



ECONOMIC EFFICIENCY OF GROUNDNUT PRODUCTION IN KANO STATE,  
NIGERIA

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ABSTRACT

The study examined the economic efficiency of groundnut production in Kano State, Nigeria. Using a simple random sampling, two hundred and sixty seven (267) farmers were selected and interviewed from nine communities, under the three selected LGAs from the study area. Descriptive statistics, DEA, as well as Tobit regression model were used for data analysis. The result of the Data Envelopment Analysis (DEA) reveals that the farmers were operating below the optimum frontier with average Technical Efficient (TE), Allocative Efficiency (AE) and Economic Efficiency (EE) scores was 0.265, 0.371 and 0.098 respectively, with the GM enterprise having a higher mean TE score of (0.7654). All the inefficiency variables met *a priori* expectation with positive coefficients except age and level of education. This indicates that increase in age and years of schooling have minimal effect in reducing the farmers' inefficiency in groundnut production. Four out of the eight fitted inefficiency variables were significant at 10%, while three at 5%, but the extension contact was not significant. It was thus concluded that even though groundnut production enterprise is a profitable one, groundnut farmers in the study area were both technical and allocative inefficient. It was therefore recommended that farmers should be encouraged through extension to adopt new available technologies and improved varieties which will help improve both their technical and cost efficiency thereby widen their margin gaps.

**Keywords:** Efficiency, Groundnut, Inefficiency, Return and Scale

INTRODUCTION

Groundnut (*Arachis hypogaea*), also known as peanut is an annual herbaceous leguminous oil-seed grown in tropical and temperate areas of the world (Food and Agriculture Organization of the United Nations, 2014; Syed *et al.*, 2021). It is the thirteenth most important food crop and sixth most important oil-seed crop in the world (FAO, 2006; Mukhtar, 2009). Groundnuts are widely grown as a crop of major importance in many tropical, sub-tropical and temperate countries between 40<sup>0</sup> N and 40<sup>0</sup> S latitudes (Ansari *et al.*, 2015).

According to Breth (2004) who said that "no nation has been able to substantially reduce poverty and bring about economic development without first markedly increasing the productivity of its agricultural and food system". Similarly, Amos (2007) argued that, increasing productivity and efficiency within the agricultural sector, particularly among the small scale producers, requires a good knowledge of the current efficiency or inefficiency inherent in the sector as well as factors responsible for such efficiency or inefficiency. He also argues that any attempt at studying efficient allocation of resources on the farm represent a veritable source of achieving growth in the economy. Rahman (2013) in his work notes that, the measurement of farm production efficiency is important in three areas: Firstly, it is a success indicator and performance measure for evaluating farms. Secondly, the sources of efficiency differential can only be identified by measuring



efficiency and appreciating its effects. Thirdly, identification of sources of inefficiency will enable the public and private establishments to improve farm performance.

Even though the national output of groundnut has been increasing at an estimated growth rate of 8%, both from area expansion (6%) and increase in productivity of 2%, the growth in domestic production lags behind growth in domestic demand of 413,784 metric tonnes hence this result in an annual shortfall of approximately 300,000 tonnes (Ndjeunga and Ibro, 2010). The short fall in production leads to the removal of ban placed on the importation of crude vegetable oil by the Government of Nigeria (Agricultural Development in Nigeria (ADENI)/NAERLS Report, 2012). In spite the ready market and the financial benefit of groundnut fodder, groundnut farmers continue to swap their resources to the production of other cash crop and abandoning groundnut production. The decline in groundnut production has meant that industries that use the crop as raw material have had to close down on account of shortages of the crop for their industrial activities (Taphee, *et al.*, 2015).

The low average yield per hectare for the crop has also been a source of concern for Sub-Sahara Africa. Abate *et al.* (2012) and Ajeigbe (2015) have both reported an average yield between 0.8 to 1.8 metric tonnes for the North-West zone of Nigeria to which Kano State belongs. This actual yield is below the potential yield per hectare for the crop of 3000 kg/ha, indicating a yield gap of 1200 kg/ha (Mukhtar, 2011; Zekeri and Tijjani, 2013). The shortfall in supply and poor output realized by farmers is an indication that resources needed in the production of the crop are not being used at the optimal levels. This situation calls for an examination of the production efficiencies associated with the production of the crop in order to determine the economic and scale efficiencies of groundnut producers in the study area, to identify the determinants of the economic efficiency in groundnut production.

