Journal of Biology, Agriculture and Healthcare
ISSN 2224-3208 (Paper) ISSN 2225-093X (Online)
Vol., No.6, 2015

Comparative Economic Analyses of Production Efficiency of Fadama II Catfish Beneficiaries with Non- Beneficiaries, Ogun State, Nigeria

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Abstract
This study compared the production efficiencies of Fadama II catfish farmers with non-beneficiaries in Ogun State. Stochastic Frontier Analysis and difference of mean statistics were used to analyze the primary data collected from two hundred and seventy (270) respondents among the 10 the Fadama participating Local Government Areas. The Maximum Likelihood Estimates (MLE) for the production function revealed that fertilizer (X_1), quantity of feed (X_3) and pond size (X_7) at ($p<0.01$) determined the output of the beneficiaries and quantity of feed (X_3) ($p<0.05$), fingerlings (X_5)and pond size(X_7) at ($p<0.01$) also have positive and significant effect on the output of the non-beneficiaries. The production inefficiency analysis revealed that farm efficiency would increase with increase in benefits status and extension contact($p<0.01$). The MLE for cost function revealed that lime(X_1) and fingerlings(X_5) decreased the production cost, quantity of feed(X_3) ($p<0.1$) increased the cost among the beneficiaries. while quantity of feed(X_3), labour(X_4) and pond size (X_7) on the other hand increased the production cost among the non-beneficiaries. The cost inefficiency analysis further revealed that farming experience decreased the cost efficiency but increased the economic efficiency and the t-test showed significant difference ($p<0.01$) between the technical efficiencies of both sets of respondents. The beneficiaries are more efficient in terms of their technical, allocative and economic efficiencies than their non-beneficiary counterparts. The study recommends the expansion of the project scope to all the non-benefitting communities, provision of conducive environment for the establishment of ponds in all parts of the country to encourage more citizens to get into fish farming business and by extension, alleviate poverty status and un-employment in the state and country at large. The link between the Village Extension Agents (VEAs), Fadama Facilitators and the Fadama fish farmers should be strengthened through continual training and capacity building initiatives, if the objective of sustainably increasing Fadama farmers' income is to be achieved.
Keywords: National Fadama Development Project II (NFDPII), Beneficiaries, Non-beneficiaries, economic analysis, Production efficiency , catfish production, Ogun state, Nigeria

Introduction

Some of the objectives of the agricultural sector in the Nigerian economy, is to increase and sustain food production, provide all year round food at stable prices transform the rural and develop infrastructures in order to achieve these objectives, the Federal Government of Nigeria with the assistance of the World Bank, the African Development Bank, the State Governments and the participating Local Government Areas, jointly implemented the National Fadama Development Project in phases and of which is the National . Fadama Development Project II that had the fisheries component included the National Fadama Development Project II was aimed at reducing poverty by supporting communities to acquire infrastructures and productive assets, provide demand-driven advisory services, increase the capacity of communities to manage economic activities and reduce conflicts among resource Users (Nkonya *et al.*, 2008).

Apart from malnutrition and infant mortality that are still high, rural income per caput is lower than they were some decades ago (Adamu, 2005). There is therefore a growing awareness that, in order to derive maximum benefits on welfare from economic development, it is essential to solve not only the problem of unemployment and rapid population growth, but also, the problems of low income, lack of equipment, improved quality and advisory services needed to improve the quality of lives of the rural households. Also, one of the most serious constraints to agricultural growth in Nigeria, is the inefficient use of productive resources as considerable growth can be achieved by improving the level of efficiency in the use of resources (Kareem, *et al.*, 1998).

Fish is a major source of animal protein and an essential food item in the Nigerian diet. This implies that, training people to become better fish farmers is not only an empowerment strategy, it is also ta way by

