

RESOURCE USE AND TECHNICAL EFFICIENCY IN VALUE ADDITION TO CASSAVA: A CASE STUDY ON GARI AND FUFU PROCESSING IN OGUN STATE, NIGERIA.

Abstract

In Nigeria, the use of stochastic frontier to estimate processing efficiency effects is still at the rudimentary level and is beginning to build up. This paper presents the analysis of technical efficiency of cassava processing in Odeda and Yewa South Local Government Areas of Ogun State in southwestern Nigeria, using the stochastic production frontier, gross margin and resource-use efficiency analyses. The ratio of marginal value product of inputs (MVP) to input prices (P_x) lower than one indicates that the variables (quantity of cassava tuber, cost of transportation and labour) were highly over utilized. This implies that production may be enhanced by reducing the costs of inputs. Since none of the inputs used had this ratio equal to one, it indicates that these resources were not optimally allocated in the study areas. For increased efficiency of resources used in cassava processing, there is need to decrease the quantity of inputs used by the amount of their deviations. The enterprise economic efficiency is 1.10 and 1.33 for gari and fufu respectively. This means that for every Naira (100 kobo) spent by processors on gari and fufu processing 10kobo and 33kobo was realized as profit respectively. Analysis of efficiency using stochastic production frontier shows that quantity of cassava tubers, transportation cost, packaging cost, hired labour are significant ($P < 0.01$) for fufu processing while in gari processing only hired labour is significant ($P < 0.01$). The mean technical efficiency index for the entire fufu and gari respondents are 0.59 and 0.45 respectively. The implication of this is that their technical efficiency can potentially be increased through a more judicious use and better management of available resources to increase productivity of fufu and gari respectively.

Keywords: Resource-use, technical, efficiency, processing, gari, fufu.

₦ means Naira, the Nigeria Currency.

₦158 is equivalent to One USD (\$1.00) as at the time of this study.

INTRODUCTION

Cassava is reputed for being a hardy crop, producing economic yield under drought, low fertility, locust attack, poor husbandry and other adverse production conditions where other crops cannot survive. As a result of its hardiness and high food producing potentials, the crop has assumed a place of prominence among other staple food crops in West Africa in general and in Nigeria in

particular. Famine rarely occurs in a community where cassava is widely grown because in some places they are harvested continuously throughout the year, thus making it available for farmers over the lean season after other crops have been planted but are not yet mature.

Cassava processing provides sources of income and employment for thousands of farmers. The wide-spread importance of cassava to poor rural farmers, processors and both rural and urban consumers means that investments in the processing of cassava are likely to have a positive impact on both rural and urban livelihoods. Cassava is a very high yielding tuber giving high return to food per unit of energy input; its harvesting is flexible because it can be staggered for up to three years. It is therefore sometimes referred to as an excellent famine reserve crop.

Cassava leaves can be used to make soup or as feed for livestock, the stems can be used as planting materials, for mushroom production or as fire wood; the roots can be cooked and eaten fresh or processed (CTA, 2007). Cassava has become prominent in Nigeria's drive towards increasing her foreign exchange generation base.

Processing as a form of value addition still appears to be the best method of preserving the highly perishable cassava roots and for removing 'cyanogenic glucosides' which impart toxicity to the roots. Cassava processing methods involving different combinations of drying, grating, soaking, boiling and fermentation of whole or fragmented roots reduce the total cyanide content of cassava products (Dziedzoave *et al*, 2010).

Traditionally, cassava roots are processed into different products by a variety of methods according to local customs and preferences (Odebode, 2008). Kaine, (2011) quoting Abolaji *et al*. (2007) stated that cassava processing in Nigeria involves a number of undesirable attributes such as time and energy consumption and in addition low yields of products.

Cassava roots can be processed into many edible products through value addition. These products are abacha (eaten by south-easterners in Nigeria), cassava flour, **fufu**, **gari**, starch, tapioca (Philip, et al., 2005 and Adebayo, 2006).

Proper processing leads to production of safe food products and raw materials and this increases the market opportunities for farmers, motivates them to produce more cassava and can provide opportunities for self reliance in the supply of food, feed and industrial raw materials.