## **MATERIALS AND METHODS**

### **The Study Area**

The study was carried out in Kano State of Nigeria. Kano State is situated in a semi-arid region of the country. The State lies between latitudes 10° 30' and 13° 00' North, and longitudes 7° 40' and 10° 39' (Kano State Government (KSG), 2015). The state covers a land mass of about 20,760 square kilometres of which 18,684 square kilometres are arable with 1,754,200 hectares agricultural and 75,000 hectares forest vegetation and grazing land and wide range of irrigation channels in some areas (KSG, 2013; NAERLS, 2015). The mean daily temperature ranged between 35°C and 19°C. The major crops grown in the state include rice, maize, millet, sorghum, cowpea, groundnut, wheat and vegetables like spinach, carrot, cabbage and onion (NAERLS, 2011). The state also has a large population of livestock made up of over 12 million birds and nearly 10 million goats, sheep and cattle (KSG, 2013). A favourable climatic condition for groundnut cultivation exists in the state, such as moderate rainfall during the growing season, an abundant sunshine and relatively high temperatures. The average soil type in the state is generally loamy soil suitable for groundnut cultivation as the crop requires an ample soil moisture from the beginning to the end of the cropping season (Weiss, 2000).

### **Sampling Technique**

Multistage sampling procedure was used, made up of a combination of random sampling and proportional sampling methods to select the groundnut farmers. One groundnut-producing Local Government was randomly selected from each of the three ADP zones in the state. In the second stage, four communities were also randomly selected from each of the Local Government

Areas (LGAs). In the third stage, with the aid of the Naing, *et al.* (2022) sampling formula, a sample size of 267 farmers was arrived at (Table 1), where proportional percentages of the shortlisted groundnut-producing farmers in each community were randomly selected.

**Table 1: Sample frame and Sample Size of Groundnuts farmers in the Study Area**

LGA's	Communities	Sample frame	Proportional %	Sample size
DawakinTofa	Marke	46	6.02	16
	‘Yan-Shado	84	10.99	29
	‘Yan-Rutu	75	9.82	26
	Gauraki	58	7.59	20
Bebeji	Bebeji	80	10.47	28
	Gwarmai	55	7.20	19
	Kofa	52	6.81	18
	Dakatsalle	64	8.38	22
Gezawa	Gezawa	70	9.16	24
	‘Yar-kogi	61	7.98	21
	Jogana	71	9.29	25
	Danja	48	6.28	17
<b>Total</b>		<b>742</b>	<b>100.00</b>	<b>267</b>

### Method of Data Collection

The data was collected using a Computer Assisted Personal Interview (CAPI). A total of 267 farmers were interviewed. The data collected were on input usage, output and constraints. Combinations of analytical tools were employed to analyze the collected data. These include: descriptive statistics, Data Envelopment Analysis (DEA) and Tobit regression analysis. As a non-parametric approach, Data Envelopment Analysis (DEA) following the work of Kohl *et al.* (2019);

Fotova *et al.* (2022) were used to estimate the technical, allocative, economic, and scale efficiencies of the respondents in the study area. Data envelopment analysis (DEA) is a nonparametric approach to measuring the relative efficiency of a set of decision-making units (DMUs) that uses multiple inputs to produce multiple outputs.

