PRODUCTION EFFICIENCY OF CASSAVA WASTE (PEELS), IN OGUN STATE, NIGERIA

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ABSTRACT
This study examined the value chain of cassava peels in Ogun State Nigeria. Multistage sampling technique was used to select 180 cassava processors and marketers. Socio-economic data were obtained from respondents with the use of pre-tested questionnaires. Data were analyzed using descriptive statistics, budgetary technique, and Stochastic Frontier Analysis (SFA) and Student t-test. The study found that majority (84.3% and 52.8%) of cassava processors and marketers were female. In addition, 60.2% of the processors and 51.4% of the marketers had secondary education. The value chain activities carried out by processors were transportation, drying and packaging while marketers transported, packaged and put the peels in storage for future sales. The SFA revealed that cost of labour ($p<0.01$) and quantity of fresh cassava peels ($p<0.01$) were the main determinants of output of dried cassava peels by the processors. The inefficiency model revealed that the efficiency of producing dried cassava peels increased with increase in age ($p<0.01$), credit access ($p<0.01$), household size ($p<0.01$) and membership of cooperative society ($p<0.01$). Furthermore, the cost function revealed that cost of sieving ($p<0.05$) and depreciation on capital item ($p<0.01$) increased the production cost of dried cassava peels. The mean technical, allocative and economic efficiency of producing dried cassava peels were estimated as 94%, 83% and 78% respectively. This study concluded that production of cassava peels is efficient and its trade is profitable. The study recommends that cassava processors and marketers should form cooperative groups to increase access to credit for higher output and trade of peels.

Keywords: Production competence, Cassava value chain, Depreciation cost system, Ogun state

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Introduction
A serious competition exists between the feed industry and other channels in the food chain (especially man) over conventional feed ingredients such as Maize and Soya bean (Tuleun *et al*., 2005). This had resulted in the high cost and scarcity of these conventional feedstuffs. Poultry feed producers are thus faced with the task of finding alternative feedstuffs that will not compromise quality. The search of such alternatives has exercised Animal Nutritionists in Nigeria for over a decade (Onyimonyi and Okeke, 2005).

Such alternative feedstuffs as cassava peel do not have any direct food requirement by man. They are waste and even constitute health hazards and nuisance in waste disposal of these industries (Onyimonyi and Onukwufor, 2003). Since these peels could make up to 10-20% of the wet weight of the roots, they constitute an important potential resource for animal feeds, if properly processed by a bio-system. Research results indicate that, cassava peel if properly processed can constitute up to 40 percent of the diets of rabbits (Omole and Sonaiya, 1981).

However, the transformation of cassava waste into various forms for food, feed, and industrial raw material has the potential to help developing countries improve food security, create additional value in rural settings, generate income and employment and develop a more favourable balance of trade. In addition, reported that there are opportunities to utilize agro-processing wastes such as cassava peels to generate wealth. The wealth so generated from waste can lead to reduction of poverty among the rural entrepreneur especially the women processing the herbal soap in particular. This concept is called the "waste to wealth" initiative to improve the economic and health status of the beneficiaries. (Oluwalana, 2011)

A value chain can be defined as the full range of activities which are required to bring a product orservice from conception, through the different phases of production (involving acombination of physical transformation and the input of various producer services),delivery to final customers, and final disposal after use (Elegbede, *et al*., 2018). Value chain activities of cassava peels begins with the processing activities which includes; collecting of peels, drying, blowing, sieving and packaging. The marketing activities includes; transportation, bagging, and putting the peels in storage for future sales (Elegbede, *et al*., 2018).

This article examines the value chain of cassava peels in Ogun State Nigeria. Stochastic Frontier Analysis, Budgetary Technique and a T-test were used to analyze the economic efficiency of cassava peels processors, estimate the financial outcome and profitability in value chain of cassava peels and test the significant difference between the profit levels of cassava chain actors in Ogun State Nigeria.