Efficiency is a productive use of resources; the degree to which something is done well or without wasted energy or time. There are different measures of efficiency: technical, economic and allocative. The concept of efficiency helps in determining how well the scarce inputs are efficiently allocated in production.

Technical efficiency is the effectiveness with which a given set of inputs is used to produce an output. A firm is said to be technically efficient if it is producing the maximum output from the minimum quantity of inputs such as labor, capital and technology. It is also a point at which the

Marginal Physical Product (MPP) equals Zero (0) in the production curve (Obagaye, 2007). Allocative efficiency is at an output level where the price of output (P_y) equals the Marginal Cost (MC) of production. It also refers to the choice of optimal input proportions given relative prices (Omonona *et al.*, 2010). Economic efficiency is achieved when the cost of producing a given output is as low as practically possible. In the production curve, it is the point where the Marginal Value Product (MVP) equals the price of input (P_x). It is also referred to as the product of technical and allocative efficiency.

This paper attempts to contribute to the existing literature on efficiency of resources use in developing country's agriculture by quantifying the levels of resource availability, use and technical efficiency for a sample of cassava processors in two major cassava producing Local Government Areas (LGA's) selected from Ogun State, Southwestern Nigeria. The objectives are to determine the profitability, measure the technical efficiencies involved in processing gari and fufu by the processors and compare the profitability and the technical efficiency of processing of the two products, gari and fufu, in the selected Local Government Areas.

DATA AND EMPIRICAL PROCEDURES

Ogun State was purposively selected for study because of the very large number of cassava farmers and processors in the state. The two local government areas covered were also purposively sampled based on the production records of registered cassava farmers available in the state's ministries of Agriculture. Simple random sampling procedure was used to capture the respondents among the state registered members of association of cassava processors in the local government areas. The instrument used for data collection was a well structured questionnaire which contains open and close ended questions tailored towards realizing the objectives of the study. The total number of questionnaires administered in the two Local Government Areas was 127 out of which 112 were retrieved and 100 fully completed ones used for the analysis in this study. The Cobb-Douglas functional form was used to estimate the technical efficiency in the stochastic production frontier.

The model is of the form:

$$\ln Y_i = \beta_0 + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_4 \ln X_4 + \beta_5 \ln X_5 + e$$

where:

β_0 = constant term / vector parameter

$\beta_1 - \beta_5$ = coefficient of variables $X_1 - X_5$

e = Error term

Y = total output (kg)

105 X_1 = quantity of cassava tubers (kg)
 106 X_2 = amount spent on hired labour in Naira (₦)
 107 X_3 = transportation cost in Naira (₦)
 108 X_4 = packaging cost in Naira (₦)
 109 X_5 = amount spent on rent in Naira (₦)

110
 111 A frontier 4.1 package was used to analyze for socio–economic attribute(s) that affect the
 112 technical efficiency in the stochastic production frontier. It is given as:

113 $TE = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, e_t)$

114 where:

115 TE= Technical efficiency

116 X_1 = Quantity of cassava tubers (kg)

117 X_2 = Age of farmers (in years)

118 X_3 = Gender grouping: Dummy variable female= 1, otherwise= 0

119 X_4 =Level of education; if educated= 1, otherwise= 0

120 X_5 = Cooperative membership; membership= 1, otherwise= 0

121 X_6 = Processors experience (in years)

122 X_7 = Marital status; married= 1, otherwise= 0

123 e_t = the error term

124 ANALYTICAL FRAMEWORK

125 In the analysis of the data for cassava processors, budgetary, resource-use efficiency and
 126 stochastic production frontier were employed. Farrell (1957) proposition was directed towards
 127 the estimation of frontier models of a production technology and obtaining production efficiency
 128 measures. The types of model used include non- parametric deterministic models, deterministic
 129 full frontier models, stochastic full frontier models and stochastic frontier models. The basic
 130 concept of a stochastic frontier production functions as proposed by Aigner *et al.*, (1977) was
 131 employed in this study. The model is expressed as:

132 $\ln Y_i = \beta_0 + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_4 \ln X_4 + \dots + \beta_n \ln X_n + e$