The input variables for this study include the following:

$X_1$  = Quantity of seed planted (kg),

$X_2$  = Quantity of fertilizer applied (kg),

$X_3$  = Quantity of agro-chemicals (herbicides and pesticides) applied in litres

$X_4$  = Total labour used (man-days),

$X_5$  = Farm size under groundnut production (ha)

### Technical Efficiency

Using the DEA model specification, the TE score for a given field  $n$  is obtained by solving the following LP problem:

$$TE_n = \min_{\lambda_i \theta_n} \theta_n \quad \dots(1)$$

Subject to:

$$\sum_{i=1}^I \lambda_i x_{ij} - \theta_n x_{nj} \leq 0$$

$$\sum_{i=1}^I \lambda_i y_{ik} - y_{nk} \geq 0$$

$$\sum_{i=1}^I \lambda_i = 1$$

$$\lambda_i \geq 0$$

Where:

$i$  = one to  $i$  fields;  $j$  = one to  $j$  inputs;  $k$  = one to  $k$  outputs;  $\lambda_i$  = the nonnegative weights for  $i$  fields;  $x_{ij}$  = the amount of input  $j$  used on field  $i$ ;  $x_{nj}$  = the amount of input  $j$  used on field  $n$ ;  $y_{ik}$  = the amount of output  $k$  produced on field  $i$ ;  $y_{nk}$  = the amount of output  $k$  produced on field  $n$ ; and  $\theta_n$  = a scalar  $\leq$  one that defines the TE of field  $n$ ,

A value of one indicates a technically efficient field and a value less than one indicates a technically inefficient field with the level of technical inefficiency equal to  $1 - TE_n$  (Coelli, 1996; Dredawa, 2019).

The constraint  $\sum_{j=1}^J \lambda_i = 1$  in equation (1) ensures the  $TE_n$  in equation (1) is calculated under the variable returns to scale (VRS) assumption (Coelli, 1996). Equation (1) is therefore the TE formulation proposed by Banker, Charnes, and Cooper (1984). When  $\sum_{j=1}^J \lambda_i = 1$  constraint is omitted, constant returns to scale (CRS) are assumed, and equation (1) becomes the TE formulation proposed by Kohl *et al.* (2019; Fotova *et al.* (2022).

### Economic Efficiency

The EE score for a given field  $n$  is obtained by first solving the following cost-minimizing LP model:

$$MC_n = \min \lambda_i x_{nj}^* \sum_{j=1}^J P_{nj} x_{nj}^* \quad \dots (2)$$

Subject to:

$$\sum_{i=1}^J \lambda_i x_{ij} - x_{nj}^* \leq 0$$

$$\sum_{i=1}^J \lambda_i y_{ik} - y_{nk} \geq 0$$

$$\sum_{i=1}^J \lambda_i = 1$$

$$\lambda_i \geq 0$$

Where;

$MC_n$  = the minimum total cost for field  $n$ ;

$P_{nj}$  = the price for input  $j$  on field  $n$ ; and

$x_{nj}^*$  = the cost-minimizing level of input  $j$  on field  $n$  given its input price and output levels.

All other variables in equation (2) are as previously defined. The constraint  $\sum_{i=1}^J \lambda_i = 1$  in equation (2) again ensures that the minimum total costs for the field are calculated under the VRS assumption (Mert, 2016; Kerstens & Van de Woestyne, 2018).

Economic efficiency ( $EE_n$ ) for each field is then calculated using the following equation:

$$EE_n = \frac{\sum_{j=1}^J P_{nj} x_{nj}^*}{\sum_{j=1}^J P_{nj} x_{nj}} \quad \dots (3)$$

where the numerator  $\sum_{j=1}^J P_{nj} x_{nj}^*$  = the minimum total cost obtained for field  $n$  using equation (2) and the denominator  $\sum_{j=1}^J P_{nj} x_{nj}$  = the actual total cost observed for field  $n$ . The  $EE_n$  for a given field takes on a value of one with an  $EE_n = 1$  indicating the field is economically efficient and an  $EE_n < 1$  indicating the field is economically inefficient with the level of economic efficiency equal to  $1 - EE_n$ .

### Allocative Efficiency

The EE for a Decision Making Unit (DMU) can also be represented as the product of both the TE and the AE for the DMU, or  $EE_n = TE_n \times AE_n$  (Kohl *et al.*, 2019; Fotova *et al.*, 2022). Thus,

the AE score for field n can be determined given both the EE and TE for the field using the following relationship:

$$AE_n = \frac{EE_n}{TE_n} \quad \dots (4)$$

Where:

EE<sub>n</sub> = the economic efficiency calculated for field n using equation (3) and

TE<sub>n</sub> = the technical efficiency calculated for field n using equation (1).

