ABHINAV
International Monthly Refereed Journal of Research In Management & Technology
ISSN – 2320-0073 Volume II, January'13

TECHNICAL EFFICIENCY OF FISH PRODUCTION IN IJEBU-ODE

O.O. Olayiwola

Research Fellow, Department of Economics Policy Unit,
Development Policy Centre (DPC), Nigeria
Email: olubodun_2008@yahoo.com

ABSTRACT

The study analyzed the factors influencing technical efficiency of fish production in ijebu-ode Local Government Area of Ogun state. Random sampling technique was used in selecting the One Hundred and Fifty (150) farmers from the Ijebu-ode Local Government Area and One Hundred and Forty-one questionnaires were filled while nine questionnaires were unfilled and data were collected through structured questionnaires. The information was coded and analyzed through the use of both descriptive statistics and stochastic production frontier based on Cobb-Douglass production function.

The results of the descriptive analysis show that 89.6 percent of the farmers were male while 10.4 percent were female, with male having higher mean efficiency of 0.92 percent. The age range of farmer was between 30 and 61 and those of 41-50 years of age form the majority (0.80%). Majority of the farmers were not educated with increase in mean efficiency as level of education increases. Also, majority of the farmers (0.93%) have household size of between 6-10 and most of their farmland were owned by the government and agencies.

The maximum likelihood estimation of the stochastic production frontier shows that the mean technical efficiency is 0.99. The results also reveal that coefficients of pond size, fingerlings and family labour are positive while feed and hired labours were negative but statistically significant in fish production. The return to scale (RTS) was 0.6137 indicating a positive decreasing return to scale and production was in stage II.

The policy implication is that there is still more opportunities to raise the present level of technical efficiency of the fish production in the study area. The study made recommendation to encourage young people to practice fish farming. Finally, suggestion was made to carry out further research on fish farming as related to food security and food sufficiency.

Keywords: Technical Efficiency, Fish Production and Ijebu-Ode, Nigeria.

Background Information on Fishery in Nigeria

Fish farming has been in practice since the civilization of Egypt and China. Although fish culture has existed in Africa (Egypt) since 2000BC, it started in Nigeria in 1942 (Federal Ministry of Agriculture and Natural Resources, (2007) as a hobby by expatriate fisheries officers. The first experimental fish farm at Pan yam, near Jos, Plateau State, was constructed between 1951 and 1954. Over the years, several governments and individual fish farms have been set up. Some have been successful, while others have failed due to lack of adequate

management, which may be attributed to unavailability of basic principles guiding a profitable aquaculture venture.

According to Barker (2002), the world demand for fish has been on the increase over the last three decades and this observed increase in demand for fish predicts on extrapolated total global demand of 340.5 million metric tons of fish by the year 2005. This represents an annual increase in demand of 1.5 million metric tons of fish product. Fisheries workers in different parts of the globe have worked extensively on the problem facing the development and management of the industries and small-scale fisheries and their failures are indicators of the limitations imposed by the complex nature of the sector artificial and natural resources.

The establishment of three fisheries research institute in 1975: Lake Chad Research Institute, Maiduguri (1975), the National Institute for Oceanography and Marine Research (NIOMR), Lagos (1975), Kanji Lake Research Institute, New Bussa (1976) and a full-fledged Federal Department of Fisheries (FDF) in 1976 with its headquarters in Lagos, accorded priority to fisheries production.

Nigeria has the potential to be self-sufficient in fish production, both for household's and industrial need and also for export. However, fish farmers have identified a number of constraints militating against concerted production effort. Addressing these obstacles is a key step toward attaining self sufficiency in fish production. The Federal Department of Fisheries (FDF, 1985), identified fish production problems as poor rate of capital formation, lack of credit facilities, inadequate extension service, poor fish farm management techniques and lack of incentives for fish producers.

The need to solution fish production, in the country in efforts at maintaining food security especially for low income earners (majority of whom mainly consume protein from fish sources) suggest that fish farmers be empowered. A potent way of doing this is to design appropriate capacity building mechanism for them so that the level of their efficiency will be increased. Also, a study by the World Bank in 1985 revealed that fisheries development programmes of the various levels of government in the failed to make a desired impact on the fish production because their design and implementation lacked adequate Research and extension support.

