highly important in the total processing cost of cassava in the study area. This is like the findings of Adeosun et al., (2022).

Table 3: Maximum Likelihood Estimates of Parameters of Stochastic Frontier Analysis

Normalised Variables	Parameters	Coefficient	Standard Error	Z Value	P- Value
Constant	β_0	0.82684	0.05202	15.89	0.000
Labour cost	β_1	0.07097	0.00644	11.02***	0.000
Cassava Tuber cost	β_2	0.83306	0.00755	110.27***	0.000
Firewood cost	β_3	0.07343	0.00571	12.85***	0.000
Water cost	β_4	0.00002	0.0000	5.31***	0.000
Inefficiency Model					
Age	Z_1	0.00004	0.02109	0.00	0.998
Gender	Z_2	0.10399	1.02498	0.10	0.919
Household Size	Z_3	0.44626	0.13315	3.35***	0.001
Education	Z_4	0.00605	0.07291	0.08	0.934
Processing Experience	Z_5	-0.04597	0.02519	-1.82*	0.068
Credit Access	Z_6	-1.89147	0.99645	-1.90*	0.058
Farm ownership	Z_7	0.60126	0.19412	3.10**	0.002
Constant	Z_0	-7.40619	2.51577	-2.94	0.003
Wald χ^2 (4) = 74062.43					
Prob > χ^2 = 0.0000					
Log likelihood = 626.369					

*10% level of significance; **5% level of significance; *** 1% level of significance

Factors affecting the inefficiency of the cassava processors such as household size ($p = 0.001$), processing experience ($p = 0.068$), credit access ($p = 0.058$) and cassava farm ownership ($p = 0.002$) as presented in Table 3. Since this is an inefficiency model, the positive coefficients of household size and Cassava farm ownership have had a negative effect on cost efficiency. This is similar to Akinola et al., (2020) and Adeosun et al., (2022) findings. The household size, farm ownership, which were significant at 1% and 5% respectively, decreased cost efficiency. This could imply that family members were not available for use in the processing activities and that farm ownership may bring about not dedicating enough attention to the processing activities.

The negative coefficient of processing experience (-0.0459), which was significant at 10% revealed that processors with higher processing experience are more cost efficient. This result suggested that experience in cassava processing contribute positively to cost efficiency. This meant the more experienced the processor, the more cost efficient he would be in allocating available resources. The negative coefficient of credit access (-1.8914) which was negative and significant at 10%, revealed that the higher the credit access, the

higher the cost efficiency of the cassava processors. This implied that increase in credit access increases the cost efficiency of the cassava processors. This result is similar to the findings of Adeosun et al., (2022), Ogunleye, (2018) and Elegbede et al., (2018) who reported that increase in credit access and processing experience improved efficiency and strengthened productivity.

The distribution of the cost efficiency of cassava processors is presented in Table 4. The cost efficiency ranged between 0.7451 and 0.9962 with a mean cost efficiency of 0.9784. The mean output of 98% revealed that there is the potential for cassava processors to increase their output by 2% under the present technology along the cassava processing value chain by eliminating inefficiency arising out of inappropriate allocation of resources and response to prices. The majority of the cassava processors (99.22%) operated on the highest efficiency cost frontier of 0.90-1.00. The minority who were 0.78%, operated below the average cost efficiency frontier at 0.71- 0.90. This result indicated that cassava processors in the study area are cost efficient in their processing activities, suggesting that cassava processing in the study area is profitable and sustainable.