which some of the natural resources can be creatively tapped for the good of all (Omotayo *et al.,* 2006). Fish farming in Nigeria today is responsible for about 9.7 percent contribution; (53,355 tonnes in 2005); to the annual supply of 705,000 metric tonnes which lags far behind the annual fish demand of 1,865,000 metric tonnes (Olaoye, *et al,* 2011). Most of the fish consumed by Nigerians which accounts for 55 percent of the total protein intake sources, is from fishing in the nation's water bodies (marine, estuarine, lacustrine and riverine biotype) which is over exploited as Total Allowable Catch (TAC) has always exceeded the Maximum Sustainable Yield (MSY) of 415,000 Metric tonnes. Fishery in ponds (Aquaculture) is therefore, the only visible and sustainable fish production alternative which can ensure the satisfaction of the nation's demand for fish (Gbolade and Adekoya, 2007). This study therefore compared production efficiencies of catfish farming beneficiaries of Nation Fadama Development Project (NFDP) II fisheries component with the non-beneficiaries in Ogun state. The research determine the technical, allocative and economic efficieincies of the Fadama II catfish farmer-beneficiaries and non-beneficiaries catfish in the study area.

Objectives of the study

The study is focused at comparing the production efficiency beneficiaries of catfish farming component of National Fadama Development Project (NFDP) II with Non- Beneficiary Catfish Farmers in Ogun State. The Specific objectives are to:

(i) estimate the profits of beneficiaries and non-beneficiaries of the project in catfish production in the study area ;

(ii). estimate and compare the production efficiency (technical, allocative and economic) of the Fadama II beneficiary and non-beneficiary catfish farmers in the study area.

(iii). determine if there are significant differences in the production efficiencies of beneficiaries and non-beneficiaries in the study area;

(iv) make suggestions for policy formulation and implementation on projects in future

Research hypotheses

H_{01}: There is no significant difference between the profit of the Fadama II beneficiary and non-beneficiary fish farmers in the study area.

H_{i1}: There is significant difference between the profit of the Fadama II beneficiary and non-beneficiary fish farmers in the study area.

H_{02}: There is no significant difference between the technical efficiency of the Fadama II beneficiary and non-beneficiary fish farmers in the study area.

H_{i2}: There is significant difference between the technical efficiency of the Fadama II beneficiary and non-beneficiary fish farmers in the study area.

H_{o3}: There is no significant difference between the allocative efficiency of the Fadama II beneficiary and non-beneficiary fish farmers in the study area.

H_{i3}: There is significant difference between the allocative efficiency of the Fadama II beneficiary and non-beneficiary fish farmers in the study area.

H_{o4}: There is no significant difference between the economic efficiency of the Fadama II beneficiary and non-beneficiary fish farmers in the study area.

H_{i4}: There is significant difference between the economic efficiency of the Fadama II beneficiary and non-beneficiary fish farmers in the study area.

Methodology

Multi-stage sampling technique was used with a well designed questionnaire to obtain primary data in this study. Purposive selection of four (4) Local Government Areas that gave adequate representation of the four (4) agriculture zones and are reputed for catfish production from the ten (10) Local Government Areas that participated in the project. From these, simple random selection of four (4) communities from each of the selected Local Government Areas and random selection of thirty four (34) catfish farmers from each chosen community to give 136 beneficiary and 136 non-beneficiary respondents;. Therefore, two hundred and seventy two (272) respondents were interviewed for the study but only two hundred and seventy (270) responses were considered useful for meaningful analysis (135 each beneficiary and non-beneficiary respondents (table 1, Fig.

1).

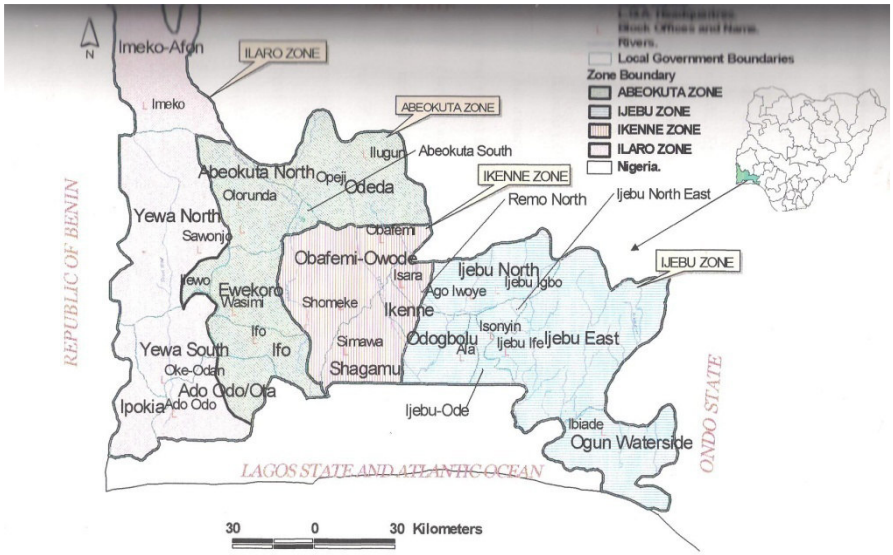

Fig.1: Map of Ogun state showing the study area.

