ANALYSIS OF ECONOMIC EFFICIENCY AND PERCEIVED CONSTRAINTS TO SMALL SCALE CASSAVA PRODUCTION IN ORUK ANAM LOCAL GOVERNMENT AREA OF AKWA IBOM STATE, NIGERIA.

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Abstract
The study used stochastic profit frontier function to estimate farm-level profit efficiency and it determinants among small scale cassava farmers in Oruk Anam Local Government Area of Akwa Ibom State, Nigeria. It also examined the perceived environmental and economic factors that constraints cassava production in the study area. Combination of sampling methods was used to select 100 small scale cassava farmers in the study area. Analysis of Socio-economic characteristic of farmers revealed an average age of 44.89 years and household size of 6 members. About 79.00% of cassava farmers do not belong to any social organization, while the mean annual farming income stood at ₦37, 970.00 per person. The result also indicates that majority (66.00%) of cassava farmers in the study area acquired their farm lands through inheritance. Empirical results indicated that the most important farm resources that affect farm level profit of cassava farmers were: farm capital, farm land, hired labour, fertilizer and cassava stem. Findings also reveal that none of the cassava farmer reached the maximum profit efficiency frontier. The mean profit efficiency of 57.3% revealed an efficiency gap of 42.7%; implying that substantial portion of profit is not earned. Empirical findings revealed that: level of farming involvement, farmers' education; farming experience, household size, soil management technique adopted and farm size were significant variables affecting farm level profit efficiency among cassava farmers. Also, significant perceived constraints to cassava production in the study area were: land fragmentation, presence of pest and disease, glut in the market, short shelf life, and high cost of fertilizer and manure. Based on the findings, it is recommended that, government should provide rural education through provision of basic educational facilities in the rural area of the State. Also, there is need to intensify research on appropriate soil improvement techniques suitable for less productive land in the region; as such strategy will push the farmer's efficiency nearer to the frontier efficiency.

Key words: Cassava, Economic efficiency, Farmers, Small Scale, Akwa Ibom State

Introduction

Cassava (*Manihot spp*) does not only serve as a food crop and industrial raw material, but also a major source of income and employment for rural dwellers in Nigeria (Abang *et al*, 2001). Cassava has been identified as a powerful weapon against poverty in Nigeria and its derivatives have great potentials in export market (Iheke, 2008). Following the important of cassava to the Nigeria's economy, several policies and programmes have been enunciated and implemented at all tiers of government to boost its production so as to meet the rising demand for the commodity (Presidential Initiative on Cassava Reports, 2003). Despite these lofty interventions, cassava production in Nigeria is still characterized by the use of less productive tools, poor varieties and is affected by uncertainties of input and output prices as well as other constraints inherent in arable crop production (Akpan *et al.*, 2012). Many aspects of the crop production activities are still done with crude or traditional tools (Akpan and Essien, 2011). With the increasing rural – urban migration among youths in Nigeria (Ajaero and Onokala, 2013 and Akpan *et al.*, 2016), the relative scarcity of rural labour constitutes another serious impediment to cassava production in Nigeria (Ohajianya, 2005).

Due to several factors ranging from environmental, socio-economic, cultural and technological issues, cassava production has suffered severe setback in most farming communities in Nigeria; hereby hindering most farmers from attaining optimum level of production and hence profit (Ohen *et al.*, 2014). To achieve optimum output and profit efficiency, farm resources have to be optimally and efficiently utilized and output price adjusts following demand capacity. The ability of cassava farmers to adopt new technology and achieved sustainable production depend on their level of profit efficiency, mostly determined by variable inputs and output prices as well as the cost of fixed factors of production. Inability of farmers to adequately address this issue has resulted to loss of substantial output and revenue accrued to them. If this situation occurs, farm resource use will be sub optimal and the profits accrue to farmers drastically reduced. This connotes that, sustainability of farm enterprise is hinged on tackling the issue of insufficient farm resource mix and output price cycling (Udoh and Idiong, 2000). As such, in an environment characterized by unstable factor and output prices of staple crops; elastic demand nature of arable crop outputs and scarce resources mix available to farmers; some factors would operate to cause changes in farm level profit and its efficiency. What are these factors and the magnitudes of their effects on farm level profit efficiency constitute the

empirical questions this study sought to provide answers.

