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Comparing Technical Efficiency of Project and Non project Farmers in Nigeria: A Case Study of Kogi State Maize Growers

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Abstract

This study compared technical efficiency of project and non project farmers in Kogi State, Nigeria. Primary data were used for the study. A total of 800 (400 for each category of households) households engaged in farming activities were investigated. Data collated were analyzed using parametric statistical tools such as descriptive statistics, ordinary regression, and stochastic frontier model (Cob Douglas). Empirical results show that project farmers are within the productive of 52 (with average age equals 42yrs) as estimated by World Health Organization 2011 as against non project farmers who are above productive age (with average age equals 60yrs). About 47% of the project farmers are female while only 12.5% of non project farmers are female. The study further showed that farmers in the study area are generally knowledgeable. The maximum likelihood estimate of stochastic frontier showed that farm size, agro chemicals, seed, years of experience and family labour are factors affecting production in the study area. The mean technical efficiency suggest that project farmers are able to attain well over 90% of potential output from a given mix of production inputs while non project farmers attained an average of 75.8%. This implies that project farmers are more technically efficient in their use of available technologies than non project farmers. For non project farmers, there is a scope for increasing production by 24% if they adopt the best available technologies. Gender, membership of association, relative distance to market, and access to credit facilities is determinants of technical efficiency in the study area.

Key words: *Agriculture, Farmers, Project, Stochastic, Technical Efficiency,*

Introduction

The current food crisis is a global issue and it is being caused by a web of interconnected forces involving agriculture, energy, climate change, trade, and new market demands from emerging markets (CSIS, 2008). These have grave implications for economic growth and development, international security, and social progress in developing countries. Although, Nigeria heavily depends on oil revenue, the role of agriculture on economic growth in Nigeria cannot be overemphasized. It contributes about 42% to the national GDP and this value is the highest among all the other sectors (Central Bank of Nigeria, 2007). About 64.4 and 83.7% of the population lives below the $1.25 and $2 a day, respectively (UNDP, 2009). Over 70% of the poor live in rural areas and majority depends on agriculture for livelihood. Smallholder farmers in Nigeria produce about 90% of Nigeria's total food production and about 60% of the country's population depends on these small farms for livelihood (Oluwatayo et al., 2008).

Not all producers are technically efficient. As opposed to conventional microeconomic theory, such statement implies that not all producers are able to utilize the minimum quantity of required inputs in order to produce the desired quantity of output given the available technology. Similarly, not all producers are able to minimize necessary costs for the intended production of outputs (Paulo et al, 2009).

Numerous studies have attempted to determine the technical efficiency of farmers in developing countries because determining the efficiency status of farmers is very important for policy purposes. Efficiency is also a very important factor of productivity growth in an economy where resources are scarce and opportunities for new technologies are lacking. Inefficiency studies will be able to show that it is possible to raise productivity by improving efficiency without increasing the resource base or developing new technology. Estimate on the extent of inefficiency also help to decide whether to improve efficiency or to develop new technologies to raise agricultural productivity.

Yao and Liu (1998) suggested that for efficient farmers, government can expedite development by emphasizing new investment or technologies rather than extension and education efforts which were aimed at less efficient farmers. Nevertheless, studies by

Alimi (2000), Ayanwale (1995) and Jondrow *et al* (1982) found evidence of technical inefficiency among farmers in the developing countries.

The stochastic frontier production function postulates the existence of technical inefficiencies of production of firms involved in producing a particular output. For a given combination of input levels, it is assumed that the realized production of a firm is bounded above by the sum of a parametric function of known inputs, involving unknown parameters, and a random error, associated with measurement error of the level of production or other factors, such as the effects of weather, strikes, damaged product, etc. The greater the amount by which the realized production falls short of this stochastic frontier production, the greater the level of technical inefficiency (Batesse and Coeli, 1993).