Table 1: Sample size and sampling techniques

Beneficiaries				Non-beneficiaries		
Agricultural Zone	**Selected LGAs**	**Selected communities**	**No. of farmers**	**Selected LGAs**	**Selected Communities**	**No. of fish farmers**
Ikenne	**Obafemi -Owode**	Oba, Eriti, Mokoloki, Imedunla	34	**Odeda**	Ilugun , Ibara, Iyesi, Ajibode	34
Ilaro	**Yewa north**	Imasayi, Igbogila, Imeko, Ilaro	34	**Ado-Odo**	Ado-Odo, Ere, Iwoye,Ago-Church	34
Ijebu	**Ijebu- north**	Ijebu-Igbo, Ayegbami Ago-Iwoye , Agan	34	**Odogbolu**	Ala, Odogbolu, Ata, Isoyin	34
Abeokuta	**Ifo**	Coker , Lumesi, Solu, Obelawo	34	**Obafemi Owode**	Kobape, Iro Ogunmakin, Ajura	34
Total			**136**			**136**

Analytical techniques

The analytical tools used for the study were ***Stochastic frontier analysis t***o estimate the production efficiencies: following the standard assumption that farmers maximize expected profits (Kareem 2001, *et al.,*). Cobb-Douglas Stochastic Production frontier was applied to the study of comparative economic analysis of catfish farming component of NFDP II beneficiary and the non- beneficiary is as specified in explicit term as:

$\ln Q_i = \beta_o + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_4 \ln X_4 + \beta_5 \ln X_5 + \beta_6 \ln X_6 + \beta_2 \ln X_2 + vi - \mu i$

Where:

Q_i = Output of the i-th farm (kg)
Lime (X_1) = Quantity of Lime (kg)
Fertilizer (X_2) = Quantity of fertilizer (kg)
Feed (X_3) = Quantity of feeds (kg)
Labor (X_4) = No. of labour used (family and hired labour) in mandays.
Fing (X_5) = Quantity of fingerlings (kg)
Other Material (X_6) = quantity (quantity/month)
β_{is} = estimated coefficients (i.=1 – 6)

The ***technical and cost inefficiency effect*** μ_i is defined as:

$\mu_i = \delta_0 + \delta_1 Z_1 + \delta_2 Z_2 + \delta_3 Z_3 + \delta_4 Z_4 + \delta_5 Z_5 + \delta_6 Z_6 + \alpha_7 Z_7$ .....(2)

Where:

μ_i = Efficiency effect

Z_1 = Educational level (No of years)
Z_2 = Age (years)
Z_3 = Farming experience (years)
Z_4 = Household size (No.)
Z_5 = Benefit value (Quantity/mth)
Z_6 = Extension contact (No.)
The δ_0 and δ_i coefficients are un-known parameters to be estimated along with the variance parameters δ^2 and γ.
The δ_0 and δ_i coefficients are un-known parameters to be estimated along with the variance parameters δ^2 and γ.

The variances of the random errors, δ_v^2 and that of the technical and cost inefficiency effect $\delta\mu^2$ and overall variance of the model δ^2 are related. Thus $\delta^2 = \delta v^2 + \delta\mu^2$. The δ^2 indicates the goodness of fit and the correctness of the distributional form assumed for the composite error term. The ratio $\gamma = \delta\mu^2/\delta^2$ measures the total variation of output from the frontier which can be attributed to technical or cost inefficiency. The sigma square (δ^2) and the gamma (γ) coefficients are the diagnostic statistics that indicate the relevance of the use of the stochastic production frontier function and the correctness of the assumption made on the distribution form of the error term. The estimates of all the parameters of the stochastic frontier production function and the inefficiency model were simultaneously following Coelli, 1996 model. The study, also estimated the return to scale.. T-test of difference of mean was used to determine the variation in the mean technical, allocative and economic efficiencies of the Fadama Project II beneficiary and non-Beneficiary catfish farmers in the study area..