Table 4: Cost efficiency distribution of Cassava processors

Cost Efficiency	Frequency	Percentage (%)
0.71 – 0.80	1	0.39
0.81-0.90	1	0.39
Above 0.90	254	99.22
Mean	0.9784	
Minimum	0.7451	
Maximum	0.9962	
Total	256	100.00

Source: Field Data Survey, 2025

Challenges militating against Cassava processors

Cassava processors in the study area face a range of challenges militating against efficient cassava processing activities. Cassava processors' responses to the challenges militating against them in the study area is presented in Table 5. High cost of processing input, unstable market price, inadequate capital and government policies were the topmost (100%) identified challenges while insecurity problem (35.80%) was the least

identified. Financial limitation poses a great challenge to processors with majority facing inadequate capital, unstable market price and unstable government policies. These challenges collectively are likely to affect the profitability and growth of cassava processing to Garri in the study area. The processing function, efficiency and performance are threatened by these challenges militating against the respondents.

Table 5: Distribution of Cassava Processors by Challenges faced

Challenges faced by Cassava Processors	Frequency	Percentage (%)
Government Policies	256	100
High cost of Processing Input	256	100
Inadequate Capital	256	100
Unstable Market Price	256	100
Inadequate Credit facilities	255	99.6
Transportation	245	95.7
Inadequate Processing machine	240	93.4
Storage Problem	240	93.4
Marketing Problem	218	84.8
Land Tenure Problem	210	81.7
Inadequate Water Supply	202	78.6
Insecurity Problem	91	35.8

Source: Field survey, 2025

CONCLUSION AND RECOMMENDATIONS

Based on the study's findings, it concluded that credit access significantly enhanced cost efficiency among cassava processors in Oyo state. The study revealed that socio-economic factors such as processing experience, credit access, household size and farm ownership influence cost efficiency. Cassava processing in Oyo state is efficient, profitable and a viable agribusiness, with total processing cost being influenced by input prices such as the labour cost, cassava tuber cost and input cost. In spite of the profitability nature of the venture, cassava processors are still faced with challenges such as high cost of processing input, unstable market price, inadequate capital, government policies, inadequate credit and transportation facilities. The study recommended that the government should make available affordable credit facilities to cassava processors. Credit access will empower the processors for competitive advantage, resulting to improved cost efficiency.

REFERENCES

- Adeosun, D.R., Adegbite, D.A., Sanusi, R.A. and S.O. Ayansina, (2022). Impact of Credit on Production Efficiency: Evidence from Cassava Smallholders Farmers in Southwest, Nigeria. *Asian Journal of Advances in Agricultural Research*, 18(2): 35-47.
- Adeosun, D.R., Adegbite, D.A., Sanusi, R.A., Ayansina, S.O., and Oke, F.O. (2023).

Impact of credit use on profitability among cassava smallholder farmers in Southwest, Nigeria. *Agricultura Tropica Et Subtropica*, 56, 198–208.

- Akinola A.O., Obayelu A.E., Shittu A.M. and S. O. Akinbode (2020) Production Efficiency and Its Determinants in Cassava-Based Production in Ogun, State Nigeria. *Ife Journal of Agriculture*, 32(1), 1-12
- Akinwalere, B.O. (2022). Accessibility of Cassava Farmers to Credit Facility in Oyo State Nigeria. *Applied Tropical Agriculture*, 27(1), 30-34.
- Ali, O. J., Odusina, O. A. & Olawumi, A. T. (2023). Determinants of Output of Cassava Products in Ogun State, Nigeria. *Applied Tropical Agriculture*, 28(2), pp. 9-14.
- Aungwa, B., Aye, G.C. and Okereafor, V.U. (2019) Marketing Efficiency of Processed Cassava Retailers and Wholesalers in Benue State, Nigeria. *Global Science Journal*, 7(11), 1073-1097.
- Chijioke, U., Madu, T., Okoye, B., Ogunka, A.P., Ejechi, M., Ofoeze, M., Ogbete, C., Njoku, D., Ewuziem, J., Kalu, C., Onyemauwa, N., Ukeje, B., Achonwa, O., Forsythe, L., Fliedel, G., and Egesi, C. (2021). Quality attributes of Fufu in South-East Nigeria: Guide for cassava breeders. *International Journal of Food Science & Technology*, 56(3), 1247 – 1257. <https://doi.org/10.1111/ijfs.14875>.