Several study attempts to investigate the impact or effect of interventions in the agricultural sectors in developing countries. Such studies are sometimes bewildered by the absence of impact of intervention funds or inputs on the participating farmers despite huge investment channelled to the programme. This in part is due to low efficiency level at which the small scale participating farmers are producing. The main objective of this study therefore, is to compare the technical efficiency of project and non project farmers in Kogi state using maize farmers as case study. The term ''project farmers'' here is used to denote farmers currently benefiting from Fadama intervention funds while ''non project farmers'' refers to conventional farmers not benefiting from any known intervention funds.

Materials and Methods

Study area

Kogi state is found in the central region of Nigeria. It is popularly called the Confluence State because the confluence of River Niger and River Benue is at its capital, Lokoja, which is the first administrative capital of modern-day Nigeria**.** The state was formed in 1991 from parts of Kwara State and Benue State. Agriculture is the mainstay of the economy and the principal cash crops. The state is known for its mass production of farm produce such coffee, cocoa, palm oil, cashews, groundnuts, maize, cassava, yam, rice and melon. According to 2005 estimate, Kogi state has approximate population of 3,595,789. Kogi state has a coordinate of 7°30′N 6°42′E and a land area 29,833 km^2

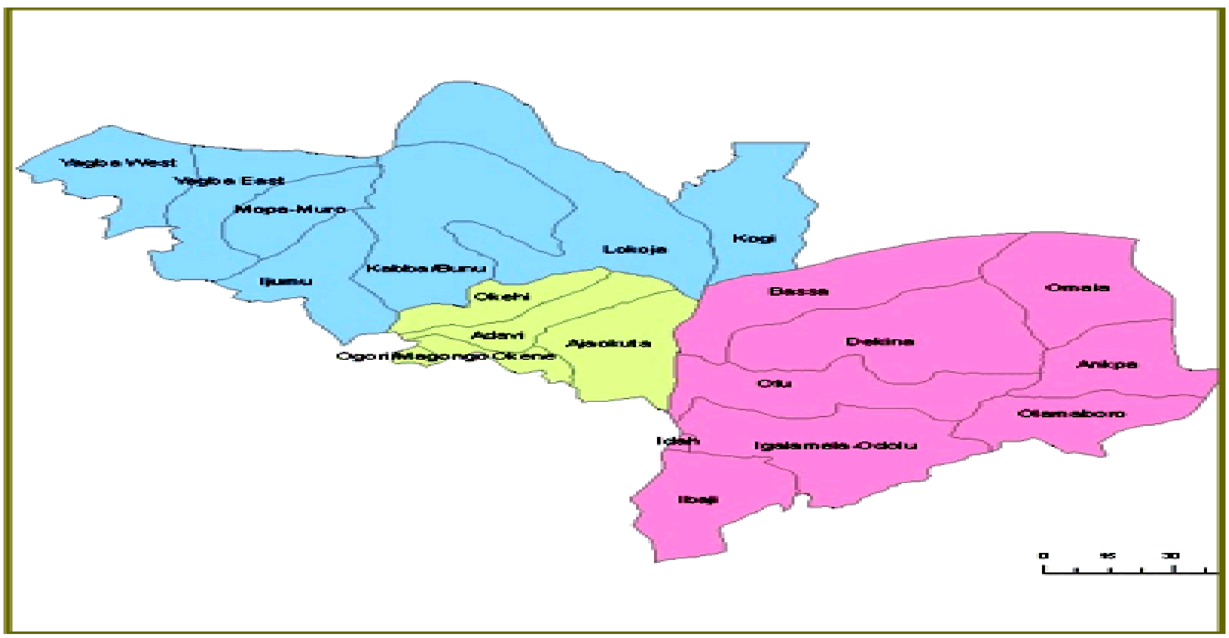

Fig. 1: Kogi State Map showing all the local governments
Source: Google Map, 2013

Kogi State has an average maximum temperature of 33.2°C and average minimum of 22.8°C. The state has two distinct weather conditions, dry season, which lasts from November to February and rain season that lasts from March to October. Annual rainfall ranges from 1016mm to 1524mm.

Methodology

The study was conducted in Kogi State of Nigeria. Farming is the major occupation of the majority of the people in the locality. The study employed multi-stage sampling technique involving a purposive selection of eight maize producing clans that are chiefly concerned with maize production as their most preferred means of livelihood in the study areas. A total of eight hundred questionnaires were administered respondents (four hundred for each category of farmers i.e. project and non project farmers.