Many scholars in Nigeria have linked food shortages to low level of resource productivity of farmers in the country (Ogundari and Ojo, 2007, Udoh and Akpan, 2007 and Akpan *et al.,* 2012). There are several scholarly reports on economic efficiency of cassava production in Nigeria. For instance, Akpan *et al.,* (2012) used the stochastic profit model to study the efficiency of homestead based cassava farmers in Cross River State, southern Nigeria. The maximum likelihood estimates of the specified models showed that, price of cassava stem, price of fertilizer, price of manure and wages were negatively related to farm level profit; whereas farm land had a positive significant relationship. Also, an average economic efficiency of 61.22% was discovered among sampled farmers. The study also found that farmer's education, experience, household size, level of farming involvement, extension agent visit, soil management method adopted by farmers and farm size, were significant factors that affect farm-level economic or profit efficiency among homestead based cassava farmers in the study area. Also, Oladeebo and Oluwaranti (2012) examined profit efficiency among cassava producers in south western Nigeria. Results showed that about 51% of cassava producers had formal education; about 50% had more than ten years of farming experience while the average age, household size and farm size of the respondents stood at 46 years, 8 people and 3 hectares respectively. Result of the analysis further showed that the profit efficiency of farmers ranged between 20% and 91%, while the mean level of profit efficiency was 79% which implies that an estimated 21% loss in profit was due to a combination of both technical and allocative inefficiencies. The study further showed that household size and farm size were the major significant factors which influenced profit efficiency positively. In addition, Akpan *et al.,* (2013) estimated translog stochastic profit function and profit efficiency model for cassava based farmers in Southern Wetland region of Cross River State, Nigeria. Maximum likelihood estimates of the specified models showed that, price of cassava cutting, wages and price of manure impacted negative influence on cassava farm profit; while land area exhibited positive relationship. An average economic efficiency of about 0.58 was obtained. The results further showed that level of farming involvement, farmer's education, ability to predict rainfall, farming experience; household size, soil management technique adopted, extension agent visits and farm size were significant determinants of profit efficiency of cassava based farmers in southern wetland region of Cross River State.

From the literature reviewed, none of the study was carried out in Akwa Ibom State despite the importance of cassava production to farmers and the people of the area. Hence, result derivable from other states might not give a good inference on cassava farmers in Akwa Ibom State. Currently, the Akwa Ibom State government has shown good commitment to boost cassava production in the State. For instance, the State was enlisted to participate in Fadama III additional financing in 2016, which focused on cassava and rice production. To achieve policy target in cassava production, policy makers in the State need sound empirical evidence that could be obtained from a study like this.

Hence, assessing the resource productivity of cassava farmers in a typical farming community is one of the necessary factors needed to understand the working of the rural farming system and also a prerequisite to increase agricultural productivity among majority rural farming households in the State. Therefore, the study estimates the normalized stochastic profit function of cassava farms and its determinants and identified the perceived constraints to cassava production among cassava farmers in the study area.

Research Methodology

Study Area: The study was carried out in Oruk Anam Local Government Area of Akwa Ibom State. The Local Government Area is located in the Southern part of Akwa Ibom State, Nigeria. The State lies between latitude 4^0 40^1N and 5^0N, and longitude 70^0 30^1E and 70^0 50^1E. It has a land mass of 511.73km sq. The area comprises of two political units, the Oruk zone and the Anam zone. It is characterized by a typically humid tropic climate with a distinct dry and wet season. The agricultural season last for up to 9 months. The mean annual rainfall is heavy and lies between 2000mm – 4000mm and a temperature range of 26^0C – 28^0C. Its inhabitants are mostly farmers, craft men and civil servants. The population of the local government is about 172,654 persons comprising of 86,239 males and 86,415 females (National Population Commission, 2006). Notable food crops like yam, cassava, cocoyam, maize, pumpkin, okra, melon, oil palm, plantain and banana are cultivated continuously.

Sample Size Selection

From Cochran (1963), a representative sample size from a large population of cassava farmers in the study area was obtained using the equation (1) specified as thus:

$$S_n = \frac{z^2\rho(1-\rho)}{D^2} \ldots\ldots\ldots\ldots\ldots (1)$$

Where S_n is the required sample size from a large population; "Z" is the standard normal variate (at 95% confidence interval, type 1 error; 1.96). "P" is the expected proportion of farmers in the population

(From the record of Akwa Ibom State Agricultural Development Programme "AKADEP" about 95% of inhabitants of Oruk Anam Local Government Area cultivate cassava). "D" is the absolute error or precision at 5% type 1 error. The sample size is derived as shown in equation 2.

$$S_n = \frac{(1.96)^2 0.95(1 - 0.95)}{(0.05)^2} = 73 \dots\dots\dots\dots\dots (2)$$

In order to obtain proportional sampling among selected villages, the sample size was increase to 100.