Revenue function is
$TR = \sum (P_Q.Q_i)$ ……..... (4)
i.e Total Revenue (TR) = Total sum of (quantity of Output (Q) x Unit Price (P_Q) of output .Where :
TR_i= Output price (P) (₦) X Quantity of output of the i-th farm (Kg).....
P_Q = Unit Price of Output Produced (₦)
Q = Quantity of Output (kg)

Cost function:
TC = TVC + TFC ……..... (5)
TC= Total cost of production
FC = Fixed Cost of production
TVC = Total Variable cost of production
$TVC = \sum(C_{Xi} . X_i)$ ……..... (6)
$TVC=cLime(C_1)+cFertilizer(C_2)+cFeed(C_3)+cLabour(C_4)+cFingerlings(C_5)+ cOtherMat.(C_6)$
Where :
TVC = Total Variable Cost = Sum of (Price x Quantity) of inputs
cLime (C_1) = cost of Lime (₦)
cFertilizer (C_2) = cost of Fertilizer (₦)
cFeed (C_3) = cost of Feed (₦)
cLabour (C_4) = cost of Labour (wage, ₦)
cFingerlings (C_5) = cost of Fingerlings (₦)
cOtherMat.(C_6) = Cost of Other materials (Quantity/month in ₦)
cPond (C_7) = cost of pond construction (₦).
TFC = Dc + R + I ……..... (7)
Where:
TFC = Total fixed Cost = Depreciation (Dc) + Rent (R) + Interest (I) .
Straight line method of depreciation was used to calculate the depreciation cost of fish farm tools and equipment.
Annual Depreciation $= \frac{C - S}{N}$ ..... (8)
where:
C = Purchase cost of the equipment (₦)
S = Salvage value of equipment after the productive life (₦)
n = Economic life of the farm equipment/tool (years)
All costs from C_1 to C_6 were incurred per production cycle and C_7 is the depreciated cost of Pond construction.

Results and Discussion
Estimates of Stochastic Production Function for 0.01 ha Catfish Earthen Pond Farm
The result of the study shows the estimate of the parameters of the stochastic production frontier model for technical efficiency. The parameter estimates obtained from the Maximum Likelihood Estimates (MLS) for the Fadama II project beneficiaries revealed that fertilizer (X_2), quantity of feeds (X_3) and pond area (X_7), have

positive relationships with fish output and significantly influenced the value of the output at 1% ($p<0.01$). However, labour (X_4), other materials (X_6) and fingerlings (X_5)also have positive relationship with the fish output but do not significantly influence the value of the fish output (table 2). However, Lime (X_1) has a negative relationship with catfish output and does not significantly influence it. The result of the coefficient of the Maximum Likelihood Estimates (MLEs) shows that feed has highest elasticity for farmers operating Fadama fish farm. This implies that productivity of the fish farmers can be improved with an increase in efficient use of feeds.

Table 2:Maximum Likelihood Estimates of the Cost Function for the Fadama II Project Beneficiary and Non-Beneficiary Catfish Farmers

		Beneficiary		Non-Beneficiary	
Variable	Parameter	Coefficient	T-Ratio	Coefficient	T-Ratio
Constant	Q	4.210***	6.279	4.360***	6.332
Output	Q	0.601***	11.210	0.321	4.155
Lime	P_1	-0.114***	-0.109	0.653	-0.103
Fertilizer	P_2	0.378	0.577	0.0091	1.400
Feed	P_3	0.618***	13.03	0.639***	23.901
Labour	P_4	0.977	0.115	0.154***	6.050
Fingerling	P_5	-0.647***	-2.23	-0.782	-1.430
Other materials	P_6	-0.174	-0.139	-0.022	-0.330
Pond	P_7	0.843	0.720	0.100*	1.950
Inefficiency model					
Constant		0.742***	4.721	2.230	1.136
Educational level	Z_1	-0.024	0.009	-0.419	0.081
Age	Z_2	0.031**	2.015	0.022	0.093
Farming experience	Z_3	0.092*	1.646	-0.035*	-1.718
Household size	Z_4	0.022	0.11	-0.157**	2.071
Dist..of Farm to Facilitator's Office	Z_5	-0.142**	2.102	0.101	0.067
Extension contact	Z_6	0.250**	2.012	0.135	0.110
Diagnostic statistics					
Sigma square δ^2	δ^2	0.055***	7.01	0.89	0.64
Gamma (γ)	Γ	0.800***	5.52	0.75	0.50