Data was collected using a well structured questionnaire and interview schedule administered on the respondents. Data collections covered one production cycle and include input-output data such as farm size, family labour, hired labour and planting material, capital, maize output as well as socio-economic characteristics of respondent.

A combination of descriptive and stochastic production function model using the method of Maximum Likelihood Estimate (MLE) with the aid of computer programme stata 11 were used to analyze the data obtained from the farmers. Descriptive tools such as percentages and frequency were used to analyze the socio-economic characteristics of the farmers while Maximum Likelihood Estimate (MLE) was used to analyze the technical efficiency of the farmers.

The empirical model is expressed as

$$Y_i = \exp\ (X_{ij}\beta + v_i - u_i) \quad (1)$$

Where Y_i is the output of the i^th^ farms, X_{ij} is a vector of inputs used by i^th^ farm, β is the vector of unknown parameters which will be estimated, the term v_i is a two sided ($-\infty < v_i < \infty$) normally distributed random error ($v \sim N[0, \sigma_v^2]$) that represent the stochastic effects outside the control of the farmers (whether, natural disaster and luck) measurement errors, and other statistical noise. The term u_i is a one sided ($u_i \geq 0$) efficiency component that represents the technical inefficiency of farm (Coeli et al. 2005). The distribution of ui can be half-normal, exponential, or gamma (Aigner et al. 1977; Meeusen and Boreck, 1977). u_i and v_i are assumed to be independently distributed. Under this assumption, the mean of the technical inefficiency effect ui can be specified as follows;

$$u_i = \sum \delta_k z_{ik} \quad (2)$$

Where

z_i is a vector of observable farm specific variables hypothesized to be associated technical inefficiency,

δ is a vector of unknown parameters to be estimated.

The variance$\sigma^2 = \sigma_u^2 + \sigma_v^2$, while the ratio of the two standard errors γ is defined as;

$$\gamma = u_i^2 / v_i^2 \quad (3)$$

Equation 3 determines whether a stochastic frontier model is warranted as opposed to simple production function.

Data Analysis Techniques

Since the Cobb Douglas functional form is preferable to other forms if there are three or more independent variables in the model (Hanley and Spash 1993), the study utilized the Cob Douglas stochastic frontier production function model with seven independent variables. The independent variables are farm size, hired labour, years of experience, family labour, fertilizer, agro chemicals and seed. This is expressed as follows;

$$\ln y = \beta_0 + \beta_1 lnX_1 + \beta_2 lnX_2 + \beta_3 lnX_3 + \beta_4 lnX_4 + \beta_5 lnX_5 + \beta_6 lnX_6 + \beta_7 lnX_7 + (v_i - u_i) \quad (4)$$

Where

y is quantity of maize (kg),

X_1 is farm size,

X_2 is agro chemicals,

X_3 is seed,

X_4 is years of experience,

X_5 is family labour,

X_6 is hired labour and

X_7 is fertilizer.

The inefficient component u_i was modelled in terms of the factors that are assumed to affect the efficiency of production of the maize farmers such as the socio-economic characteristics of the farmers. The determinant of technical inefficiency is defined by:

$$u_i = z_0\delta_0 + z_1\delta_1 + z_2\delta_2 + z_3\delta_3 + z_4\delta_4 + z_5\delta_5 + z_6\delta_6 + z_7\delta_7 + z_8\delta_8 + z_9\delta_9 \quad (5)$$

Where,

u is technical inefficiency,

z_1 is gender (dummy variable 1=male, 0=female),

z_2 is age (years),

z_3 is level of education (1=formal school attended, 0=no formal attended),

z_4 is membership of cooperative society (1=yes, 0=no),

z_5 is access to credit facility (1=yes, 0=no),

z_6 accessed to agric-based information (1=yes, 0=no),

z_7 is accessed to storage facility (1=yes, 0=no),

z_8 is previous annual income (1=≤N600,000, 2=≥600,000), and

z_9 is distance to market (km)