Methodology

This study was based on primary data obtained through structured questionnaire from the main value chain actors in ogun state Nigeria (Elegbede, *et al*., 2018). This was designed to obtain relevant information that will help in the actualization of the stated objectives in Ogun State Nigeria. Multistage sampling technique was used to select 180 cassava processors and marketers. The first stage involved a purposive selection of two Agricultural Zones in Ogun State this is due to the predominance of cassava process and marketing activities in the chosen zones (Elegbede, *et al*., 2018) while the second stage involved a proportionate sampling of six blocks. The third and fourth stages respectively involved a simple random sampling of two cells from each block and nine processors and six marketers.

The study data were analysed by descriptive and stochastic frontier technique. The stochastic frontier analysis based on Coelli, 1995 were used to estimate coefficients of the parameters of production function and to analyse the economic efficiency of cassava peel processors in Ogun State Nigeria. The theoretical model underlying the analysis includes the technical efficiency and allocative efficiency. The relationship of the afore mentioned model will give us the overall performance measure (economic efficiency) of the cassava peels processors in the study area. Detailed specifications of the theoretical framework are common in literature (Coelli, 1995).

Model Specification

Specification of the Stochastic Frontier Production Model

For the purpose of analyzing the economic efficiency of cassava peels to various useful consumer products in the study area. The stochastic frontier production function model for estimating value chain level technical efficiency is specified as: following Amaza and Olayemi (2001):

$Yi = f(Xi;\beta) + \varepsilon_i = l, 2, ...n$ ……………………… (1)

Here Yi is output, Xi denotes the actual input vector, β is vector of parameters to be estimated/production function and ε_i is the error term that is composed of two elements, that is: $\varepsilon_i = V_i - U_i$

Where Vi is the symmetric disturbances assumed to be identically, independently and normally distributed as $N(0, \sigma^2_v)$ given the stochastic structure of the frontier. The second component UI is a one-sided error term that is independent of V and is normally distributed as $(0, \sigma^2_u)$, allowing the actual production to fall below the frontier but without attributing all short falls in output from the frontier as inefficiency.

$\sigma^2 = \sigma^2_u + \sigma^2_v$ ………………..(2)

Furthermore, $\gamma = \frac{\sigma^2_u}{\sigma^2}$ ………………..(3)

The variance ratio parameter y (Gamma) according to Dawson, P.J., and Lingard, J. (1991). '$\gamma = (0 \leq \gamma \leq 1)$.
The variance ratio parameter y has two important characteristics:

i. when σ^2 tends to zero, then u is the predominant error in equation (1) and γ tends to 1, implying that the output of the sampled farmers differs from the maximum output mainly because of difference in technical efficiency.

ii. when σ^2_u tends to zero, then the symmetric error v is the predominant error in equation (1) and so γ tends to 0. Thus based on the value of γ, it is possible to identify whether the difference between a farmer's output and the efficient output is principally due to random errors (γ tends to 0) or the inefficient use of resources (γ tends to 1) (Kalirajan, k.p., Shand, R.T. (1988). Following Belbase, K., and Grabwoski, R. (1985), the technical efficiency estimation is given by the mean of the conditional distribution of inefficiency term Ui given ε_i and thus defined by:

$$E(U_i|\varepsilon_i) = \frac{\sigma_u \sigma_v}{\sigma}\left[\frac{f(\varepsilon_i \lambda/\sigma)}{1 - f(\varepsilon_i \lambda/\sigma)} - \frac{\varepsilon_i \lambda}{\sigma}\right] \quad \text{……………(4)}$$

Where $\lambda = \sigma^2_u / \sigma^2_v$, $\sigma^2 = \sigma^2 + \sigma^2$ while f and F represents the standard normal density and cumulative distribution function respectively evaluated at e/a

The farm specific technical efficiency is defined in terms of observed output (Y1) to the corresponding frontier output (Y_i*) using the available technology derived from the result of equation (5) below as:

$$TE = \frac{Y_i}{Y_i *} = \frac{E(Y_i \mid u_i, X_i)}{E(Y_i \mid u_i = 0, X_i)} = E\left[\exp(-Ui/\varepsilon)\right] \quad \text{……………………..(5)}$$

Therefore, $TE = \exp(-U_i)$

TE takes values within the interval zero and one (i.e between 0 and 1), where 1 indicates a fully efficient farm.