Like with TE<sub>n</sub> and EE<sub>n</sub>, the value for AE<sub>n</sub> will be ≤ 1 with an AE<sub>n</sub> = 1 meaning the field is allocatively efficient and an AE<sub>n</sub> < 1 meaning the field is allocatively inefficient with the level of allocative inefficiency equal to 1 – AE.

### **Scale efficiency and returns to scale**

The DEA models discussed thus far assume VRS. As indicated, CRS may be imposed by omitting the constraint  $\sum_{i=1}^I \lambda_i = 1$  in both equations (1) and (2). Imposing both CRS and VRS on TE in equation (5) allows for calculation of scale efficiency. Scale efficiency is determined for each field as follows:

$$SE_n = \frac{TE_{CRS_n}}{TE_{VRS_n}} \quad \dots (5)$$

Where:

TE<sub>CRS<sub>n</sub></sub> = technical efficiency of field n under constant returns to scale and TE<sub>VRS<sub>n</sub></sub> = technical efficiency of field n under variable returns to scale.

The value for SE<sub>n</sub> will be ≤ 1 with SE<sub>n</sub> = 1 meaning the field is operating at an optimal scale and SE<sub>n</sub> < 1 meaning the field is scale inefficient with the level of scale inefficiency equal to 1 – SE<sub>n</sub>.

Scale inefficiency arises as a result of the presence of either Increasing Return to Scale (IRS) or Decreasing Return Scale (DRS). The value derived from equation (5) can indicate if a field is scale-inefficient but provides no indication as to whether this inefficiency arises as a result of IRS or DRS. Increasing or decreasing returns to scale may be determined for each field by running the TE model in equation (1) and replacing  $\sum_{i=1}^I \lambda_i = 1$  with  $\sum_{i=1}^I \lambda_i \leq 1$ . The result is TE calculated under Non-Increasing Returns to Scale (TE<sub>NIRS<sub>n</sub></sub>). If TE<sub>NIRS<sub>n</sub></sub> = TE<sub>VRS<sub>n</sub></sub>, the field exhibits DRS (larger than optimal scale); but if TE<sub>NIRS<sub>n</sub></sub> ≠ TE<sub>VRS<sub>n</sub></sub>, the field exhibits IRS (suboptimal scale) (Coelli, Rahman, and Thirtle, 2002).

### **Tobit regression**

A Tobit regression analysis was used to determine factors affecting economic efficiency and inefficiency among farmers. A Tobit model with two-limit (upper = 1, lower = 0) was used for this analysis. This was because efficiency scores are bounded between zero and one (unity). The inefficiency model was specified as follows:

$$\beta_i^* = \delta_0 + \delta_1 \ln Z_i + U_i \quad \dots (6)$$

$$\beta_i = \beta_i^* \text{ if } \delta_0 + \delta_1 \ln Z_1 + \delta_2 \ln Z_2 + \delta_3 \ln Z_3 + \delta_4 \ln Z_4 + \delta_5 \ln Z_5 + \dots + \delta_8 \ln Z_8 > 0 \quad \dots (7)$$

$$\beta_i = 0 \text{ if } \delta_0 + \delta_1 \ln Z_1 + \delta_2 \ln Z_2 + \delta_3 \ln Z_3 + \delta_4 \ln Z_4 + \delta_5 \ln Z_5 + \dots + \delta_8 \ln Z_8 \leq 0 \quad \dots (8)$$

Where:

β<sub>i</sub><sup>\*</sup> = latent variable

β<sub>i</sub> = coefficients of economic efficiency

δ<sub>0</sub> = constant term

δ<sub>1</sub>-δ<sub>10</sub> = Parameters to be estimated

The variables used in the inefficiency model were as follows;

Z<sub>1</sub> = Age of farmer (years)



$Z_2$  = Farming experience (years in groundnut production)

$Z_3$  = Farm size (numbers of hectares under groundnut production)