Sampling techniques and sample Size

Combination of sampling methods was used to select respondents in the study. The study area consists of nine (9) Clans namely: Inen, Obio Akpa, Ibesit Nung Ikot, Nung Ikot, Nung Ita, Ndot, Ibesit, Ekparakwa, and Abak/Midim. The first phase involved random selection of five (5) clans out of the 9 Clans in Oruk Anam. In the second phase, two villages were randomly selected from each Clan. A total of 10 villages were used in the study. The third phase involved proportional and random selection of 10 cassava farmers from each of the selected village. The grand total of 100 respondents were randomly selected and used in the study. The respondents were mainly cassava farmers who practiced cassava farming either as sole cropping or mixed cropping and cultivate less or equal to 10 hectares of farm land.

Sources and method of data Collection

Cross sectional data were collected from selected cassava farmers in the study area. Data were collected using structured questionnaire and complemented by personal interview to ensure consistency and accuracy of collected data.

Analytical Techniques

Descriptive statistics, five point Likert scaling and Cobb Douglass stochastic profit function based on maximum likelihood estimation method were applied to analyze data collected. The stochastic profit function is based on the analysis of economic efficiency of farms derived from production frontier proposed by Farrel (1957). Economic or profit efficiency shows success of a given farm enterprise, as it indicates the ability of a farm to obtain a maximum profit given a level of variable inputs and output price including the level of fixed factors of production in the farm. From Farrel's analysis, a farm is economically efficient in resource use when it operates on the economic efficiency frontier. On the other hand, economic inefficient farms operate below the efficiency frontier. The difference between observed profit and the potential profit is generally attributed to a combination of inefficiency and random error.

Following Battese and Coelli (1995), stochastic profit is defined as:

$$\pi/p = f(q_i; Z)exp(V_j - U_j) \dots\dots\dots\dots (3)$$

Where
π = normalized profit of ith farmer
qi = vector of variable inputs
Z = vector of fixed inputs
ρ = output price
$exp\ (Vi - U_j)$ = composite error term

The stochastic error term consist of two independent elements "V" and "U". The element V account for random variations in profit attributed to factors outside the farmer's control. A one sided component U ≤ 0 reflects economic efficiency relatives to the frontier. Thus, when U = 0, it implies that farm profit lies on the efficiency frontier (i.e. 100% economic efficiency) and when U < 0, it implies that the farm profit lies below the efficiency frontier. Both V and U are assumed to be independently and normally distributed with zero means and constant variances. Thus economic efficiency of an individual farmer is derived in terms of the ratio of the observed profit to the corresponding frontier profit given the price of variable inputs and the level of fixed factors of production of farmers.

$$EE = \frac{\pi_i}{\pi_i^*} = \frac{Observed\ farm\ profit\ of\ a\ farmer}{Frontier\ profit} = \frac{f(q_i; Z)exp(V_j - U_j)}{f(q_i; Z)exp(V_j)} = exp(-U_j) \dots\dots\dots\dots\dots (4)$$

Implicitly, it is shown as thus:

$$Log\pi = \vartheta_0 + \vartheta_1 LogLAN + \vartheta_2 LogFLP + \delta\vartheta_3 LogFEP + \delta\vartheta_4 LogCSP + \delta\vartheta_5 LogCAP + \delta\vartheta_6 LogHIP + \delta\vartheta_7 LogMAP + (V_1 - U_1) \dots\dots\dots\dots\dots\dots\dots\dots (5)$$

π = Normalized profit of ith farmer
LAN = Land size of a farmer (ha)
FLP = Normalized Wage of household labour
HIP = Normalized wage of hired labour
FEP = Normalized Price of Fertilizer
CSP = Normalized Price of cassava Stem cutting
CAP = Value of farm capital (Naira)
MAP = Normalized price of manure measure
(Vi –Ui) = Composite error term
Note that all monetary variables were normalized using output price.

Determinants of economic inefficiency of small scale cassava farmers were presented as shown in equation 6:

$$\mu = \beta_0 + \beta_1 AGE + \beta_2 GEN + \beta_3 INV + \beta_4 EDU + \beta_5 CRE + \beta_6 EXP + \beta_7 HHS + \beta_8 SMG + \beta_9 EXT + \beta_{10} FAS + V_i \ldots\ldots (6)$$

Where,
μ = Economic efficiency index of ith farm
AGE = farmer's age (year)
GEN = Gender (dummy 1 for female farmers and 0 for male farmers)
INV = level of involvement in farming (0 for part time, 1 for full-time)
EDU = level of education (year)
EXP = farming experience (years)
HHS = household size (number)
SMG = soil Management technique (1 for tillage, 0 for zero tillage)
FSI = farm size (ha)
Vi = stochastic error term
Note Equation (5) and (6) were jointly estimated by maximizing the likelihood function.