133 where;

134 $\ln$ = Natural Logarithm

135 $Y =$ Output

136 $\beta_0 =$ constant term / vector parameter

137 $\beta_1 - \beta_n =$ coefficient of variables $X_1 - X_n$

138 $X_1 - X_n =$ vector of inputs

139 $e =$ Error term

140 Also, the technical inefficiency effects in the stochastic frontier as indicated above are expressed
141 in terms of various explanatory variables which include the socio-economic characteristics such
142 as gender, age, educational attainment... etc. This given by:

143 $V_t = \delta + \delta_1 Z_1 + \delta_2 Z_2 + \dots \delta_n Z_n$

144 where;

145 $V_t =$ technical inefficiency

146 $\delta =$ coefficient

147 $Z_1 - Z_n =$ socio-economic variables

148 **RESOURCE USE EFFICIENCY**

149 Resource productivity in agriculture deals with the profitability of resources allocated or how
150 efficiently resources are used. Resource allocation methods can be used for policies of
151 government and labour shift based on whether there is over-utilization or under-utilization of
152 resources. An appropriate function is chosen and marginal physical productivity (MPP) is
153 calculated and when this is multiplied by product unit price, marginal value products (MVP)
154 results. This is eventually compared to the unit price of input. Equality signifies optimum or
155 efficient allocation of inputs. This is shown as:

156
$$MVP_{xi} = MPP_{xi} \cdot P_y$$

157 where: $P_x =$ Unit price of input

158 $P_y =$ Price of output

159 If we assume an implicit function as follows:

160 $Y = f(x_1, x_2, x_3, x_4, x_5, u)$

161 The explicit forms can be shown in various functional forms as follows:

162 Linear: $Y_1 = b_0 + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + u$

163 Semi-log: $Y_1 = b_0 + b_1\ln x_1 + b_2\ln x_2 + b_3\ln x_3 + b_4\ln x_4 + b_5\ln x_5 + u$

164 Double-log: $\ln Y_1 = b_0 + b_1\ln x_1 + b_2\ln x_2 + b_3\ln x_3 + b_4\ln x_4 + b_5\ln x_5 + u$

165 From the above functional forms, the MPPs can be derived as follows:

166 In linear form: $MPP_{xi} = b_i$

167 In semi-log form: $MPP_{xi} = b_i / X_i$

168 In double log form: $MPP_{xi} = b_i \cdot Y / X_i$

169 $MVP_{xi} = MPP_{xi} \cdot P_y$

170 where:

171 P_x = Unit price of Input.

172 P_y = Price of Output.

173 b_i = Estimate of Regression Coefficient.

174 Y = Output

175 X_i = The varying inputs

176 This thus implies that:

177 when $MVP_{xi} > P_{xi}$ it is under-utilization of resources;

178 $MVP_{xi} = P_{xi}$ it is optimum use of resources

179 $MVP_{xi} < P_{xi}$ it is over-utilization of resources.

180

181

182 GROSS INCOME ANALYSIS

183

184 The gross income analysis was used to compute the difference in terms of costs and benefits,
185 and hence determine the profitability of the enterprise. Thus, subtracting direct costs incurred in
186 the production of the good sold from the revenue gave the gross income. The profitability
187 technique can be expressed as:

$$\text{NFI} = \text{GFI} - \text{TC}$$

$$\text{GM} = \text{GFI} - \text{TVC}$$

where:

NFI- Net farm income in Naira

GFI- Gross farm income (P.Q) in Naira

P- Price per unit of output in Naira

Q- Total output in Kg

TC- Total cost of production (TVC +TFC) in Naira

TVC- Total Variable cost in Naira

TFC- Total Fixed cost in Naira

RETURNS ON INVESTMENT (ROI) MODEL

This analysis is used to determine the amount of profit made when one Naira (₦1.00) is spent on cassava processing. It is the ratio of Gross Margin to the Total Cost of production. The bigger it is, the better the profit made on gari and fufu products.

It is given as:

$$\text{ROI} = \frac{\text{G.M.}}{\text{T.C.}}$$

where:

G.M. – Gross margin expressed in Naira

T.C. – Total cost in Naira

Results obtained from the application of this model are used for comparative analyses between the processors in terms of profitability of investment.