Gaffer (1991) submitted that early extension efforts in fisheries were concentrated on capture fisheries not strategies to adopt in order to increase the technical efficiency of the fish farmers. Even, despite all the effort of National Accelerated fish Production Project (NAFP) in Nigeria toward improving the efficiency of fish farmers as well as to increased per capital income of indigenous fish farmers, the project was not yield expected outcomes due to poor implementation, poor monitoring and evaluation of the project. This study will therefore analyze technical efficiency of fish production in Ijebu-Ode of Ogun State for the purpose of bringing out the areas in which they need to be empowered so that the fish farmers will be able to maximize advantage in fish production and it enhance effective utilization of National Resources available to them. In addition, an underlying factor behind this work is that fish farmers were not making efficient use of existing technology to improve farm level efficiency.

The role that agriculture should play in economic development has been recognized for years because the adoption of new technologies designed to enhance farm output and income has received particular attention as means to economic development. Output growths are

however not only determined by technological innovations but also by the efficiency with which available technologies are used (Bravo-ureta et al, 1993).

Therefore, the study of the present level of efficiency and the analysis of factors influencing their level of efficiency is necessary. This will indicate the possibilities of increasing their productivity level by highlighting the direction of resources use adjustment and allocation because increase production and productivity are direct consequences of efficiency of input combination given the available technology (Ogundari and Ojo, 2005).

Economic Efficiency

Economic efficiency is a situation where there are both technical efficiency and allocative efficiency. Therefore, the achievement of either of technical efficiency or allocative efficiency is a necessary but not a sufficient condition to ensure economic efficiency (Ellis, 1988). The simultaneous achievement of both efficiencies however, provides the sufficient condition for economic efficiency. The sufficient condition according to Heady, (1952), occurs when price relationships are employed to denote maximum profits for the firm or when choice indicators are employed to denote the maximization of other economic objectives. Thus, economic efficiency refers to the choice of the best combination for a particular level of output, which is determined by both input and output prices.

Allocative Efficiency

While technical efficiency is only concerned with the physical relationship between input and output allocative efficiency takes into account price relationship in addition to the physical relationship. Thus, allocative efficiency is concerned with choosing optimal sets of inputs. In the regard, a firm is allocatively efficient when production occurs at a point where the marginal value product is equal to the marginal factor cost.

Technical Efficiency

Technical efficiency in production is the physical ratio of product output to the factor input; the greater the ratio, the greater the magnitude of technical efficiency. This definition of technical efficiency implies that difference in technical efficiency between firms exists. The production function pre-supposes technical efficiency, whereby maximum output is obtained from a given level of input combination. Therefore, it is a factor-product relationship. An important assumption relating to efficiency is that firms operate on the outer bound production function, that is, on their efficiency frontier. When firms fail to operate on the outer bound production function, they are said to be technically inefficient. For such firms, an improvement in technical efficiency may be achieved in three ways (Heady 1960).

Firstly, technical efficiency can be improved through improved production techniques. This may imply a change in factor proportions through factor substitution under a given technology. Hence, it may represent a change along the given production function. Secondly, technical efficiency can also be improved through an improvement in the production technology. This represents a change in the production itself such that the same amounts of resources produce more output, or alternatively, the same amount of output is derived from smaller quantities of resources than before. Thirdly, technical efficiency can be improved through an improvement in both production technique and technology.