$\delta_1 - \delta_9$ Inefficiency parameters

These variables are assumed to influence technical efficiency of maize farmers in Kogi State. However, the technical efficiency of an individual maize farmer in the study area is defined in terms of the observed output (y_i) to the corresponding frontier output y_i^* given the available technology. Mathematically, this could be expressed as;

$$TE = \frac{y_i}{y_i^*} = \frac{Exp\,(x_i\beta + v_i - u_i)}{Exp\,(x_i\beta + v_i)}, \quad (6)$$

Where $0 \leq TE \leq 1$

Results and Discussion

Socio-economic Characteristics

Table 1 compares the socio-demographic characteristics the project and non project farmers. About 58% of the project farmers are between the ages of 45 years and less while for non project farmers, the fraction in this age bracket is as low as 20%. The average ages of project and non project farmers are 41 years and of 47 years respectively. This shows that project farmers relatively younger than non project farmers. Judging by the World Health Organization 2003 average life span of 42 years for Nigeria, it can be concluded from this study that the project farmers are within productive age while non project farmers already above the project age. For non project farmers, farming was a male dominated enterprise in the study area since more than 80% of the respondents are male. This can be attributed to the fact that male always have right to land as a productive resource than the female. The male domination of male farming may also be due to high demands of time and energy required to work in such enterprise. This agrees with the study of Baiyegunhi and Fraser, (2009). However, for project farmers, the ratio is almost equal (52.8% male vs 47.2% female).This is not surprising since most intervention project are targeted towards the female and vulnerable group. The study also shows that 32.5% and 37.5% of the project and non farmers respectively had no formal education, while more than 60% farmers from either group have one form of formal education or the other. It is therefore reasonable to conclude that farmers in the study area have the ability to read and write, handle and interpret messages relating to farm inputs and machinery uses. Also their education status as it is could enable them to appreciate extension services. 89.2% of non project farmers depend solely on their personal savings as source of farm credit while 72.9% of project farmers depend on cooperative/intervention funds as source of credit for farming activities. Very few others sourced credit from other available money lenders. The study further shows that more 60% of project farmers have access to storage facilities. This could have enabled them to reduce post harvest losses to the barest minimum, added value to their product and enhance productivity. About 89.1% of non project farmers have no storage facilities. This has negative implication on their farm product as the quantity of produce grown may be limited because of lack of storage facilities.

Table 1: Farmers Characteristics in the study areas

		Project Farmers		Non Project Farmers	
Variable	Description	Frequency	Percentage	Frequency	Percentage
Age of Respondent	≤ 30	33	8.2	13	3.3
	31 – 45	199	49.8	67	16.7
	46 – 55	122 (42)*	30.5	217	54.2
	≥55	46	11.5	103(60)*	25.8
	Total	400	100	400	100.0
Gender	Male	211	52.8	350	87.5
	Female	189	47.2	50	12.5
	Total	400	100	400	100.0
Education Status	No formal education	130	32.5	150	37.5
	Primary education	162	40.6	137	34.2
	Secondary Education	50	12.4	70	17.5
	Tertiary education	41	10.3	37	9.2
	Quranic education	17	4.2	7	1.7
	Total	400	100	400	100.0
Membership of cooperative society	Yes	400	100	380	95.0
	No	0	0	20	5.0
	Total	400	100	400	100.0
Major Source of Fund	Personal	61	15.2	357	89.2
	Money lender	30	7.4	10	2.5
	Bank loan	18	4.5	7	1.7
	Cooperative	292	72.9	27	6.7
	Total	400	100	400	100.0
Storage Facility	Yes	264	65.9	44	10.9

Variable	Description	Project Farmers		Non Project Farmers	
		Frequency	Percentage	Frequency	Percentage
	No	136	34.1	356	89.1
	Total	400	100	400	100

**** is average age***

Summary Statistics of Measured Variables of Interest

The summary statistics of the variable gathered from both project farmers and non project farmers are reported in Table 2. The average yield per hectare is 14.95 and 23.0 maize bags respectively. The standard deviations of 6.07 and 15.13 respectively associated with these measurements indicate large variability in output among the two farming system. On average, about 394.10 and man-hours per hectare were applied for one production cycle/season. This shows that the production technology existing among farming household is labour intensive (Tewodros, 2001). This is a peculiar characteristic of farmers in developing countries where appropriate mechanized technologies are lacking.