Source :Computed from field Survey, 2013

*** significant at 10%, ** significant at 5%, * significant at 1%t

Other materials (e.g. number of other miscellaneous items on the farm instrumental to fish farming

However, the stochastic frontier model analysis for non-beneficiary fish farmers of the Fadama II project revealed that quantity of fish feeds(X_3) , fingerling (X_5), and pond area (X_7) have positive relationship with fish output and significantly influenced the value of the output at 5% ($p<0.05$), 10% ($p<0.1$) and 1% ($p<0.01$) respectively. The result further showed that fertilizer (X_2) and lime(X_1) also have positive relationships with the fish output but do not significantly influence the value of the fish output. However, labour (X_4) and other materials (X_6) have negative relationships with the fish output but do not significantly influence it. Findings from the study further showed that in pond production system, pond has highest elasticity for catfish farmers. This implies that productivity of the farmers can be improved with increase in pond size. According to the findings of Kareem *et.al.,* (2008), pond area and feed are significant factors in catfish production which in a way agree with this result both for beneficiary and non-beneficiary catfish farmers of the Fadama Project; while the inefficiency sources model showed that extension contacts, distance of fish farm site to Fadama facilitators' office and educational level negatively influence the inefficiency of fish farmers contrary to the findings of Kareem *et. al.,* (2008) that only years of experience negatively influence the inefficiency of fish farmers. The result of the inefficiency analysis showed that distance of fish farm site to Fadama facilitators' office and extension contact negatively influence the inefficiency of the fish farmers at 1% significant level ($P<0.01$). This implies that Fadama fish farmers tend to be more efficient technically as the distance of fish farm site to Fadama facilitator's office reduces. Also, educational level, age, farming experience and household size tend to increase the farmers' inefficiency at a non-significant level. The result of the inefficiency analysis for farmers operating non- project beneficiaries shows that educational level and distance of fish farm site to Fadama facilitators office negatively influence the inefficiency of the fish farmers at 10% ($p<0.1$) and 1% ($p<0.01$) , this implies that fish farmers tend to be more efficient with better educational level and short distance of fish farm site to Fadama facilitators' office. Also, household size and farming experience tend to decrease farmers' inefficiency but not at a significant level. However, age and extension contact tend to increase the farmers' inefficiency at a non-significant level. The result also agrees with the findings of Olabode and Ambe-Lamidi (2007) who applied the

use of SFPF (Stochastic Frontier Production Function) to measure input elasticities and economic efficiency in poultry production in Osun State, Nigeria in which it was shown that some of the coefficients of the estimated parameters that is family and hired labour including expenses on chemicals, had negative signs in the Maximum likelihood estimate functions. It however contrast to the findings of Ogundari *et al.,(2006) and* Emokaro and Emabor (2006a) where positive coefficients were recorded for all the estimated parameters.

Table 3:Estimates of the Stochastic Production Functions for a 0.01ha cat fish earthen pond for Fadama II Beneficiaries and non-beneficiaries in Ogun state

		Beneficiary		Non-Beneficiary	
Variables	**Parameters**	**Co-efficient**	**t-values**	**Co-efficient**	**t-values**
Constant	β_o	2.483	3.295	0.985	0.886
Lime	β_1	-0.031	0.508	0.669	0.127
Fertilizer	β_2	0.248*	3.531	0.050	0.883
Feed	β_3	0.372*	24.947	0.221**	2.116
Labour	β_4	0.018	0.345	-0.087	-0.94
Fingerlings	β_5	0.052	0.567	0.277***	1.698
Other materials	β_6	0.037	.717	-0.009	-0.089
Pond	β_7	0.108*	3.121	0.903*	4.683
Inefficiency model					
Constant	θ_o	0.609	1.439	-3.386	2.395
Education level (yrs)	θ_1 -	0.011	-1.188	-0.106***	-1.804
Average Age(yrs)	θ_2	-0.003	-0.359	0.019	1.358
Farming experience(yrs)	θ_3	-0.005	0.466	-0.037	0.657
Household size (No.)	θ_4 -	0.025 -	-0.561	0.282	1.542
Dist.to NFDO (km)	θ_5	-0.007*	-3.6981	-0.032	-1.423
Extension contacts(No.)	θ_6	-0.0469*	-9.4	0.090	0.511
Sigma-squared$\sigma^{2=}$	$\sigma^2_u + \sigma_v^2$	0.187	6.183	0.307	2.627
Gamma γ	$= \sigma 2u / \sigma 2$	8.901	1.115	0.699	5.817
Log of Likelihood function(LLF)		-44.685	-	-22.066	-