Technical and allocative inefficiency effects is the result of behavioral factors which could be controlled by efficient management ((Coelli, 1996)) they are assumed to be independent of the error term.

The estimated technical and allocative inefficiency model is presented explicitly by

$$\mu_i = \delta_0 + \delta_1 Z_1 + \delta_2 Z_2 + \delta_3 Z_3 + \delta_4 Z_4 + \delta_5 Z_5 + \delta_6 Z_6 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (6)$$

Where: μ_i = inefficiency effect, δ = a vector of unknown parameters to be estimated, Z_i = Factors contributing to inefficiency

The stochastic frontier cost functions model for estimating farm level overall economic efficiency is specified as:

$$C_i = g(Y_i, P_i; \alpha) + \varepsilon_i \quad i = 1, 2, \ldots\ldots n \quad \ldots\ldots\ldots\ldots (7)$$

Where C_i represents total production cost, Y_i represents output produced, P_i represents prices of inputs, ct represents the parameters of the cost function and ε_i represents the error term that is composed of two elements, that is:

$$\varepsilon_i = V_i + U_i$$

Here V_i and U_i are as defined earlier. However because inefficiencies are assumed to always increase costs, error components have positive signs Sharma, K. R., Pingsun, L., and Halina M. Z. (1999).
The farm specific economic efficiency (EE) is defined as the ratio of minimum observed total production cost (C*) to actual total production cost (C) using the result of equation 15 above. That is:

$$EE = \frac{C_i}{C_i *} = \frac{E(C_i \mid u_i = 0, Y_i P_i)}{E(Y_i \mid u_i, Y_i P)} = E\left[\exp(-Ui \mid \varepsilon)\right] \quad \ldots\ldots\ldots\ldots (8)$$

Here EE takes values between O and 1.
Hence a measure of farm specific allocative efficiency (AE) is thus obtained from technical and economic efficiencies estimated as:

$$AE = \frac{EE}{TE}$$

Estimation Techniques

A total of 180 respondents supplied data used in this study. The following subsections present results of various analyses carried out on the study data.

Results and Discussions

Socioeconomic Characteristics of the Cassava Waste Processor and Marketers along the Chain

The socioeconomic characteristics of cassava value chain actors such as the age, sex, educational level, years of experience, household size, membership of association and other occupation etc., as summarized in table 1. Below, reveals the influence of the personal characteristics of the respondents in the study.

Table1: Distribution of Age, Sex, Educational Level, Household Size, Years of Experience, Membership of Association and Potential Buyers of Cassava Peels in the study Area.