Important farm inputs include seed, fertilizer, and agro chemicals mostly sourced from the market. There were also agricultural credit facility and subsidy on some of these farm inputs. Additional information revealed that the so called subsidies on the farm inputs were grossly below expectation/performance. For example, about 8 to 10 bags of fertilizers may be required for one hectare of maize farm, a farmer however, may be subsidized with as few as 2bags.

Table 2: Summary Statistics for Survey Variables

Variable	Sample mean	Std deviation	Minimum	Maximum	Study
Output (bag)	14.95	6.07	8.00	32.00	Non Project Farmers
Farm size (ha)	1.45	0.93	1.00	8.00	
Hired labour (man-0day)	394.10	198.79	56.25	1260.00	
Family labour (man-days)	259.86	183.14	26.25	840.00	
Fertilizer (kg)	215.22	155.84	100.00	800.00	
Agro chemical (litre)	12.43	5.65	4.00	25.00	
Seed(kg)	20.93	23.70	10.00	200.00	
Output (bag)	23.00	15.13	10.00	120.00	Project Farmers
Farm size (ha)	1.74	1.06	1.00	6.00	
Hired labour (man-day)	300.33	186.32	16.88	1170.00	
Family labour (man-days)	193.43	150.25	9.00	960.00	
Fertilizer (kg)	197.56	358.81	100.00	2400.00	
Agro chemical (litre)	13.75	5.56	6.00	25.00	
Seed (kg)	65.07	84.40	10.00	400.00	

Source: field Survey, 2011

Factors Affecting Production in the Study Area

Ordinary least square (OLS) estimate of the parameters which show the average performance of the farming households in the study area is presented in Table 3. The high value of adjusted R^2 for both project and non project farmers study imply that about 82.90 and 95.69 percent of the variation in the production process were explained by the various explanatory variables/inputs employed. Some of the coefficients of the measured parameters such as farm size, labour, agro chemicals, fertilizers and seed were statistically significant and exhibited expected sign. Years of experience exhibit negative sign. This is not unconnected with the fact that most farmers in the study area are relatively old as seen earlier in farmers' characteristics.

There was no incidence of multi-collinearity in the data since the test prove otherwise. Insignificant variables were not considered for further analysis.

Table 3: OLS estimate of Cobb-Douglass production function

Variable	Parameters	Non protect farmers	Project farmers

		Coefficient	T-ratio	Coefficient	T-ratio
Constant	β_0	-4.3835	-4.0200*	-1.8310	-0.5500
Farm size	β_1	0.7888	4.9200*	0.8807	2.5900*
Agro chemicals	β_2	0.0586	2.2600*	1.0220	4.1600*
Seed	β_3	0.2618	3.1300*	0.2036	1.0100*
Years of Exp.	β_4	-0.1652	-2.0200*	-0.5888	-1.1800*
Family labour	β_5	0.0206	0.3900	0.1264	1.9700*
Hired labour	β_6	0.0493	-0.9100	0.6302	2.7300*
Fertilizer	β_7	0.1277	-3.2100*	0.1963	1.3400*

R^2_{adj}=86.65-Rainfed, R^2_{adj}=94.95-FADAMA

Effect of Distributional Assumption (Comparison and Selection of the Appropriate Model)

The maximum likelihood estimates of the Cob-Douglas stochastic frontier model, was made on two different distributional assumptions on the efficiency error term namely; half normal and exponential distributions, are presented in Table 4. The table presents the estimates of the stochastic frontier which shows the best practice and efficient use of available technology.

The log likelihood functional values for the two different models are relatively the same for both project and non project farmers. The estimated values of the frontier production obtained with the two models are very similar to one another. This suggests that either of the models can be used to appropriately capture the inefficiency component if it exists.