Result and Discussion

Socio-economic characteristics of cassava farmers in the study area

The social and economic characteristics of cassava farmers in the study were analyzed and the result is presented in Table1 and 2. The result shows that majority of respondents (71.00%) involved in cassava production in the study area were females and only 29.00% were males. This implies that more female population are involved in cassava production in the study area compared to the male population. This perhaps is to complement family income and help to reduce over dependent on the male members of the family. The distribution of the cassava farmers in the study area according to age range reveals the modal age bracket of 41-50 year, which accounted for 42.00% of the respondents; while the mean age was 44.89 years. This means that most cassava farmers in the study area are in their adult age, fast approaching old and less active age. Following this result, cassava output is expected to decline in the near future due to aged farming population. The result also reveals that only 11.00% of the farmers fell in the age range of 20-30 years, implying that there is less active labour force involved in cassava production in the study area. This indirectly implies that the sustainability of the business in the near future might be jeopardized due to labour constrained.

The study also shows that 67.00% of the respondents were married, 19.00% were widows, 4.00% were separated and 5.00% were single and widower respectively. A mean farming experience years of 14.86 years was obtained for all respondents. This indicates that cassava farmers have experienced the up and down involved in cassava production in the study area. This huge farming experience acquired by cassava farmers in the study is an incentive for innovation adoption and risk aversion in the business. In addition, the result further shows that majority (58.00%) of cassava farmers went through primary school and 27.00% obtained secondary education, while 15.00% of the respondents advanced to higher education. The mean years of formal education of respondents stood at 8.50 years. This implies that there is high probability of adoption and assimilation of agricultural innovations among them.

The findings also showed that, majority (79.00%) of cassava farmers do not belong to any social organization, while only 17.00% and 4.00% belong to social organization for the period of 1-5 years and 6-10 years respectively. On average, farmers' membership in social organization was about one year. This implies that, cassava farmers in the study area have low level of social interaction among themselves. Hence, the low degree of social capital formation among farmers in the study area means that, somehow these farmers might not have sufficient information base or relevant data to update the current level of production or to improve on disease management, improved cutting, and fertilization among others. The household size distribution of cassava farmers in the study area reveals that majority (62.00%) have 6-10 members' household size. About 38.00% of the total respondents have family size of range 1-5 member. An average household size of 6 members was obtained for respondents. This indicates that cassava farmers in the study area have moderate family size which implies that, the enterprise needs external labour to augment insufficient and predominant family labour.

Further analysis of the socio-economic characteristic of respondents indicates that, majority (55.00%) of the respondents made annual farm income in the range of ₦20,001 to ₦ 40,000; 32.00% earned income in the range of ₦40,001 to ₦60,000 while 8.00% realized income that spanned from ₦10,001 to ₦20,000 per year. Only 5.00% of farmers earned income from ₦60,001 to ₦100,000 and no respondent made less than ₦10,000 and greater than ₦100,000 per year respectively. This implies that, cassava farmers in the study area are mainly peasants, hence generate small amount of revenue meant for household upkeep. An average annual income of ₦37, 970.00 was discovered among respondents. The result also indicates that majority (66.00%) of cassava farmers in the study area acquired their farm lands through inheritance, while 25.00% acquired their land through leasing arrangement and only 9.00% of land was acquired through outright purchased. This situation might likely lead to increasing land fragmentation and

perhaps inflict a deteriorating effect on agricultural mechanization drive among serious minded cassava farmers in the area.