Variable	Processors Frequency	Percentage	Marketers Frequency	Percentage	Pooled Frequency	Percentage
Age Group (Years)						
21-30	21	19.4	22	30.6	23	**12.8**
31-40	30	27.8	23	31.9	53	**29.4**
41-50	29	30.7	14	18.7	43	**23.9**
51-60	17	15.7	5	6.9	22	**12.2**
>60	11	10.2	0	0.0	11	**6.1**
Total	**108**	**100.0**	**72**	**100.0**	**180**	**100.0**
Mean		**44**		**38**		
Sex						
Male	17	15.7	34	28.3	51	**28.3**
Female	91	84.3	34	52.8	129	**71.7**
Total	**108**	**100.0**	**72**	**100.0**	**180**	**100.0**
Educational Level						
No Formal Education	6	5.6	4	5.6	10	**5.6**
Primary	37	34.3	31	43.1	68	**37.8**
Secondary	65	60.2	37	51.4	102	**56.7**
Experience (years)						
≤ 5	11	10.2	7	9.7	18	**10.0**
6-10	30	27.8	24	33.3	54	**30.0**
11-15	16	14.8	19	26.4	35	**19.4**
16-20	19	17.6	10	13.9	29	**16.1**
21-25	7	6.5	5	6.9	12	**6.7**
26-30	14	13.0	7	9.7	21	**11.7**
≥ 31	11	10.0	0	0.0	11	**6.1**
Total	**108**	**100.0**	**72**	**100.0**	**180**	**100.0**
Household size						
≤ 4 persons	29	26.9	28	38.9	57	**31.7**
5-8	69	63.9	44	61.1	113	**62.8**
≥ 9 persons	10	9.3	0	0.0	10	**5.6**
Total	**108**	**100.0**	**72**	**100.0**	**180**	**100.0**
Mean		**6**		**5**		
Membership of Cassava Association						
Members	81	75.0	50	69.4	131	**72.8**
Non-Members	27	25.0	22	30.6	49	**27.2**
Total	**108**	**100.0**	**72**	**100.0**	**180**	**100.0**
Other Occupation						
None	64	59.2	33	45.8	97	**53.9**
Farming	14	13.0	7	9.8	21	**11.7**
Trading	30	27.8	32	44.4	62	**34.4**
Total	**108**	**100.0**	**72**	**100.0**	**180**	**100.0**

Source: Field Survey, 2019

Table 2: The Stochastic Frontier Production Function Results for cassava peels processing along the chain

Variable	Regression Coefficient for Cassava peels	T-Value
Production Function		
Constant	5.56*** (0.0894)	62.2
Cost of Labour (X_1)	-0.0370*** (0.0379)	-3.57
Qty of cassava peels (X_2)	-0.3071*** (0.0652)	-8.10
Depreciation (X_3)	0.0041 (0.0079)	0.517
Inefficiency Model		
Constant	-8.59*** (0.978)	-8.79
Age (D_1)	-0.168*** (0..0115)	-14.57
Education level (D_2)	0.124*** (0.056)	2.19
Years of experience (D_3)	0.0751*** (0.0199)	3.76
Credit access (D_4)	-1.24*** (0.3955)	-3.126
Household size ($D_{5)}$)	-0.590*** (0.0948)	-6.223
Membership of Association (D_6)	-6.64*** (0.564)	-11.77
Diagnoistic Statistics		
Sigma-squared (δ^2)	0.188*** (0.2968)	6.36
Gamma (γ)	0.996*** (0.00213)	466.69
Cost function		
Constant	2.003*** (0.419)	4.77
Price of Packing (P_1)	0.275* (0.153)	1.792
Price of labour (P_2)	-0.205* (0.102)	-2.009
Price of sieve (P_3)	0.694*** (0.133)	5.22
Depreciation on capital item (P_5)	0.127** (0.045)	2.831
Diagnostic Statistics		
Constant	1.967** (0.805)	2.443
Age (Z_1)	-0.0075 (0.017)	-0.642
Education Level (Z_2)	0.202*** (0.0486)	4.157
Years of experience (Z_3)	0.00168 (0.0136)	0.1228
Credit access (Z_4)	-0.3709 (0.251)	-0.475
Household size (Z_5)	-0.106 (0.0669)	-1.59
Membership of Association (Z_6)	-0.535* (0.300)	1.78
Sigma-squared (δ^2)	1.025 (0.300)	1.42
Gamma(γ)	0.99*** (0.0000212)	47029.1

Source: Field Survey, 2019

Table3. Distribution of Technical, Allocative and Economic Efficiency of Cassava peels Processing along the Value Chain