Source: Computed from field Survey, 2013

***significant at 1% **significant at 5% *** significant at 10%**

Other materials (e.g. number of other miscellaneous items on the farm instrumental to fish farming)

Technical Efficiency Estimates of Catfish Farmers

frequency distribution of the technical efficiency estimation of catfish farmers for the two categories of catfish farmers in the study area. For farmers operating under Fadama II Project, majority (66.33%) of them have technical efficiency score ranging from 0.8 – 0.9, while 10.20 percent of the fish farmers have above 0.9 technical efficiency score. The mean technical efficiency score of the Fadama farmers is 0.84 with a minimum value of 0.72 and a maximum of 1.0. The mean efficiency score still show some inefficiency in Fadama fish farming in Ogun State. Thus, there is still potential for increasing output at the given level of inputs being used. From the findings of Kareem *et. al.,* (2008) majority (greater than 56%) of the fish farmers have technical efficiency score ranging from 0.8 – 0.9.

Table 3: Technical Efficiencies of Fadama Beneficiary and non-beneficiary fish farmers in Ogun state

	Beneficiaries		**Non-Beneficiaries**	
Efficiency Range	**Frequency(No.)**	**%**	**Frequency(No.)**	**%**
< 30	0	0	7	7.4
0.31- 0. 40	14	14.7	9	9.5
0.41 – 0.50	14	14.7	15	15.8
0.51-0.60	7		14	14.7
0.61 -0.70	14	14.7		
0.71 – 0.80	23	23.5		
0.81 – 0.90	65	66.3		
Above 0.90	10	10.2		
Mean	0.84		0.61	
Minimum	0.72		0.03	
Maximum	1.00		0.96	

Source : Computed from field survey, 2013

Allocative Efficiency Estimates of the Fadama II Beneficiary and Non-Beneficiary Cat fish farmers in Ogun state

The frequency distribution of the allocative efficiency estimates of the Beneficiary and Non Beneficiary catfish farmers is as presented in Table 4. The allocative efficiency ranged between 0.32 and 0.99 for the Fadama II

beneficiary cat fish farmers with the mean allocative efficiency of 0.89. Fairly large proportion (30.6%) of the Fadama II fish farmers have their allocative efficiency above 0.90 while 69.4% have their allocative efficiency below 0.90 but above 0.30. The mean allocative efficiency (0.89) implies that the Fadama II fish farmers have the potential to increase their allocative efficiency by 12%. On the other hand, 33.7% of the non-beneficiaries have their efficiency ranged between 0.71 – 0.80 and mean allocative efficiency of 0.84. (table 4)

Table 4 : Allocative Efficiency Estimates of Fadama II Beneficiary and Non-Beneficiary catfish farmers

Beneficiary		Non Beneficiary		
Efficiency range	Frequency	Percent	Frequency	Percent
≤0.30	0	0	0	0
0.31 – 0.40	2	2.04	3	3.16
0.41 – 0.50	4	4.1	9	9.47
0.51 – 0.60	5	5.1	23	24.21
0.61 – 0.70	11	11.2	18	18.95
0.71 – 0.80	18	18.4	32	33.68
0.81 – 0.90	28	28.6	4	4.21
>0.90	30	30.6	6	6.32
Mean	0.89		0.84	
Minimum	0.31		0.36	
Maximum	0.98		0.96	

Source : Computed from field Survey, 2013

Economic Efficiency Estimates of Fadama II Project Cat fish farmers and the Non-Beneficiaries

The economic efficiency estimates of the Fadama II Beneficiaries vary between 0.35 and 0.90. The mean economic efficiency estimated at 0.74 is an indication that the Fadama beneficiaries have the potential to improve their economic efficiency by 26 percent. On the other hand, the economic efficiency estimates of the Non-Fadama II Beneficiaries ranged between 0.31 and 0.82; large proportion (38.95%) of the non Fadama II cat fish farmers have their economic efficiency falling between 0.51 and 0.60. The mean economic efficiency of 0.51 implies that the non-beneficiaries of Fadama II catfish farmers have the potential to improve their economic efficiency by 49 percent.