EMPIRICAL RESULTS

The socio-economic characteristics of the cassava processors as presented in Table 1 shows that both male and female ventured into gari and fufu products but more females are into cassava processing than males. This might be connected to the fact that most males are more into cassava farming than to full time cassava processing in the study areas. It also reveals that 46.8% and 52.8% of gari and fufu processors respectively have at least the primary education while 19.2% and 13.2% of the gari and fufu processors have no formal education respectively. Education is considered highly necessary in the adoption of new technology and the various technical operations involved in the use of mechanized systems. Marital information reveals that gari (78.7%) and fufu (79.2%) processors were married. This is hoped to have positive impact since it gives opportunity for processors to use their household members labour in the peak periods of processing when hired labour tends to be scarce. A higher percentage of cassava processors did not belong to any cooperative association since, according to them; they did not benefit from the advantages derivable from membership of such associations as members in the past and consequently had to pull out a few years back. (See Table 1).

231 Table 1: Socio-Economic Characteristics of Gari and Fufu Processors in Ogun State

Processors	Gari		Fufu	
Variable	Frequencies	Percentages	Frequencies	Percentages
Sex				
Male	1	2.1	1	1.9
Female	46	97.9	52	98.1
Age(years)				
Less than30	2	4.3	8	15.1
31-40	17	36.2	21	39.6
41-50	24	51.1	15	28.3
51-60	4	8.5	5	9.4
Greater than 60	0	0	4	7.6
Marital status				
Married (1)	45	95.7	46	86.7
Not married (0)	2	4.3	7	13.2
Membership of Cooperative Associations				
Member (1)	11	23.4	11	20.8
Non member (0)	36	76.6	42	79.2
Education				
Had some (1)	38	80.8	46	86.8
Had none(0)	9	19.2	7	13.2

232 Source; Field Survey, 2013

233

234 The results obtained from the analyses of data using the stochastic frontier package for fufu and
 235 gari processing are shown in Tables 2 and 3. The stochastic production coefficient revealed that
 236 the quantity of cassava tubers (kg), costs of hired labour, transportation and packaging were
 237 statistically significant ($P<0.05$) for fufu processing. This implies that the inputs had significant
 238 influence on the total output (the dependent variable) of fufu products. In quantitative terms, a
 239 unit percentage increase in quantity of cassava tubers (kg) processed and, the costs of hired
 240 labour, transportation and packaging (Naira) will bring about 0.75, (-0.11), 0.072 and 0.007
 241 percent increase in the dependent variable of processed fufu products (kg) respectively. For gari
 242 processing, the stochastic production coefficient revealed that the hired labour used was
 243 significant ($P<0.01$) while the coefficient of packaging cost (₦) was also statistically significant
 244 but at 10 percent level. This implies that a one percent increase in hired labour used (₦) will
 245 result to 0.01percent increase the processed gari products (kg).

246

247 Table 2: Maximum likelihood parameter estimates of stochastic production frontier (fufu)

Variables	Parameter	Coefficients	Standard error	t-ratio
Constant	b_0	-1.043	0.0050	-225.5***
Quantity of cassava tubers (kg)	b_1	0.750	0.0024	315.2***
Hired labour (₦)	b_2	-0.110	0.0025	-43.1***
Transportation cost(₦)	b_3	0.072	0.0006	129.4***
Packaging cost(₦)	b_4	-0.007	0.0004	-17.3***
Sigma-square	Σ	1.42	0.2204	6.5***
Gamma	Γ	0.999		

248 Log likelihood function = -39.68

249 Computed from survey data, 2013

250 Statistical significance: ***1%; ** 5%; *10%.

251

252 Table 3; Maximum likelihood parameter estimates of stochastic production frontier (gari)

Variables	Parameter	Coefficients	Standard error	t-ratio
Constant	b_0	6.143	0.132	46.484***
Quantity of cassava tubers(kg)	b_1	-0.007	0.012	-0.596
Hired labour (₦)	b_2	0.014	0.004	3.639***
Transportation cost(₦)	b_3	0.018	0.018	0.986
Packaging cost(₦)	b_4	-0.016	0.0085	-1.890*
Sigma-square	Σ	0.0092	0.0021	4.296***
Gamma	Γ	0.7966	0.0858	9.287***

253 Log likelihood function = 56.67.

254 Computed from survey data, 2013

255 Statistical significance: ***1%; ** 5%; *10%.

256

257

258 The Technical Efficiency model Estimation results derived from the fitted stochastic frontier
 259 model for the processors of fufu and gari gave results as shown In Tables 4 and 5.