Class	**Frequency**	**Percentage**
Technical Efficiency		
≤ 0.40	8	7.4
0.41-0.50	6	5.6
0.51-0.60	12	11.1
0.61-0.70	14	13.0
0.71-0.80	25	23.1
0.81-0.90	26	24.1
≥ 0.91	17	15.7
Total	**108**	**100**
Mean	**0.94**	
Minimum	**0.057**	
Maximum	**0.968**	
Allocative Efficiency		
≤ 0.10	41	38.0
0.11-0.20	27	25.0
0.21-0.30	15	13.9
0.31-0.40	10	9.3
0.41-0.50	6	5.6
≥ 0.51	9	8.3
Total	**108**	**100**
Mean	**0.83**	
Minimum	**0.018**	
Maximum	**0.996**	
Economic Efficiency		
≤ 0.10	46	42.6
0.11-020	36	33.3
0.21-0.30	15	13.9
0.31-0.40	4	3.7
≥ 0.41	7	6.5
Total	**108**	**100**
Mean	**0.78**	
Minimum	**0.0012**	
Maximum	**0.6779**	

Source: Field Survey, 2019

Chain of cassava peels actors, as well as the economic efficiency of cassava peel processing are presented in table 1, 2 & 3. The findings showed that the mean age of the cassava value chain actors was 44 years and 38 years for processors and marketers respectively. Also 77.9 percent and 81.2 percent of processors and marketers are aged below 50 years. This implies that majority of the farmers are in their active age. This also informs their skill, ability and wiliness to adopt new innovations and technologies which can be used to transform the cassava industry in the study area. In terms of sex, the study revealed that 15.7 percent are male while 84.3 percent are female for processors of cassava while for cassava marketers 28.3 percent are male and 52.8 percent are female respectively. The result revealed that majority of the actors in cassava value chain in the study area are female and this may be due to the fact that female are predominant in processors and marketers while the male are basically into production of the cassava. Results from the study also revealed that majority (60.2 percent) of the processors have secondary education while 51.4 percent of the marketers also have secondary education. It was discovered that for both processors and marketers 5.6 percent are found to have no formal education. The level of education among the processors and marketers could be due to the major contributions of the actors along the value chain.

Furthermore, The result of the survey showed that (38.0 percent of processors and 43.0 marketers) of cassava respectively are between 1 and 10 years' experience while 14.8 percent of processors and 26.4 percent of marketers had between 11 and 15 years of experience in the processing and marketing of cassava product and bye products. On the other hand only 10.2 percent of processor had above 31 years' experience in cassava processing and marketing respectively. The years of experience of the actors along the node is supposed to have a positive influence on the profitability of cassava value chain *ceteris paribus.* The study further showed that majority (63.9 percent) of processors and 61.0 percent of marketers have their household size falling between 5 and 8 members with a mean of 6 and 5 household members for processors and marketers respectively. It is expected that the larger household size of both processors and marketers along the value chain should translate to higher output and eventual profit. The result further showed that majority as accounted for both processors (75.0 percent) and marketers (69.4 percent) of cassava are members of a cassava processors and marketers association while 25.0 percent for processors and 30.6 percent for marketers are not member of any of the cassava association. It was also gathered from the study that 59.3 percent and 45.8 percent for the processors and marketers respectively do not have any other association other than cassava processing and marketing. Also, the study revealed that 27.8 percent of processors and 44.4 percent of marketers are traders. This means that they can plough back their returns these other sources back into the cassava processing thereby increasing their profit margin along the value chain.

The stochastic frontier production, cost and efficiency analysis of cassava peels processing.

The parameter estimate obtained from the maximum Likelihood Estimate for cassava waste processors revealed that only Depreciation on capital (X_3) have positive relationship with total output. The result also showed that Labour (X_1) and Quantity of cassava peel (X_2) have negative relationship with output and significantly influence it at 1% respectively. The negative signs of the coefficient of labour and quantity of cassava peels showed that the total revenue from cassava peels processing decrease with increase in labour and quantity of cassava peels along the chain.