Table 5: Economic Efficiency Estimates of Fadama II Beneficiary and Non-Beneficiary Cat fish Farmers in Ogun state

	Beneficiaries		Non Beneficiaries	
Class	Frequency	Percent	Frequency	Percent
≤0.30	0	0	0	0
0.31 – 0.40	6	6.12	2	2.11
0.41 – 0.50	5	5.10	29	30.53
0.51 – 0.60	9	9.18	37	38.95
0.61 – 0.70	22	22.45	20	21.05
0.71 -0.80	27	27.41	5	5.26
0.81 – 0.90	24	24.49	2	2.11
>0.90	5	5.10	0	0
Mean	0.74		0.51	
Minimum	0.35		0.31	
Maximum	0.92		0.82	

Source Computed from field Survey, 2013

Test of Mean Efficiency Difference Between the Fadama II Fish Farmers and Non Beneficiary Farmers in Ogun state

The results of the t-test showed that there is a significant difference ($p<0.01$) between the technical efficiency of the two categories of fish farmers. This signifies that the Fadama II fish farmers produce more output from a given level of inputs than their non-beneficiary counterparts. The result further showed that, there is a significant difference ($P<0.01$) between the allocative efficiency of Fadama II beneficiaries and non-beneficiaries. The result showed that economic efficiency of the two categories of fish farmers differ significantly ($P<0.01$). This also implies that the Fadama catfish farmers have the capacity to produce more output at a minimum cost than their counterpart that did not benefit from the project. Therefore, the null hypotheses were rejected for the technical efficiency, allocative efficiency and economic efficiency. Thus, the Fadama II fish farmers are more technically, and economically efficient than the non-beneficiaries apart from the better allocation of resources of the former group too (table 6).

Table 6:Test of Mean Efficiency Difference between the Fadama II Beneficiary and Non-Beneficiary fish farmers for 0.01ha per Annual Production.

	Mean Efficiency	Standard Deviation	N	DF	T-Value	Decision
Technical Efficiency						
Beneficiaries	0.84	0.1164	135	267	3.709***	Reject Ho
Non-Beneficiaries	0.61	0.1330	135			
Allocative Efficiency						
Beneficiaries	0.88	0.1154	135	267	12.950***	Reject H_O
Non Beneficiaries	0.84	0.7141	135			
Economic Efficiency						
Beneficiaries	0.74	0.128	135	267	13.99***	Reject Ho
Non Beneficiaries	0.51	0.088	135			

Source: Computed from Field Survey, 2013
***significant at 1%, ** significant at 5%, *significant at 10%

Conclusion

The stochastic frontier maximum likelihood estimates results revealed that fish farm output increases with pond size, fertilizer and feed. Also, labour, lime and other materials were over-utilized. Education, extension contact and distance of farm to facilitator's office increase the technical efficiency of the catfish farmers while Distance of farm to facilitator's office, Extension contact and Educational level decrease the cost efficiency of the Fish farmers but increase the economic efficiency. Also, household size increases cost efficiency but decreases economic efficiency. It could therefore concluded that distance of farm to facilitator's office, extension contact and educational levels of the respondents contributed significantly to the explanation of inefficiency measures in Catfish farming in Ogun State. The mean technical efficiency of 84 percent and 61 percent showed that there are potentials to increase output by 16 percent and 39 percent by the Fadama II beneficiaries and non-beneficiaries, respectively with the present technology. The mean values of technical efficiency, allocative efficiency and economic efficiency implied that the non-beneficiaries have more potentials for improvement in production efficiency. Above all, the Fadama II beneficiaries are technically, and economically efficient than their non-beneficiary counterparts and could allocate resources better in the study area. According to (Kareem,*et al.*,1998), one of the most serious constraints of agriculture growth in Nigeria is the inefficient use of productive resources and that considerable growth country be achieved by simply improving the level of efficiency in resources use.