- Coelli, T.D.S., Prasada, R., Battese, G.E., (1997). *An Introduction to Efficiency and Productivity Analysis*. Springer, Boston.
- Edeh J.C., Nwankwojike, B.N., and F.I. Abam, (2020) Design modification and comparative analysis of cassava attrition peeling machine. *AMA Agric Mech Asia Africa Latin America*, 51(1),63–71.
- Elegbede, V.A., Dipeolu A.O. and A.M. Shittu (2018) Production Efficiency of Cassava Waste (Peels), In Ogun State, Nigeria. *JABU International Journal of Agriculture and Food Science (IJAFS)*, 8(6), 1191-1201.
- FAO (2023). Efficiency of cassava production in Nigeria and Ghana. Food and Agriculture Organization of the United Nations, Rome. <https://www.fao.org/4/y5548e/y5548e07.htm> Accessed 23rd July 2025.
- Ikuemonisan, E.S., Taiwo, E.M., Igbekele, A. and Kemisola, A. (2020). Cassava production in Nigeria: trends, instability and decomposition analysis (1970–2018). *Heliyon*, 6, 1–9.
- Isitor S.U., Babalola D.A. and T.E. Abegunde (2019). Efficiency of Garri Marketing in Kwara State, Nigeria: Implication for Economic Empowerment. *Journal of Tropical Agriculture, Food, Environment and Extension*, 18(2), 1-7
- Nzudie, H.L.F, Zhao, X., Tillotson, M.R., Zhang, F., and Y.P., Li (2020) Modelling and forecasting roots & tubers losses and resulting water losses in sub-Saharan Africa considering climate variables. *Physics and Chemistry of the Earth*, 120:102952.
- Obayelu, A. E., Olaleke, O. A., Oke, F.O. & Oladeji, S. A. (2018). Economic Analysis of Cassava Processing in Yewa South Local Government Area of Ogun State, Nigeria. *Ife Journal of Agriculture*, 30(2), 22-32.
- Ogunleye A.S. (2018). Effect of Access to Microcredit on Productivity and Profitability of Cassava Farming in Osun State, Nigeria. *Journal of Tropical Agriculture, Food, Environment and Extension*, 17(2), 51-57.
- Ogunwande, I.O. and Adesokan, G.E. (2020). Cost Efficiency Analysis of Maize Production Among Rural Small-Scale Farmers in Itesiwaju Local Government Area (LGA), Oyo State, Nigeria. *Greener Journal of Agricultural Sciences*, 10(3), 136-144.
- Okoye, F.U., Okoye, A.C. and Umeh, S.I. (2021). Consumption behaviour analyses of cassava products among rural household in Ebonyi State, Nigeria. *Agro-Science*, 20(2), 14–19. <https://dx.doi.org/10.4314/as.v20i2.3>.
- Oladejo, J.A. (2017) Marketing Efficiency Analysis of Women Cassava Processors in Oyo State, Nigeria. *Applied Science Reports*, 19 (2), 62-66.
- Oladele, O.I. (2001) Farmer perception of the relevance of livestock production technologies in Oyo State, Nigeria. *Livestock Research for Rural Development*, 13(6), 57-60.
- Ologbon, O. A. C., Oyebanjo, O., Oluwasanya, O.P. Ilori, A.R., Fadipe, M.O., (2021), Economic returns and technical efficiency in Cassava-Based Farming Systems in Yewa Communities of Ogun State, Nigeria. *Journal of Agricultural Science and Environment*, 21(1&2), 27-39.
- Suryani, A., Masyhuri, L. R. Waluyati, Utami, A.W. (2023), Risk Analysis on the Cassava Value Chain in Central Lampung Regency. *AGRARIS: Journal of Agribusiness and Rural Development Research*, 9 (2),150-173.