The result of the maximum likelihood estimates from the Stochastic Frontier Cost Function of the cassava peels processors shows the relative importance of the variable inputs in terms of the allocative efficiency of the cassava peels processors. It further revealed that the price of packing ($P<0.10$), Price of sieve ($P<0.05$) and depreciation on capital item ($P<0.01$) for cassava peels processors, conform to the a *priori* expectation with positive signs while other variables as Price of labour ($P<0.10$) have negative signs. The magnitude of the price of packing, price of sieve and depreciation on capital items imply that an increase in the unit cost of these variables will lead to an increase in the total cost of production *ceteris paribus.* From the price of packing which has a positive coefficient of 0.275, this means that a 100% change in variable will bring about 27.5% changes in the allocative efficiency of the cassava peels processors. Also, for price of sieve and depreciation

on capital item of 0.694 and 0.127 respectively, this means that 100% change in each of these variables while other things are held constant will bring about 69.4% and 12.7% change in the allocative efficiency of the cassava processors. More so, the price of labour with a negative sign is a decreasing factor to the farmers' allocative efficiency, hence the cassava peels processors along the cassava peels value chain in the study area need to be prudent in allocation of resources in their hiring of labour to carry out their activities along the value chain.
The mean technical efficiency of cassava peels processors was estimated to be 0.94. The mean output of 94 percent revealed that there is the potential for the cassava peels processors to increase their output by 6 percent under the present technology along the cassava waste value chain. More so, the mean allocative efficiency of 83 percent for the cassava peels processors along the chain revealed that there is room for 17 percent improvement in their output. Finally, the mean economic efficiency of 78 percent for the cassava waste (peel) processors implies that there is room for improvement by 22 percent and that there was a great potential for increasing the gross output and profit with the existing level of technology along chain.

Regarding the inefficiency model, the study concluded that processors education and years of experience, contributed significantly and positively to technical inefficiency, while age, credit access, household size and membership of association had an inverse relationship with technical inefficiency. In terms of allocative efficiency only educational level was significant and years of experience though not significant contributed positively to allocative inefficiency. The coefficient of age, credit access, household size and membership of association was negative for allocative inefficiency. These results suggest that experience in cassava peels processing, increased credit, household size and membership of association could jointly contribute positively to an improvement in efficiency of cassava peels processors in Ogun State of Nigeria.

One of the most important policy implications of this study is that there is enough potential to increase the present level of efficiencies for cassava peels processing along the chain in the study area. Furthermore, this study shows that cassava peels processors and marketers are faced with several constraints along the chain. These constraints negatively affect the efficiency of cassava peels processing and marketing in the study area. Notable among them are poor value added technology, low awareness of economic potentials of value added products, lack of extension services, inaccessibility of formal credit source because of high interest rate, poor road network, non-availability of modern equipment, low price of value added products, poor level of education and poor health issues. For efficient processing and marketing of cassava peels in the study area, these constraints must be drastically reduced to the barest minimum. This can be done through provision of more and better economic infrastructure, proper supervision of cassava peels and marketing programme along the chain, effective extension service and proper agricultural financing. It would pave a way to increase profit and will help alleviate poverty in Ogun State.

Conclusion

The result of the study revealed that majority of Cassava processors and marketers are female. Also, the mean age of the cassava value chain actors was discovered to be 44 years and 38 years for processors and marketers respectively. Furthermore, the stochastic frontier analysis revealed that labour and quantity of cassava peels increases the output of the cassava peels processors. The inefficiency model revealed that the efficiency of producing dried cassava peels increased with increase in age ($p<0.01$), credit access ($p<0.01$), household size ($p<0.01$) and membership of co-operative society ($p<0.01$).The mean technical efficiency of cassava peels processors was estimated to be 0.94. The mean output of 94% revealed that there is the potential for the cassava peels processors to increase their output by 6% under the present technology along the cassava peels value chain. However, the mean allocative efficiency of 83% for the cassava peels processors along the chain revealed that there is room for 17% improvement in their output. More so, the mean economic efficiency of 78% for the cassava peel processors implies that there is room for improvement by 22% and that there was a great potential for increasing the gross output and profit with the existing level of technology along chain. This shows that the cassava processors are economically efficient along the cassava peels value chain in the study area.