The Fadama project should be extended to all the non-benefiting Fadama communities within and outside the Local Government Areas of the State so that they could enjoy the various benefits of the Project. This is very essential to bring into full reality the major objectives of the project to sustainably improve the Fadama farmers' income and to raise their standards of living" in all Fadama farming communities. The study also suggested that government of Nigeria should provide a conducive environment for the establishment of ponds in all parts of the country to encourage more citizens to get into fish farming business and by extension, alleviate poverty status and un-employment in the state and country at large. The link between the Village Extension Agents (VEAs), Fadama Facilitators and the Fadama fish farmers should be strengthened through continual training and capacity building initiatives, if the objective of sustainably increasing Fadama farmers' income is to be achieved.

REFERENCES

Adamu. T. M., (2005): Determinants of household Income among farmers in Odeda Local Government, Ogun State.

Ayanwale. B. and Alimi, T. 2003. The Impact of National Facility in Alleviating Rural Poverty and Enhancing Agricultural Economic Obafemi University, Ile-Ife, Osun-State, Nigeria 34pp.

Aihonsu O.Y (2001), Bank loan default by small scale farmers in Ogun State, Nigeria . Ogun J. Agric. Sci. 1: 11 – 20

Bello, M.O. (2000). Categorization of Potential Adopters for Organic-Based of Fertilizer Among Vegetables Farmers in Ojo LGA State. B. Agric. Project University of Agriculture, Abeokuta. Pp. 32

C.B.N./NISER,. (1992): The impact of SAP on Nigeria Agriculture and Rural Life. 1:9. National Report.

Central Bank of Nigeria, (1998). Statistical Bulletin and Annual Report.Pp.64.

Central Bank of Nigeria, (1999). Nigeria's Development: Poverty Assessment and Alleviation. Research Department in collaboration with World Bank, 1996. Collaborative study on Nigeria's Prospect for Development; Proceedings of a Workshop April . 5-7pp.

Coelli, T.J. (1996): A Guide to Frontier Version 4.1 A computer Program for Stochastic Frontier Production and

Cost Function Estimation. Department of Econometrics, Univerisity of New England, Armidale.

Coelli, T.J., Sandura, R. and Colin, T.(2002). Technical, allocative, cost and scale in Bangladesh rice production: A non-prametric approach. Agricultural Economics 53, 607 – 626.

Coelli, T.J.., Prasada Rao, D.S. and Battese, G.E. (1998): An Introduction to Efficiency and Productivity Analysis. Kluwer Academic Publishers, Boston/Dordrecht.220pp.

Fadama (2007). http//:www.fadama.org.ng. National Fadama Development Project II.

Fadama (2007). http:Ilwww.fadama.org_nigeria.

FAO,(1999): The State of Word Fisheries and Aquaculture, in 1998, FAO of the United Nation Rome. ll2pp.

Gbolade, F.O. and Adekoya, B.B., (2007): A Review of the reproductive and grow-out management of the African Catfish, Clarias gariepinus in Ogun State, Nigeria. A paper presented at the international workshop on the; Development of a genetic improvement programme for catfish- Clarias gariepinus Organized by the Council for Scientific and Industrial Research (Water Research Institution); 5th — 9th November, 2007. Accra, Ghana.196pp.

Kareem, R.O., Dipeolu,A.,Aranmolaran, A.B and Akegbejo,S. (2008): Analysis of technical, Allocative and Economic Efficiency of different pond systems in Ogun state. J. of Agric. Econs. And farm Mgt.1:2-5

Ogundari, K. and Ojo, S.O. (2007): Economic Efficiency of Small Scale Food Crop Production in Nigeria. A Stochastic Frontier Approach. Journal of Social Sciences. 14 (2), 123 – 130.

Olaoye, O.J, Adebayo O.C (2011): Economic viability for the use of Microfinance Bank loan on Aquatic studies. World Journal of Agricultural Science ,Vol. 3, Pg. 29 -40672-677pp, http.wwww.idosi.org/wjas7(6)/6.pdf.

Omotayo, M.A., Akegbejo-Samsons, Y. and Olaoye, O.J., (2006): Fish Production,Processing and Storage Training manual' for fish farmers in Epe, Lagos state. published by Extension Centre, University of Agriculture, Abeokuta, and BATN Foundation, Lagos. 46pp.

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