Table 4: Maximum Likelihood Estimates of the Stochastic Frontier Production Function

	Non project farmers		Project farmers	
Parameters	Half normal	Exponential	Half normal	Exponential
β_0	-3.3322* (1.3261)	-0.1011* (1.1481)	-0.0137* (0.000)	-2.3457* (0.0058)
β_1	0.5337* (0.1658)	0.4498* (0.1513)	-0.1198* (0.0006)	0.1573* (0.0008)
β_2	0.0598 (0.0432)	0.2804* (0.0514)	0.2120* (0.0006)	0.2120* (0.0002)
β_3	0.3066* (0.0832)	0.2520* (0.0799)	0.1675* (0.0007)	-0.0438* (0.0004)
β_4	-0.1579* (0.0892)	-0.1961* (0.0587)	-0.0595* (0.0004)	-0.0595* (0.0002)
β_5	0.1116* (0.0630)	0.0798* (0.0468)	0.1852* (0.0005)	0.1852* (0.0002)
β_6	-	-	0.0900* (0.0002)	0.0900* (0.0001)
β_7	-	-	0.3864* (0.0008)	0.4442* (0.0003)
$\lambda = \sigma_u / \sigma_v$	8377.82 (0.0257)	2.5903 0.0360	12726.12 (0.0146)	24728.59 (0.0140)
$\sigma^2 = \sigma_u^2 + \sigma_v^2$	0.1054 (0.0167)	0.0387 0.0096	0.0175 (0.0039)	0.0080 (0.0025)
Chi Square	2.24E+07	1022.21	3.51E+08	3.51E+08
Log Likelihood	31.94	29.533	53.21	58.00
Probability	0.001	0.001	0.001	0.001

*significant at 1% level, figures in parenthesis are standard errors

Parameter Estimates of Stochastic Production Function

Using the half normal assumption, we reproduce the maximum likelihood estimates of the Cobb-Douglas stochastic frontier model on Table 5 below for further discussion. From the Table, it is evident that the estimate of λ (8377.82, 12726.12) and σ(0.8224654, 0.7754288) for both project and non project farmers respectively are large and significantly different from zero. This indicates a good fit and the correctness of distributional assumption, (Tewodros 2001). The observed significant of σ at 1% is consistent with the findings of Sharma et al. (1997) and Hjalmarsson et al. This suggests that conventional production function (OLS) is not an adequate representation of the data. Furthermore, the estimate of $\Gamma^{\#}$ for both project and non project farmers are 0.997 and 0.998 respectively. This implies that more than 99% of the variation in the output among farmers for both farming group are due to the differences in technical efficiencies. This result agrees with that of Coelli and Battese (1996), Kalirajan (1981) and Hjalmarsson et al, (1997).

The positive significant coefficient of farm size for non project farmers shows the existence of economies of scale in the study area. This result is in consonance with findings of Oyewo (2011), and Onuk E. G. et al. (2010). However, given the small size of farm used by most respondents, it may not be feasible to actually exploit the economies of scale arising from farm size. Project farmers on the other hand have a significant but negative coefficient for farm size. This may imply an over use of the land size. This is not unconnected with the fact that most cultivated farm lands for project farmers in the study area were borrowed. Seed was also seen to be overused by both project and non project farmers in the study area. Since most respondent indicated the use of improved/hybrid seed given as a subsidy, the overused here may suggest scarcity and / or insufficient provision of this very important input.

Other significant positive variable includes labor, agro chemicals and fertilizers. All these indicated that there is potential for increasing production through raising the level of these inputs. The estimated elasticity of production which are the coefficient of the Cob-Douglas for all the inputs are less than 1, implying positive decreasing function to the factors. This suggests that the allocation of these inputs were in the stage of efficient factor usage (Singh & e t al, (2009).