Table 1: Socio economic characteristics of cassava farmers in Oruk Anam Local Government area of Akwa Ibom State

Characteristic	Frequency	Percentage
Gender (number)		
Male	29	29.00
Female	71	71.00
Total	100	100.00
Age Distribution (Years)		
<20	0	0.00
20- 30	11	11.00
31– 40	20	20.00
41– 50	42	42.00
>50	27	27.00
Total	**100**	**100.00**
Mean	**44.89**	
Marital Status of Farmer (number)		
Single	5	5.00
Married	67	67.00
Widow	19	19.00
Widower	5	5.00
Divorced	0	0.00
Separate	4	4.00
Total	**100**	**100.00**
Farming Experience (Years)		
<1	0	0.00
1-5	16	16.00
6-10	21	21.00
11-15	26	26.00
16-20	13	13.00
>20	24	24.00
Total	**100**	**100.00**
Mean	14.89	
Educational Qualifications (years)		
No schooling	0	0.00
Primary	58	58.00
Secondary	27	27.00
Tertiary	15	15.00
Total	**100**	**100.00**
Mean	8.50	
Membership of Social Organization (years)		
<1	79	79.00
1-5	17	17.00
6-10	4	4.00
11-15	0	0.00
16-20	0	0.00
>20	0	0.00
Total	**100**	**100.00**
Mean	1.08	

Source: Computed by authors, data from field work 2016.

Table 2: Socio economics characteristics of arable crops farming in Oruk Anam Local Government area of Akwa Ibom State.

Characteristic	Frequency	Percentage
Family Size of Respondents (number)		
1-5	38	38.00
6-10	62	62.00
>10	0	0.00
Total	**100**	**100.00**
Mean	**6.00**	
Farm income per year (Naira)		
<10,000	0	0.00
10,001-20,000	8	8.00
20,001-40,000	55	55.00
40,001-60,000	32	32.00
60,001-100,000	5	5.00
>100,000	0	0.00
Total	**100**	**100.00**
Mean	**37,970.00**	
Mode of farmland acquisition		
Inheritance	66	66.00
Leased	25	25.00
Contract	0	0.00
Purchase farm	9	9.00
Cooperative farm	0	0.00
Community farmland	0	0.00
Total	**100**	**100.00**
Distribution of Secondary occupation		
Civil Servant	10	10.00
Pensioner	4	4.00
Artisan	5	5.00
Okada / Bus driver / Keke driver	0	0.00
Trading on Large Scale	4	4.00
Petty Trading	29	29.00
Others	48	48.00
Total	**100**	**100.00**

Source: Computed by authors, data from field work 2016.

The study identified secondary occupation of respondents in a bit to reveal the extent of agricultural diversification. It is revealed that, 48.00% and 29.00% of respondents are into other unidentified occupations and petty trading respectively. This means that cassava farmers in the study area are not only into cassava production but also into other occupations in order to use the income generated to finance their primary occupation or and family expenditure.

Maximum Likelihood estimates

Cobb Douglas stochastic production function was estimated using maximum likelihood method. FRONTIER 4.1 was used to estimate the specified function. Table 3 presents the estimates of the production function. The coefficient of the sigma square (0.70088) is statistically significant at 1% probability level. This indicates a good fit and correctness of the specified distribution assumption of the composite error term for the model. The variance ratio (λ) of 0.72607 is significant at 1% probability level. This means that about 72.61% of disturbance in the system is due to economic or profit inefficiently attributed to farmers' behavior; while 27.39% is due to normal stochastic error. This confirms the presence of one sided error term in the specified model (Yao and Liu, 1998 Udoh *et al.*, 2001). Thus, this validates the appropriateness of the specified stochastic model and the choice of maximum likelihood estimation. The empirical results revealed that, the coefficient of farm capital is negative and statistically significant at 5% probability level; implying that, farm capital has negative elasticity relationship with cassava farm profit in the study area. A unit increase in farm capital will lead to a corresponding decrease in cassava farm profit. This result suggests that, most of farm capitals used by cassava farmers in the region have high depreciation values; as such they do not contribute significantly to increase in farm level profit. Also, the sign of the coefficient of land depicts adverse relationship between farm land and cassava farm profit. It means, as the size of farm land increases, the corresponding farm level profit declines. This result could be explained by the fact

that, most cassava farmers in the region are poor in farm resource endowment; hence increase in farm land might not increase correspondingly farmers' other farm inputs.