$Z_4$  = Household size (number of dependents who reside and eat from same pot with the farmer)

$Z_5$  = Level of education (years spent acquiring the knowledge)

$Z_6$  = Amount (₦) of credit obtained (from both formal and informal sources)

$Z_7$  = Income (₦) (from both farming and non-farming activities)

$Z_8$  = Extension contacts (number of extension contacts per season)

## RESULTS AND DISCUSSION

### Efficiency Scores of Groundnut Farmers (Technical, allocative, economic and scale efficiencies)

Data Envelopment Analysis (DEA) was used to analyze the data and the result for the technical efficiency was presented under variable return to scale (VRS). This was done to reflect the fact that production technology may exhibit increasing, constant or decreasing return to scale based on the stages of production on which a farm operates. The score of the technical and allocative efficiencies were multiplied to get the economic efficiency. The scale efficiency was estimated under the constant, increasing and decreasing returns to scales.

#### Distribution of efficiency scores of groundnut production enterprises

Table 2 is the presentation of the group frequency distribution of the pooled technical, allocative, economic and scale efficiency scores for all the sampled farmers in the study area. The results revealed that among all the farmers, only 8 (3.00%) have TE score exceeding 0.9 among which only few of them were fully technically efficient (TE = 1). 44.94% of the sampled farmers have TE score below 0.1 which indicates the poor performance of the farmers in the study area in terms of TE. This result agrees with Ani *et al.* (2013) who reported that majority (98.5%) of the groundnut farmers in Benue State have a TE score that ranged between 0.004 and 0.199 with a mean efficiency score of 0.0387.

**Table 2: Frequency Distribution of Efficiency Scores**

Range	TE		AE		EE		SE	
	Freq	%	Freq	%	Freq	%	Freq	%
<0.1	120	44.94	25	9.36	244	91.39	6	2.25
0.1-0.2	77	28.84	52	19.48	16	5.99	13	4.87
0.2-0.3	25	9.36	41	15.36	1	0.37	9	3.37
0.3-0.4	17	6.37	36	13.48	2	0.75	11	4.12
0.4-0.5	7	2.26	39	14.61	2	0.75	8	3.00
0.5-0.6	6	2.25	27	10.11	-	-	14	5.24
0.6-0.7	2	0.75	18	6.74	2	0.75	25	9.36
0.7-0.8	3	1.12	14	5.24	-	-	34	12.73
0.8-0.9	2	0.75	13	4.87	-	-	41	15.36
0.9-1	8	3.00	2	0.75	-	-	106	39.70
Total	267	100.00	267	100.00	267	100.00	267	100.00

**TE = Technical Efficiency; AE = Allocative Efficiency; EE = Economic Efficiency; SE = Scale Efficiency.**

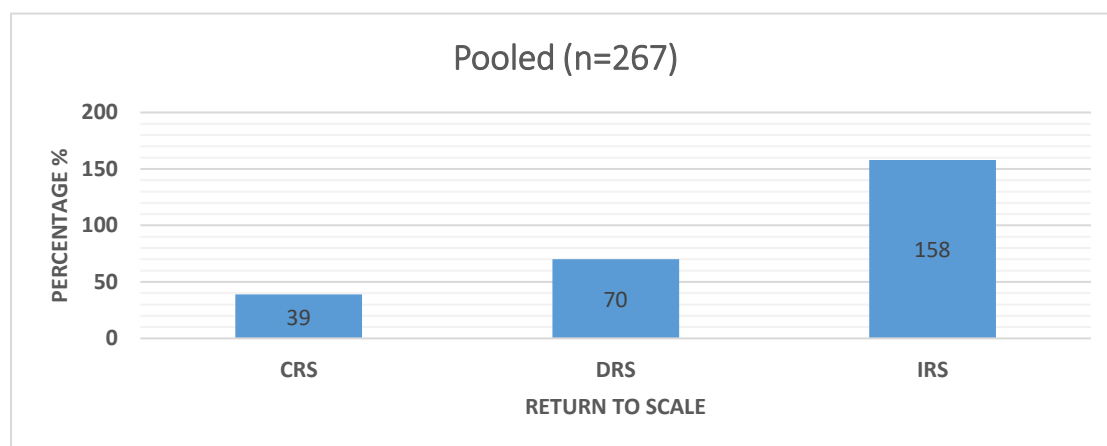
The median class (0.164) (Table 3), of the distribution (0.1 – 0.2) has a frequency of 77 (28.84%) meaning that about one-fourth of the sampled groundnut farmers in the study area have