Recommendation

Based on findings of this study, the following policy recommendations were advanced to positively bring about improvement in the cassava peels value chain especially redirecting the interest of the masses and the government to cassava peel.

1. From the socio-economic characteristics of the respondents, the majority are in active age bracket. This attraction for the younger people should be a deliberate effort on the part of all stakeholders to encourage and promote this aspect of the people's culture among the youth. The stakeholders (local, state and federal government of Nigeria should involve the youth (economic agents of change) in the transformation programme of the economy.
2. The varying levels of technical efficiency, allocative and economic efficiencies of cassava peels processors in the study area are ample opportunity to improve on the current level of efficiency. Cassava peels processors and marketers in the study area should therefore be encouraged to form cooperative group(s) to have access to credit from bank(s) for letter capital base for higher output. Also, government should invest more in making credit available to cassava peel processors at low interest rate and without collateral so that they can be able to maximize profit generated from the cassava peels and reduce productive inefficiencies.

References

Belbase, K., and Grabwoski, R. (1985). Technical efficiency in Nepalese agriculture. *The Journal of Developing Areas*, 19: 515-520.

Coelli, T. J. (1995). Recent development in frontier modeling and efficiency measurement. *Australian Journal of Agricultural Economics*, 39: 219-245.

Coelli, T. J. (1995): A Guide to Frontier Version 4,1: A Computer Program for Stochastic Frontier Production and Cost Function Estimation. *CEPA Working Paper No 7/96. Centre for Efficiency and Productivity Analysis, University of New Englan*d, Armidale, Australia.

Dawson, P.J., and Lingard, J. (1991). Approaches to measuring technical efficiency on Philippine rice farms, *Journal International Development*, l3 (3):211-228.

Kalirajan, K.P., and Shand, R.T. (1988). Firm and product-specific technical efficiencies in a multi-product cycle system. *The Journal of Development Studies*. 25(1):84-96.

Oluwalana, E.O.A.2011. Economic Potential of Forest – Based Small – Scale Enterprises in Herbal Soap *Processing and Marketing in South – West Nigeria*. 14(15): 281-282

Omole, I.A. and E.B. Sonaiya, 1981. The effect of protein source and methionine supplementation on cassava Peel utilization by growing rabbits. Nutr. Rep. Int., 23: 729-737.

Onyimonyi, A.E. and G.C. Okeke, 2002. Performance of weaner pigs fed varying dietary level of Bambara (*Voandzeria subterrenea* Thouars) waste. Proc. 7th Ann. Conf. Anim. Sci. Ass. Nigeria (ASAN), pp: 24-28.

Onyimonyi, A.E. and G.C. Okeke, 2005. Carcass, Organ and Pathological characteristics of grower pigs fed cassava peal meal. *Agro-science J. Agri. Food Environ*. Ext., 1: 1-4.

Onyimonyi, A.E. and J.O. Onukwufor, 2003. Effect of toasted Bambara (*Voandzeia subterrenea* Thouars) waste on Performance of growing pullets. *Proc. 28th Ann. Conf. Nig. Soc. For Anim. Prod. (NSAP).* 16th- 20th March, pp: 237-239.

Sharma, K. R., Pingsun, L., and Halina M. Z. (1999). Technical, allocative and economic efficiencies in swine production in Hawaii: a comparison of parametric and nonparametric approaches. *Agricultural Economics*, 20:23-35.

Tuleun, C.C., M.C. Njike, S.A. Ikurior and N.G. Ehiobu, 2005. Replacement of Maize with Cassava Root Meal/Brewer's Yeast Slurry in the diets of Broilers. *Proc. 3oth Ann. Conf. Nig. Soc. For Anim. Prod. (NSAP)*. pp: 183-185.

Elegbede V.A Dipeolu A.O Shittu A.m (2018) "Economic Analysis of Cassava Peel Processing and Marketing in Ogun State, Nigeria". *Proceedings of the 5th National Conference of Sustainable Livelihoods and Development Network for Africa (SLIDEN AFRICA*). 9th to 12th April, pp: 49-56.