Table 3: ML estimates of Cobb-Douglas stochastic Production function for Cassava Farmers in Oruk Anam LGA of Akwa Ibom State

Variable	Parameter	Coefficient	Standard error	t-test
Constant	δ_0	0.1127	0.1009	1.1169
Value of Farm capital Dep.	δ_1	-0.34952	0.16603	-2.1051**
Land area (ha)	δ_2	-0.21409	0.19683	-1.0877*
Price of Household labour	δ_3	0.06754	0.37878	0.1783
P rice of Hired labour	δ_4	0.04393	0.02078	2.1141**
Price of fertilizer	δ_5	0.10284	0.04654	2.2097**
Price of manure	δ_6	-0.03818	0.05478	-0.6969
Price of cassava stem	δ_7	-0.1199	0.06747	-1.7771*
Determinants of Economic Inefficiency				
Constant	β_0	-0.21797	0.10826	-2.0134**
Age of farmer	β_1	0.01644	0.02444	0.6725
Gender of farmer	β_2	0.44692	0.34908	1.2803
Level of farmers' involvement	β_3	-0.62042	0.30027	-2.0662**
Farmer's education	β_4	-0.02973	0.02225	-2.3362**
Farming experience	β_5	-0.05397	0.02623	-2.0576**
Household size	β_6	-0.10867	0.04724	-2.3005**
Soil management technique	β_7	-0.11996	0.05149	-2.3294**
Farm size	β_8	0.19734	0.08836	2.2334**
Diagnostic Statistics				
Sigma Square	∂^2	0.70088	0.12045	5.81867***
Gamma	λ	0.72607	0.01010	2.5812***
Log likelihood Function	**Llf**	-12.09339		

Note: Asterisk *, ** and *** represent 10%, 5% and 1% significance levels respectively. Variables are as defined in equations (3).

As the result of this, farm resource allocation will be sub-optimal and revenue as well as profit declines accordingly. In a similar manner, the coefficient of the price of cassava stem is negative and significant at 10% probability level. This implies that, as the price of cassava cutting increases, the profit level of cassava farmers' decline. This result suggests that, cassava farmers in the study area predominantly utilized low yielding varieties, perhaps due to inability to afford the improved variety or insufficient information regarding improved variety of cassava cutting.

Alternatively, the coefficients of price of hired labour and fertilizer showed positive significant relationship these variables have with farm level profit of cassava farmers. It implies that, as the price of these variables increase, the farm profit increases too. Family labour constrained and land intensification could help to explain these results. As the result of insufficient family labour, farmers will likely pay exorbitant wage to acquire hired labour for their farm activities. Also continuous cropping intensifies the use of fertilizer which is needed to maintain yield in a sustainable manner. These situations will likely aggravate farm output and hence farm revenue and also help to cancelled increase cost of production while increasing farm level profit.

Economic (Profit) inefficiency Model

The estimated coefficients of economic inefficiency model are presented in the lower portion of Table 3. The result reveals that the slope coefficient of farmers' education, level of farmers' involvement, farming experience, household sizes and soil management technique adopted by farmers are negative and statistically significant at conventional probability levels. This means that, increase in these variables will lead to decrease in profit inefficiency, but increase in profit efficiency of farmers in the region. It implies that, these variables are positive drivers of profit or economic efficiency among cassava farmers in the study area. For instance, increase in farmers' education and full time participation of farmers in cassava production will ensure optimum resource management and timely adoption of various risk aversion strategies in cassava production. Also increase in farmers' farming experience increases the tendency of innovation adoption and the use of improve managerial skills by farmers; while increase in soil management technique ensure increase in output. Household labour is enhanced by increase in family size and is the cheapest and most available form of labour to small scale arable crop farmers. All these

possibilities lead to increase in economic efficiency of farmers, or a reduction in their inefficiency index.

On the other hand, farm size is a positive significant driver of economic inefficiency among cassava producers in the study area. It implies that, increase in farm size of cassava farmers reduces their economic efficiency. Increase in farm size of poor resource farmers will rather reduce efficiency of resource used through increase in the cost of production and corresponding decrease in farm level profit.

Economic (Profit) Efficiency Distribution

The distribution of respondents' farm according to economic efficiency class interval, frequency and percentage of each class interval is described in Table 4.

The result revealed that, farmers showed varied economic efficiencies ranging from the lowest 0.110 to the highest 0.854 with an average of 0.573. The degree of variation in profit efficiency among cassava farmers shows that, substantial portion of profit is not made by cassava farmers because of profit inefficiency due to variation in prices of specified farm variable resources and quantity of fixed factors used as well as the output price. To be precise, about 42.70% of profit is not earned by cassava farmers in the study area due to profit inefficiency prevalence among farmers. About 19.00% of farmers were in the efficiency range of 0.01 to 0.20, while 17.00% and 46.00% of farmers were in the efficiency range of 0.21 – 0.40 and 0.41 – 0.60 respectively.