260

261 Table 4 Technical Efficiency Model Estimation of Fufu Processors

Variables	Coefficients	Standard error	t-ratio
Constant	36.15		

Quantity of cassava tubers (kg)	0.002	0.0009	1.87 [*]
Age (years)	0.375	0.1714	2.19 ^{**}
Gender (dummy)	-3.365	0.8902	-3.78 ^{***}
Level of education (dummy)	-0.276	0.6257	-0.44
Cooperative membership (dummy)	-0.580	0.5944	-0.98
Processors experience (years)	-0.019	0.0216	-0.86
Marital status (dummy)	2.144	0.8806	2.43 ^{**}

262

263 Mean technical efficiency for fufu processors = 0.59

264 Computed from survey data, 2013

265 Statistical significance: ***1%; ** 5%; *10%.

266 As shown in Table 4, the estimated coefficients are 0.002, 0.375, and 2.14 respectively for the
 267 quantity of cassava tubers, age and marital status of fufu processors. They are positive and
 268 statistically significant at 1 percent level. This implies that a unit increase in each of these
 269 technical factors will bring about 0.002, 0.375, and 2.14 increases in the level of technical
 270 inefficiency. The coefficients of gender grouping (-3.36), level of education (-0.27), cooperative
 271 membership (-0.58), and processors experience (-0.02) are negatively related to technical
 272 inefficiency. The negative values of estimated coefficients of education, gender, cooperative
 273 membership and processing experience variables are suggestive of their enhancement capability
 274 to bring about decrease in inefficiency of fufu processors. This shows that improvements in
 275 educational attainment, gender, cooperative membership and processing experience of fufu
 276 processors could potentially lead to decreased technical inefficiency. The estimated coefficient of
 277 marital status (2.14) is positively related to technical inefficiency. This implies that married
 278 people who have large household size reduces the efficiency of the processors. This is so because
 279 large household size constitutes a drain on the resources of the processors.

280 The estimates for gari processors as shown in Table 5 gave the estimated coefficient of quantity
 281 of cassava tubers as negative and statistically significant at 1 percent level; the value is 0.0045.
 282 This implies that 1 unit decrease in technical factors will bring about 0.0045 increases in
 283 technical inefficiency. The coefficients of cooperative membership (-0.0369) and processors
 284 experience (-0.0011) are both negatively related to technical inefficiency.

285

286

287 Table 5: Technical Efficiency Model Estimation by Gari Processors

Variables	Coefficients	Standard error	t-ratio
Constant	1.68		
Quantity of cassava tubers (kg)	-0.0045	0.0002	-23.05 ^{***}
Age (years)	0.0465	0.0409	1.14
Gender(dummy)	0.0280	0.1571	0.18

Level of education (dummy)	0.0997	0.0538	1.85*
Cooperative membership (dummy)	-0.0369	0.0528	-0.70
Processors experience (years)	-0.0011	0.0037	-0.30
Marital status (dummy)	0.0809	0.0951	0.85

288 Computed from survey data, 2013

289 Statistical significance: ***1%; ** 5%; *10%.

290 Mean technical efficiency for gari processors = 0.45

291

292 The negative estimates observed for the coefficients of cooperative membership and processors
 293 experience variables implies that enhancement of these variables could bring about a meltdown
 294 in the level of the currently observed technical inefficiency of the gari processors. The estimated
 295 coefficients of age, gender, level of education and marital status are positively related to
 296 technical inefficiency. This implies that older people had reduced efficiency. This is so because
 297 with advancing age, there is the tendency for the weakening of strength for strenuous job as
 298 entailed in gari processing. Increased level of education may not be in favour of processors
 299 staying long on the job since such individuals would prefer other more remunerative and less
 300 strenuous jobs available in the urban or sub-urban centres. The observation on gender here is as a
 301 result of fewer processors (mostly females) of gari than fufu in the study area.