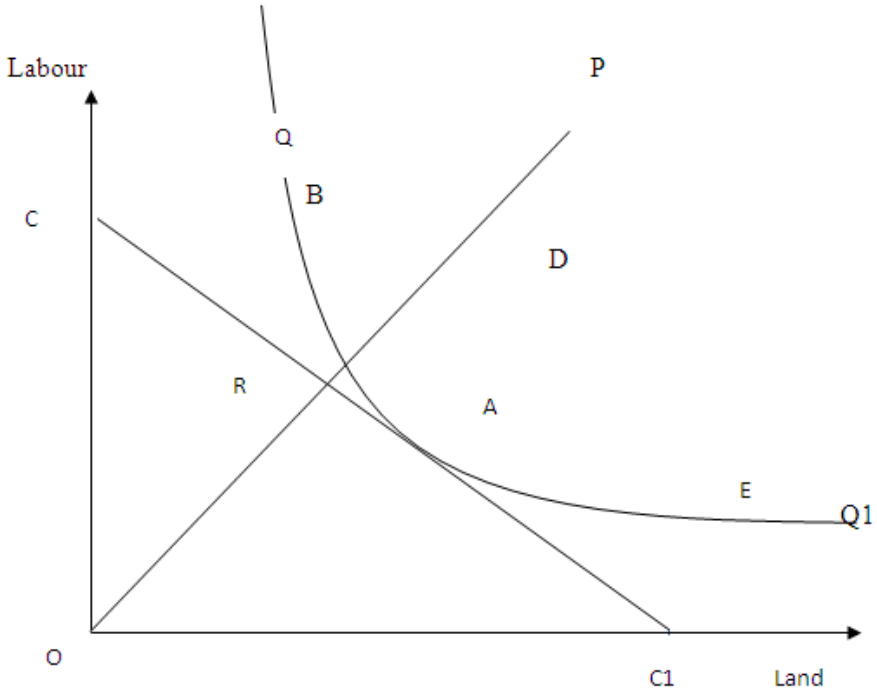

Figure 1: Allocative, Technical and Economic Efficiency

In summary, the three efficiency measures of Farrel are defined as follows from figure 1.

Technical Efficiency (TE) = $\frac{OA}{OP}$ - - - - - - - - - - - (1.1)

Price Efficiency (PE) = $\frac{OR}{OA}$ - - - - - - - - - - - (1.2)

Economic Efficiency (EE) = $\frac{OA}{OP}$ $\frac{OR}{OA}$ = $\frac{OR}{OP}$ - - - - - - - - - - - (2.3)

Materials and Methods

The study was carried out in Ijebu-Ode Local Government of Ogun State, in Nigeria. Ijebu-Ode is a city located in South-western Nigeria. With an estimated population of 222,653 (2006 census survey), it is the second largest city in Ogun State after Abeokuta. In pre-colonial times, it was the capital of the Ijebu kingdom it is the city inhabited by the Ijebus, a sub-group of the Yoruba ethnic group who speak the Ijebu dialect of Yoruba. It is historically and culturally the headquarters of Ijebu land. The city is located 110km by road North-East of Lagos; it is within 100km of the Atlantic Oceans in the Eastern part of Ogun State and possesses a warm tropical climate. Ijebu-Ode is the trade centre of a farming region where yams, cassava, grain, tobacco and cotton are grown.

Fish farming industry is well established in Ijebu-Ode Local Government and it can be justified by the fact that each area in the Local Government has at least five Fish Farms. Data

was collected through a structural questionnaire administered to fisheries farmers in other to obtain relevant primary data on to fisheries production. Simple Random sampling was used. Farmers were selected at random in the study Area and one hundred and forty one farmers was used for the research work. The Analytical techniques that were used for study were descriptive statistic and stochastic frontier production function. Descriptive statistic (frequency and percentage) was used to analyze the socio-economic characteristic of the sampled farmers.

Stochastic Frontier Production Function

The model of the stochastic frontier production for the estimation of technical efficiency is specific as:

$Yi = \beta_0 + \beta_1 InX_1 + \beta_2 InX_2 + \beta_3 InX_3 + \beta_4 InX_4 + \beta_5 InX_5 + \beta_6 InX_6$

Vi-Vi

Y = Output of the farmers in kg.

X_1 = Hire Labour input use in production in man-day

X_2 = Pond Size in (ha).

X_3 = Family Labour in (Man-day)

X_4= Agrochemical in (Liters)

X_5 = Feed in (kg)

X_6 = Fingerlings in (kg)

In's = Parameters to be estimated.

In's = Natural Logarithms

Vi = The symmetric component that captures random error associated with random factor under the control of fisheries farmers.

Vi = The asymmetric error component represents the deviation from the frontier production (the technical inefficiency).

The efficiency model:

$Ui = \alpha_0 + \alpha 1 Z_1 i + \alpha_2 Z_2 i + \alpha 3 Z_3 i + \alpha_4 Z_4 i + \alpha 5 + Z_5 i$

Where:

Ui = Technical efficiency of the fisheries farmers

Z_1 = Age of Farmers (years).