Table 4: Frequency distribution of Technical Efficiency Indices of Cassava Farmers in Oruk Anam LGA

Economic Efficiency range	Frequency	Percentage
0.01-0.20	19	19.00
0.21-0.40	17	17.00
0.41-0.60	46	46.00
0.61-0.80	10	10.00
0.81-1.00	8	8.00
Total	100	100.00
Mean	0.57268	
Minimum	0.11000	
Maximum	0.85435	

Source: Computed from output generated from frontier 4.1 MLE.

Only 10% of farmers fell in profit efficiency gap of 0.61 to 0.80; while only 8% were close to efficiency frontier. No farmer's profit reached the frontier profit efficiency in the study area. However, the least profit efficient cassava farmer needs an efficiency gain of about 104% (i.e., 1.00 – 0.110/0.854)100 in the use of specified farm resources if such farmer is to attain the economic efficiency of the best farmer in the region. Likewise for an average efficient farmer, he will need an efficiency gain of about 50.00% (i.e., 1.00 – 0.573/0.854)100 to attain the level of the most profit efficient farmer in the region. Also, the most economic efficient farmer in the study area needs about 14.57% gains in economic efficiency to be on the frontier efficiency.

Farmers Perceived Constraints to Cassava Production in Oruk Anam L.G.A of Akwa Ibom State

The perceived constraints to cassava farmers in the study area were examined and the result is presented in Table 5. The constraints were categorized into environmental and Social, and economic. Five-point likert scale was rated as follows: strongly agree = 4; agree = 3; undecided = 2; disagree = 2 and strongly disagree = 0.

Table 5: Perceive environmental constraints to cassava Production in Oruk Anam

S/N	Environmental Constraints	Weighted mean	Inference /Decision
1.	Poor yield	0.99	Disagree
2.	Low soil fertility	1.17	Disagree
3.	Soil erosion	1.16	Disagree
4.	Emission of poisonous gas	0.86	Disagree
5.	Land fragmentation	3.49	Agree
6.	Impact of rural development	1.06	Disagree
7.	Theft	1.94	Undecided
8.	Pest and Diseases	2.39	Agree
9.	Low rainfall	1.19	Disagree
10.	Long period of dryness	1.04	Disagree
11.	Low dry matter content	0.96	Disagree
12.	Poor stem available	1.48	Disagree

Source: Computed by author, data from field work 2016.

Environmental Constraints

Results revealed that, cassava farmers in the study area disagreed that poor yield was not a constraint, this means that farmers had good yield which could be as a result of fertile soil and improved cassava cuttings. They also disagreed that low soil fertility was not a serious problem in the region, which therefore implies that the soil was naturally fertile or due to application of fertilizer or and manure. Also, soil erosion was generally rejected by majority of farmers as a serious constraint to cassava production in the region. This could be due to good drainage system or the portion of land used was not subjected to erosion. The issue of emission of poisonous gas was not a constraint too; this implies that most farm lands were far away from industrial sources of emission.

Majority of the respondents agreed that land fragmentation was really one of the major constraints facing cassava production in the study area. Fragmented farm lands inflate cost of production and hinder mechanization of farms. The response in terms of pests and diseases prevalence reveals that, they are constraints to cassava production in the study area. The presence of pest and disease is a serious drawback for farm output and income.

The respondents also disagreed that impact of rural development was not a constraint to cassava production in the study area; this means their farmlands are not sited close to areas which could easily be used for community development projects like roads, hospitals etc. Also, the respondents' decision towards theft was undecided which means that it was not a serious problem affecting cassava production in the study area. In addition, issues related to low rainfall, long period of dryness, low dry matter and poor stem variety were generally considered as "not a serious constraint" to cassava production in the study area.

Social and Economic Constraints

Under the social, economic and cultural constraints, the respondents decision towards low regards to farmers was undecided meaning that it was not a kind of problem that can hinder cassava farmers from going into production. Insufficient labour was disagreed among farmers which mean that there was availability of farm labour; both hired and family labour but as observed, hired labour was very expensive and family labour highly seasonal. Low return was also disagreed among the respondents implying that there is sustainable return in cassava production in the study area. Strenuous nature of farm work was strongly agreed by the respondents, which means that cultivation of cassava in the study area is carried out manually. Alternatively, mechanization is far among cassava farmers in the area

Table 5: Perceive Social and Economic constraints to cassava Production in Oruk Anam