302 The result obtained from Budgetary analysis is shown in Table 6. The three indices used to
 303 compare the economic performance in terms of profitability of fufu and gari processing were all
 304 in favour of fufu. The net benefit of the fufu processing is more than double that of gari
 305 processing in the study area. The major items of costs were those of raw materials (cassava
 306 tubers) and processing. Gari processing entails larger quantities of cassava tubers and processing
 307 costs than fufu. The costs of additional operations of grating and pressing, firewood and frying
 308 make the cost of gari processing much higher than that of fufu. Although the value of processed
 309 gari per measure is higher than that of fufu, this could not at all compensate for the additional
 310 costs of processing the former over the latter. It could also be observed that fufu products require
 311 additional costs for transportation and packaging prior to marketing while in most cases gari
 312 processors stayed in situ and customers/consumers come to their processing site to purchase the
 313 products. However, at times when there is low patronage, these products too are packaged and
 314 transported to the markets for sale and these further reduce the realizable profit by gari
 315 processors.

316

317

318 Table 6: **BUDGETARY ANALYSIS (AVERAGE PER PROCESSOR) PER MONTH**

GARI	Amount (₦)	Fufu	Amount (₦)
Items		Item	
Total revenue	230,400	Total revenue	179,200

Raw tubers	192,000	Raw tubers	128,000
Labour	4,800	Labour	4,480
Grating and pressing	9,600	Transportation	400
Firewood and Frying works	4,000	Packaging	1,500
Total variable cost	210,400	Total Variable Cost	134,380
Total fixed cost	<u>508.4</u>	Total fixed cost	<u>837.47</u>
Total Cost (TVC + TFC)	210,908.4	Total Cost (TVC + TFC)	135,217.47
Net Return (TR – TC)	19,491.6	Net Return (TR – TC)	43,982.53
Gross Margin (TR –TVC)	20,000	Gross Margin (TR –TVC)	44,820
Return per Naira (₦) Invested	0.10	Return per Naira (₦) Invested	0.33

319 Source: Field Survey, 2013

320 In order to provide a clear interpretation of the production behaviour of the processors and their
 321 resource use pattern, three estimates derived from the fitted production function were used. They
 322 are elasticity, marginal physical product and marginal value product. These estimates are shown
 323 in Tables 7 and 8.

324 **TABLE 7: Estimation of resource use efficiency in gari processing**

Resource use	MPP= b_i	P_x	P_y	MVP=MPP $_x$. P_y	MVP/ MFC	Decision
Cassava tubers (₦)	0.358	106.38	36.17	12.95	0.12	Over utilization
Labour cost(₦)	0.688	150	36.17	24.89	0.17	Over utilization
Transportation cost(₦)	-0.069	700	36.17	-2.50	-0.00	Over utilization

325 Source; Field survey analysis, 2013

326

327

328

329

330 **TABLE 8: Estimation of resource use efficiency in fufu processing**

Resource use	MPP= b_i	P_x	P_y	MVP= MPP $_x$. P_y	MVP/ MFC	Decision
Cassava tubers (₦)	0.026	37.74	60.38	1.57	0.04	Over utilization
Labour	-0.11	50	60.38	-6.64	-0.13	Over utilization

cost(₦)						
Transportation cost(₦)	0.006	50	60.38	0.36	0.00	Over utilization

Source; Field survey analysis, 2013

where;

MPP= Marginal Physical Product (Coefficient variable 'x')

P_x = Price per unit of inputs (₦)

P_y = Price per unit of the processed output (₦)

MVP= Marginal Value Product

MFC= Marginal Factor Cost (P_x)

As evident from observations in Tables 7 and 8, none of the inputs used by cassava processors for processing was efficiently utilized in Ogun State. The ratio of marginal value product of inputs to input prices being less than one in all cases indicate that these variables were highly over utilized. It also indicates that the resources were not optimally allocated in the study areas. The implication is that production may be enhanced by reducing the costs of these inputs. For increased efficiency in the level of resources used in cassava processing in the study area, there is the need to decrease the quantity of inputs used by the amount of their deviations.