Z_2 = Household size

Z_3 = Farming experience in years.

Z_4 = No. of years of Educational.

Z_5 = Extension contacts (dummy)

αi's = Parameters to be estimated.

Socio-Economic Features of Respondents

Sex of Respondents

Out of the respondents, 89.6% were male while 10.4% were female. This shows that men are more involved in fishery production, while women are into post-cropping operations like marketing and processing into consumable product. Also, from the table it shows that mean efficiency of the farmers are equal irrespective of the gender of the farmers.

Table 1. Distribution of Respondents by Gender

Sex	Frequency	Percentage	Mean Efficiency
Male	112	89.6	0.92
Female	29	10.4	0.92
TOTAL	**141**	**100**	

Source: Field Survey, 2009.

Age of Respondents

Age is an important factor in traditional Agriculture. It determines farmers productive ability and consequently his output. This is because farming is still labour intensive in this part of the world and traditional agriculture production system relying on rudiments implements powered by human muscle. Therefore, beyond certain age, farmers productivity begins to decline. From the table below analysis of age, the modal age of 51-60 years means that majority of the fishery farmers interviewed were in their middle age and some old. This has effect on productivity.

Olayide (1980) submitted that farming population is ageing thus reducing the effective labour force from agricultural productivity. Result shows that younger people are rarely engaged in farm work as they have migrated to urban areas for non-farming occupation. In addition, the table shown that has the age of respondents increases the mean efficiency decreases.

Table 2. Distribution of Respondents by Age

Age Group (Years)	Frequency	Percentage	Mean Efficiency
Below 20	1	0.8	0.85
20-30	20	3.2	0.83
31-40	29	2.2	0.81
41-50	35	28	0.80
51-69	44	35.2	0.74
60 and Above	12	9.6	0.69
TOTAL	**141**	**100**	

Sources: Field Survey, 2009.

Marital Status of Respondents

This shows the number of dependents, which fishery farmers have to cater for as part of his responsibility. From the table, majority of the sampled farmers were married i.e 83.2% while 12% are single and 1.6% divorced, 3.2% widowed. The result shows that most of the farmers interviewed have one or more people to cater for and who can also serve as source of family

labour. Also, from the table it shown that the mean efficiencies of the farmers are equal irrespective of the marital status.

Table 3. Marital Status of Respondents

Marital Status	Frequency	Percentage.	Mean Efficiency
Single	21	12	0.96
Married	104	83.2	0.96
Divorced	2	1.6	0.96
Widowed	14	3.2	0.96
TOTAL	**141**	**100**	

Source: Field Survey, 2009.

Household Size of Respondents

The household size is an important socio-economic characteristics because it often times determines how that household size distribution of sampled farmers. Also, from the table, it shown that the household size does not have defined pattern of effect on the efficiency production.

Table 4. Distribution of Respondents by Household Size

Household Size	Frequency	Percentage	Mean Efficiency
2-5	58	46.4	0.97
6-9	73	50.4	0.96
10 and above	10	3.2	0.93
Total	**141**	**100**	

Source: Field Survey, 2009.

Level of Education

Education is an important factor that affects the productivity of farmers, since it gives the farmers the opportunity to understand improved techniques designed to increase farm output and ensure efficiency. It also help in upgrading people's level of consciousness in understanding the substance of various environmental conservation programme promote by government and Non-Government Organization (NGO). From the table below, majority of the farmers were illiterate. This has greatly affected their understanding of improved techniques and probably output level. Also, it is shown from the table that has educational level of the fishery farmers increases their efficiency level also increases.

Table 5. Level of Education of Respondents

Level of Education	Frequency	Percentage	Mean Efficiency
No Formal Education	75	60	0.84
Primary Education	40	32	0.92
Post-Primary Education	17	5.6	0.96
University / Tertiary	9	2.4	0.98
TOTAL	**141**	**100**	

Source: Field Survey, 2009.