TE score above 0.2. The AE score of the entire sampled groundnut farmers ranged from a minimum of 0.050 to a maximum of 0.901, with more than half of the farmers having 0.35 and above as their AE score (Table 2). With a mean AE score of 0.371 and a maximum of 0.91, the result implied that; on the average groundnut farmers in the study area could save up to 70% ( $1 - 0.37/0.901 \times 100$ ) input cost if they are to use inputs in cost-minimizing level and achieve same output level (Table 2).

**Table 3: Efficiency Score Statistical Summary of the Pooled Groundnut Enterprises**

Efficiency	Mean	SD	Variance	Min.	Median	Max.
<i>TE<sub>vrs</sub></i>	0.265	0.292	0.085	0.002	0.164	1.000
<i>AE</i>	0.371	0.229	0.052	0.050	0.354	0.901
<i>EE</i>	0.048	0.066	0.004	0.000	0.032	0.630
<i>SE</i>	0.775	0.234	0.055	0.077	0.862	1.000

Both the mean and the median EE scores fell under the least economically efficient class (<0.1). 244 (91.39%) farmers fell under this class whereas only two farmers (0.75%) fell under the most economic efficient class (0.6-0.7) (Table 2).



**Figure 1: Distribution of Return to Scale for Pool Result**

Despite the low scores recorded for the three types of efficiencies (TE, AE and EE), the result of the SE indicated that a significant number (39.7%) of the farmers fell within the full scale efficiency class (Table 2). The reason for this impressive result could be because 26.2% of the total respondents operate above their fields' capacity (DRS) while 14.61% are already operating at full field capacity (CRS) (Figure 1). The remaining majority (59.18%) of the farmers operate in the first stage of the production frontier with an increasing return to scale (IRS) even though at a very low average allocative (0.37) and economic (0.048) efficiency scores (Table 3).

### **Socio-economic Factors Influencing the Inefficiency Score Among Farmers**

A tobit regression analysis was used to isolate the influence of the inefficiency variables in determining the economic efficiency of the groundnut farmers in the study area. The result of the analysis is presented in Table 4 below. From the result, most of the signs of the coefficients of the inefficiency variables deviate from the *a priori* expectation except for age and the level of education. Looking at the result of the socioeconomic characteristics shows 40.07% of the respondents had non-formal education, whereas only 3.86% of the respondents had tertiary education. These two factors could have been the reason why the coefficients of age and the level



of education show inverse relationship on the inefficiency score. The negative signs of these two variables conform to the expected outcome, which indicate an indirect relationship between the variables and inefficiency score. This outcome agrees with the findings of Paltasingh and Goyari (2018) who argued that number of years spent acquiring formal education has a positive impact on the efficiencies of farmers in terms of technical know-how and new technology adoption.

On the other hand, it was *a priori* expected that more years of farming experience and larger farm sizes will decrease inefficiencies of the farmers, where farmers are exposed to new technologies and improved techniques over the years, thereby enjoying economies of scale. However, the positive signs of these variables connote a direct relationship between the inefficiency variables and the inefficiency score. This means that, the inefficiency score of the farmers will probably increase by 1.7% as they gain one more year of farming experience. This result disagrees with the findings of Mulinga (20113) and that of Adai and Owusu (2014) where it was shown that increase in the years of farming experience reduces technical inefficiency.