Table 5: Maximum Likelihood Estimates of the Stochastic Frontier Production Function

Parameters	Non project farmers Half normal	Project farmers Half normal
β_0	-3.3322* (1.3261)	-0.0137* (0.000)
β_1	0.5337* (0.1658)	-0.1198* (0.0006)
β_2	0.0598 (0.0432)	0.2120* (0.0006)
β_3	0.3066* (0.0832)	0.1675* (0.0007)
β_4	-0.1579* (0.0892)	-0.0595* (0.0004)
β_5	0.1116* (0.0630)	0.1852* (0.0005)
β_6	-	0.0900* (0.0002)
β_7	-	0.3864* (0.0008)
$\lambda = \sigma_u / \sigma_v$	8377.82 (0.0257)	12726.12 (0.0146)
$\sigma^2 = \sigma_u^2 + \sigma_v^2$	0.1054 (0.0167)	0.0175 (0.0039)
σ	0.8224654	0.7754288
Chi Square	2.24E+07	3.51E+08
Log Likelihood	31.94	53.21
Probability	0.001	0.001
Likelihood ratio test ($\sigma = 0$)	35.95, (p≤0.001)	18.35, (p≤0.001)
Γ= σ 2 / σ 2	0.997	0.998

**significant at 1%, figures in parenthesis are standard errors*

The mean technical efficiency for the project farmers and non project farmers are 0.9106 and 0.758. The maximum and the minimum technical efficiencies of the project and non project farmers are 0.998 & 0.9840 and 0.5770 & 0.187 respectively (see Table 6). This shows that project farmers are able to attain well over 90% of potential output from a given mix of production inputs while non project farmers attained an average of 75.8%. This implies that project farmers are more technically efficient in their use of available technologies than non project farmers. This is anticipated since project farmers have more access to inputs and technology that are more likely to improve their choice of decision marking in farming practice. While the non project farmers could be said to be relatively technically efficient, there is a scope for increasing production by 24% if they adopt the best available technologies (Oyewo, (2011).

Table 6: Summary of statistics for the efficiency score

	Efficiency Score	
Statistic	*Non project farmers*	*Project farmers*
Mean	*0.758*	*0.9106*
Minimum	*0.187*	*0.5770*
Maximum	*0.998*	*0.9840*
Standard Deviation	*0.218*	*0.1005*
Kurtosis	*-0.313*	*2.2694*

Skewness	*-0.813*	*-1.4249*

The frequency distribution of the efficiency in figure shows that 55% of project farmers operate with efficiency level greater than 80%, while for project farmers, about 90.25% operate with efficiency level greater than 80%. 45% of non project farmers are currently operating below technical efficiency of 80% while only 9.76% of project farmers fell into this category. This again implied that project farmers are more efficient due to the available technologies at their disposal compare to non project farmers