S/n	Social and Economic Constraints	Weighted mean	Inference/Decision
1.	Low regards to farmers	2.28	Undecided
2.	Insufficient labour	3.85	Strongly Agree
3.	Low return	3.92	Strongly Agree
4.	Strenuous nature of farm work	3.51	Strongly agree
5.	Low output price	1.0	Disagree
6.	High cost of farm input	3.58	Strongly agree
7.	Low demand	0.93	Disagree
8.	Glut in the market	3.1	Agree
9.	Short shelf life	3.06	Agree
10	High cost of transportation	2.17	Undecided
11	High cost of processing	2.4	Undecided
12	High cost of fertilizer/manure	3.44	Agree

Source: Computed by authors, data from field work 2016

Also, the respondents decision towards low output price was disagreed which implies that cassava output commands appreciable price in the study area which in turns impacted positively on farmers income. The finding further revealed that, farmers strongly agreed that high cost of farm inputs is a constraint to cassava production in the study area. This implies that, inflated price of farm resources affect cassava production in the study area. However, farmers disagreed regarding low demand of cassava products or derivatives. This suggests that, cassava is highly consumed in this area and beyond. Issue related to glut during on season or harvesting period was unanimously agreed among farmers as one of the factors hindering cassava production in the study area. This finding suggests that, there are many cassava farmers in the area producing cassava in similar season, thereby causing excess supply over demand during harvesting period.

Short shelf life of cassava derivatives was agreed by respondents as one of the constraints facing cassava production in the study area. This implies that harvested cassava tubers and its derivatives cannot stay for a longer period without getting spoilt. This means that, farmers must dispose of them as quickly

as possible to avoid post-harvest lost. The respondents' decision towards transportation cost was undecided meaning that it was not a serious constraints affecting cassava production in the study area. This implies that production sites are relatively closer to market sources. Also issue on high cost of processing was undecided by the respondents, implying that cassava farmers in the study area add little value to raw cassava produced. Respondents' average decision on high cost of fertilizer/manure was agreed; this means that high cost of fertilizer and manure are problems affecting cassava production in study area. This implies that the cost of purchasing fertilizer/manure is high which might in turn leads to zero application and corresponding poor yield. This has a negative impact on farmers' income.

Summary of Findings, Conclusion and Recommendations

The study estimated profit efficiency function for small scale cassava farmers in Oruk Anam Local Government Area of Akwa Ibom State, Nigeria. It also examined the perceived environmental, economic and social constraints to small scale cassava production in the study area. The analysis of the social and economic characteristics of cassava farmers in the study area revealed: that majority of cassava farmers were females. Most of the farmers were in their active age (mean of 44.89 years) and were married. A mean farming experience years and years of formal education of 14.86 and 8.50 years were obtained for all respondents. The findings also showed that, majority (79.00%) of cassava farmers do not belong to any social organization, while the mean household size of 6 members was obtained. Further analysis of the socio-economic characteristic of respondents reveals that majority (55.00%) of the respondents made annual farm income in the range of ₦20, 001 to ₦ 40,000; while the mean annual farming income stood at ₦37, 970.00 per person. The result also indicates that majority (66.00%) of cassava farmers in the study area acquired their farm lands through inheritance.

Maximum likelihood estimates of the specified stochastic profit function revealed that individual farmer's level of efficiency range from 11.00% to 85.4% with an average of 57.3%. The results revealed that, farmers' profit efficiency is far from the frontier level's profit. Therefore, cassava based farmers profit efficiency could still be increased by 42.7% using the most affordable technology available to the farmers. Significant factors affecting economic efficiency of cassava farmers in the study area were: level of farming involvement, farmer's education, farming experience, household size, soil management technique adopted and farm size. Significant perceived constraints to cassava production in the study area were: land fragmentation, presence of pest and disease, glut in the market, short shelf life, and cost of fertilizer and manure.

Based on the empirical findings, there is an overwhelming need to develop a holistic farm policy package to tackle the problems of small scale cassava farmers in the region. The study has identified several issues that need urgent attentions through sound policy formulation and implementation. Following the findings, it is pertinent to promote rural education through provision of basic educational facilities in the rural area of the State. This could be achieved by consolidating on the free and compulsory education currently going on in the State. The finding also indicates the need to intensify research on appropriate soil improvement techniques suitable for less productive land in the region; as such strategy will push the farmer's efficiency nearer to the frontier efficiency. Finally, the review of the land use Act of 1990 might be imperative to ease difficulties associated with land acquisition for agricultural production in the area. If more farmers are involved in cassava production under the current fragmented land system, and appropriate policy frame work adopted to improve productivity, efficiency of resource use and sustainable technology by cassava farmers in their fragmented lands: then higher economy efficiency could be achieved under the presence system which is one of the major objectives of the federal government agricultural policy.

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