CONCLUSION

The ratio of marginal value product of inputs to input prices less than one in all cases indicates that the variables were highly over utilized. This indicates that production may be enhanced by reducing the costs of inputs. This can partially be resolved if there is mass production of cassava tubers that will force down its price. Also an economic policy towards stabilization of prices of resource inputs is highly necessary. The results of the profitability analysis of cassava processing in the study areas showed that fufu processing is more profitable than gari. Factors such as high cost of transportation and raw cassava tubers were the most critical factors inhibiting profitability of gari and fufu processing.

The result of the determinants of production shows that transportation cost, quantity of cassava tubers (kg) and labour used had significant influence on the total output of gari. The negative coefficient of transportation cost shows that processors were spending more on transportation due to unregulated fares payable on haulage. The results of the determinants of fufu net return showed that technology used is negative and significantly related with net return while the coefficient of cassava tubers is positive but significantly related with the net return. On the other hand, no significant relationship was found to exist between net return and technology used in gari processing.

The mean technical efficiency index for the entire fufu and gari respondents are 0.59 and 0.45 respectively. The implication of this is that the mean technical efficiency of fufu can be increased by 41percent while that of gari can be increased by 55 percent through better use of available resources to increase their productivity.

Based on the findings of this study, the following recommendations are suggested: In order to accelerate the net returns in cassava processing in the state, governments should build linkage roads in the areas where they do not exist and maintain existing ones for easy access to raw cassava tubers. There should be regulated transportation fares in order to reduce transportation cost thereby boosting the revenue of the processors. Governments and Non-Governmental organizations' should invest in cassava production to reduce the scarcity of cassava tuber and also to enhance cassava processing in the country.

REFERENCES

- Adebayo K, 2006: Dynamics of the technology Adoption process in rural-based cassava processing systems in south-west Nigeria. A scientific report submitted to international foundation of science (IFS). 6ev Turegetan 19, st 114, 38 Stockholm, Sweden 93.
- Aigner, D.J., C.A.K Lovell, and P. Schmidt (1977). Formulation and Estimation of Stochastic Frontier Production Function Models, *Journal of Econometrics*. 6: 21-31.
- CTA, (2007): Making high quality cassava flour. Practical guide series no.5 ISSN 1873-8192 pp 1-6
- Dziedzoave, NTA. B. Abass, W.K. A. Amoa-Awua and M.Sablah. (2010): Quality Management manual for the production of high quality cassava flour. In: Adegoke, G.O and Brimer L.eds. International Institute of Tropical Agriculture (IITA). Pp. 6- 49.
- Farrell, M.J. (1957). The Measurement of Production Efficiency, *Journal of Royal Statistics Society, Series A*. 120: 253-281.
- Kaine A.I.N (2011): Investigation of Factors Affecting Technical Infancy of Akpu Processing In Delta State, Nigeria: *J Hum Ecol*. 33(2), 133-137
- Obagaye V.A (2007): Resource Use Efficiency in Egg Production in Odeda Local Government Area, Ogun State. Unpublished B. Agric project, University of Agriculture, Abeokuta, Ogun State, 70pp.
- Odebode O. Stella (2008): Appropriate technology for cassava processing in Nigeria: User's point of view. *A Journal of International Women Studies*, Vol. 9: 269-283.
- Omonona B.T, Egbetokun O.A. and Akanbi A.T. (2010): Farmers Resource-Use and Technical Efficiency in Cowpea Production in Nigeria. *Journal Economics Analysis and Policy*, 40(1), 87-95.
- Philip T.D. Taylor, L. Sanni, R. Okechukwu, C. Ezedinma, M. Akorada, J. Lemchi, P.Ilonu, F.Ogbere, E. Okoro and A.G.O. Dixon (2005). The Nigerian Cassava Industry, Statistical Hand Book. IITA, Ibadan. pp. 18-19