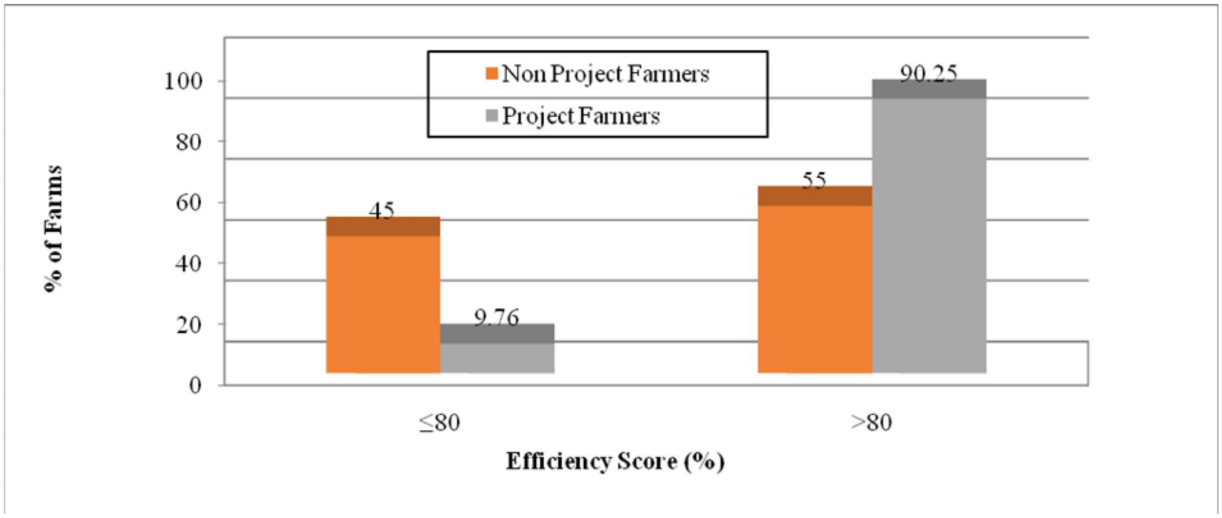

Figure 2: Frequency Distribution of the Efficiency Score

Sources of Technical Efficiency

Farmers' characteristics, demographic factors, farm characteristics and perhaps non physical factors are likely to affect efficiency (see Ali and Chaundry, 1990). The maximum likelihood estimates of the determinant of technical efficiency are summarized in Table 7.

It is believe that age is a proxy for farming experience in a traditional setting as it is the case in the study area. This means that the larger the age the greater the farming experience a farmer has, (Tewodros 2001). The study however, revealed age is not a determinant of technical efficiency. This could be due to the fact that most farmers in the study area are the above productive age as seen earlier.

Gender of ownership is a determinant of technical efficiency. Since farming in the study area is a male dominant venture, male could have made decisions concerning production activities that are favorable and technically efficient.

Memberships of group/association afford farmers the privilege of enjoying interacting with one another and assessing information and agricultural credit facilities both from the government and financial institutions. This explains the positive and significant coefficient associated with cooperative society.

Farmers with storage facility tend to be more technically efficient since post harvest losses are reduced to the barest minimum. Also the incidences of fungal attack, pest and disease, theft and / or poor weather conditions associated with post harvest trauma are controlled with the aid of storage facilities. Proximity to market is another factor that account for technical inefficiency

Table 7: Factors affecting farmers' technical efficiency

	Non project farmers		Project farmers	
Variable	Coeficients	t-ratios	Coeficients	t-ratios
Gender	0.1660	2.0200**	0.1890	2.4200**
Age	-0.0023	-1.3000	-0.0045	-1.32000
Level of education	-0.0449	-1.2200	-0.0547	-1.4200
Cooperative society	0.7956	10.5000*	0.6936	8.3400*
Access to Credit	-0.3587	-3.7500*	-0.4587	-4.1500*
Access to information	0.0569	1.2600	0.0569	1.3600
Storage	0.2269	5.0200*	0.2379	5.2420*

Previous Income	-0.1174	-1.4500	-0.2174	-1.7500
Market dist.	-0.0080	-2.0600**	-0.0089	-2.1170*

**significant at 1% level, **significant at 5%*

Conclusion

The study compares the technical efficiency of project and non project maize farmers in Kogi State. Primary data was basically used for the study and this was obtained using stratified sampling technique and through interview.
Empirical result revealed that project farmers are within the productive of 52 (with mean age of 42yrs) as estimated by World Health Organization for Nigerian in 2011 as against non project farmers who are above productive age (with mean age of 60yrs). About 47% of the project farmers are female while only 12.5% of non project farmers are female. Farmers in the study area are generally knowledgeable and can than therefore appreciate new innovations. Project farmers have access to intervention funds or farm credit that must have boosted their output.

The study further revealed that unlike non project farmers, the project farmers were equipped with storage facilities that could have encourage more production and reduce post harvest losses to the barest minimum.

The maximum likelihood estimate of stochastic frontier showed that farm size, agro chemicals, seed, years of experience and family labour are factors affecting production in the study area. The mean technical efficiency of 0.9106 and 0.758 respectively for project and non project farmers suggest that project farmers are able to attain well over 90% of potential output from a given mix of production inputs while non project farmers attained an average of 75.8%. This implies that project farmers are more technically efficient in their use of available technologies than non project farmers. While the non project farmers could be said to be relatively efficient, there is a scope for increasing production by 24% if they adopt the best available technologies. Gender, membership of group, relative distance to market, and access to credit facilities are determinant of technical efficiency in the study area.

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