With respect to the study area and the crop in question being an old enterprise, some older farmers are more conservative and most a times are laggards in adopting new technologies and new farm practices. This is evident in the as shown by the survey outcome where, about 60 percent of the respondents cultivated the local varieties. Moreover, most of the new technologies and improved inputs come with high prices and thus expensive for small scale farmers. The result also shows an overall average of 0.91 hectare as the size of the groundnut farms in the study area, indicating that farmers operate at small scale level. This is evident in the fact that over 70% of the farmers operate below the optimum field level on an increasing return to scale (IRS) (Figure 3). Coefficient of the farm size is positive and significant at 10% which implies that increasing the farm size will increase the inefficiency of the farmers. This is because of the non-mechanize nature of the farming operations, where conservative methods are being used by the farmers. This corroborates the findings of Bhatt and Bhat (2014) where a significant relationship was shown between farm size and output.

On the other hand, the coefficient of the household size of the respondents showed a positive relationship between household's size of the farmers and the inefficiency score, and is significant at 5%. This can be explained through the law of diminishing marginal return, whereby a continuous increase of the variable input (labour) on another fixed input (farmland) will lead to an increase in the level of output up to a certain point where diminishing marginal return sets in. This can be explained with the assertion made by Bathon and Maurice (2015) that an increase in the number of adult persons in a farming household increases the farmer's technical efficiency due to the readily available labour needed for farming operations. This in turn, will have an indirect positive effect on the farmer's economic efficiency. But if children constitute the available labour technical inefficiency will set in due to wastage and increase in the number of hours spent on every farm operation.

The coefficient for credit availability to groundnut farming showed a positive and significant relationship at 5% between the fund availability and the inefficiency index. This contradicts the expected outcome, because in an ideal situation credits and loans are used for business expansion which will lead to lot of economic gains to the enterprise. So also, the income generated by the farmers from the sales of groundnut output also has a direct relation with the inefficiency score at 10% level of significance. Obviously, the amount of turn over received by the farmers usually determines the size of the Net Farm Income (NFI) and subsequently the amount of money that will be available for re-investment.





Lastly, the number of extension contacts between the farmers and extension agents shows positive and insignificant relationship with the inefficiency measures. This may be as a result of the conservative practices of the farmers and the worn-out varietal trait of the groundnut seeds, where seed may have lost its agronomical attributes and preferential factors, whereby the prescribed agronomical technologies suggested by the extension agents is not compatible with the existing situation. The result corroborates the findings of Bathon and Maurice (2015) where extension contact was found not to have significant influence on the farmer's inefficiency indices.

**Table 4: Tobit Regression of Factors Influencing Economic Inefficiency**

Inefficiency Variables	Coefficient	SE	t-value
Age	-0.0083	0.0038	-2.1700**
Farming Experience	0.0174	0.0023	7.5500***
Farm Size	0.0194	0.0009	22.4800***
Household Size	0.0026	0.0012	2.1300**
Level of Education	-0.0129	0.0017	-7.5800***
Credit Availability	0.0022	0.0009	2.4100**
Income	0.0032	0.0006	4.9600***
Extension Contacts	0.0008	0.0006	1.2500 <sup>NS</sup>
Number of Observation	267		
Pseudo R <sup>2</sup>	-0.7059		
Log likelihood	864.84		

**Noted:** NS - Not Significant \*\* - Significant at 5% \*\*\* - Significant at 10%

## CONCLUSION AND RECOMMENDATIONS

The results of the descriptive analysis of the socioeconomic variables reveal that majority of the farmers (89.89%) are male which concord with the traditional practice in the study area. Most of the farmers were married with an average household size of nine persons per household. This is an indication that labour might be readily available. The estimated efficiency indices indicated that groundnut farmers operate below the ideal production frontier. The source of the inefficiency may either be inappropriate production scale or resources misallocation. Inappropriate production scale is an indication that farmers in the enterprise are not taking advantage of economies of scale and are therefore producing below the optimum frontier. It is therefore recommended that farmers need to expand their farm sizes to enable them enjoy economies of scale, otherwise some inputs need to be reduced to curtail cost. Also, there is need for formation of more cooperatives societies among small scale farmer which will enable them gain more access to modern technology through the aid EAs by providing them with technical information needed to reduce or avoid input wastage. Banks and financial institution especially the Bank of Agriculture (BOA) should provide soft loans at low rate of interest and affordable collateral to groundnut farmers.

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