Farming Experience of Respondents

The number of years of farming of nay farmers will determine how he will organized his resources in order to achieve level of production. Munir-Ahmad et al (1999) asserted that more experienced and educated farmers realize a high productive efficiency and this output. The years of farming experience of farmers affect the level of productivity and efficiency. Majority of the sampled framers have been in farming operation for a long time. The table shows that the farming experience does not have defined pattern of effect on the efficiency of production by fisheries farmers.

Table 6. Distribution of Respondents by Years of Farming Experience

Range of Year of Experience	Frequency	Percentage	Mean Efficiency
0 - 9	9	4.8	0.92
10 – 19	39	23.2	0.88
20 – 29	49	31.2	0.95
30 – 39	44	30.4	0.93
TOTAL	**141**	**100**	

Source: Field Survey, 2009.

Production and Efficiency Factors

Capital

Capital is very important because of its ability to engage or motivate other factors of production. It acts as a catalyst or elixir that activates the engine of growth, enables it to mobilize its inherent potentials and to advance in the planned or expected direction (Ijere, 1985). If farmers possess credit, he could overcome his destruction by applying credit to purchase needed equipment goods and services to attain a more efficient use. From the table, the lending sources of credit is personal savings because of these institutional source cannot be easily access by the farmers. Also, it shown from the table that as the sources of capital of the fishery farmers increases, their efficiency level also increases.

Table 7. Distribution of Respondents according to Sources of Credit

Source	Frequency	Percentage	Mean Efficiency
Co-operative	11	8.8	0.86
Friends & Relatives.	6	4.8	0.94
Bank	5	4	0.96
Personal Saving.	119	82.4	0.97
TOTAL	**141**	**100**	

Source: Field Survey, 2009.

Farm Size

Farm size is a factor that affects the level of output. Nigeria agriculture is characterized by small farm holdings. Babatunde et al,(2004). Therefore small size invariably leads to small output. From the table, farmers cultivated small size of farmland. Also, the table shows that as the farm size increases, the mean efficiency in production by fishery farmers decreases.

Table 8. Distribution of Respondent by Farm Size

Farm Size (ha)	Frequency	Percentage	Mean Efficiency
0 – 0.5	20	16	0.95
0.5 – 1.0	55	36	0.92
1.1 – 2.0	37	29.6	0.87
2.1 And above.	29	18.4	0.94
TOTAL	**141**	**100**	

Source: Field Survey, 2009.

Land

Majority of the farmers got their land through inheritance while other source of land include purchase, rent or lease, borrowed and community land. This shows that there is problem of land tenure system as characterized by family farmland. In addition, the table shows that the sources of land does not have defined pattern of effect on the efficiency production.

Table 9. Sources of Land by Respondents

Sources	Frequency	Percentage	Mean Efficiency
Family / Inheritance	105	71.2	0.96
Purchase	8	6.4	0.91
Rent / Lease	9	7.2	0.92
Borrowed	7	5.6	0.98
Community / Village	12	9.6	0.93
TOTAL	**141**	**100**	

Source: Field Survey, 2009

Labour

Labour is needed in all the state of farming operations. Nevertheless, the type and level used varies from farmers to farmers and depends on farming operation involved and how large the farm is hired labour is used to supplement family labour in peasant agriculture as production is labour intensive. Both are measured in Mondays. Akintola et al, (2000) asserted that labour is a limiting factor in the farming system of small-scale agriculture. From the table, it shows that is because of their fairly household size. Also, it is shown from the table that the mean efficiency increases irrespective of the sources of farm labour.

Table 10. Distribution of Respondent by Sources of Farm Labour

Sources	Frequency	Percentage	Mean Efficiency
Family Labour	32	25.6	0.92
Hired Labour	27	16.8	0.95
Both	82	57.6	0.97
TOTAL	**141**	**100**	

Source: Field Survey, 2009.

Problems of Labour Supply

Labour is the main items in the cost of fishery production (Nweke, 2004). The cost is very high during the off-season and thus farmers are sometime unable to hire sufficient labour. Addressing the problem of labour constraints will improve the productivity and income.

Table 11. Distribution of Respondents According to Problems in Sourcing for Labour

Problem	Frequency	Percentage
Scarcity	96	68.8
High cost of Labour	30	19.2
Transportation	15	12
TOTAL	**141**	**100**

Source: Field Survey, 2009.

Feeding Methods Adopted by Respondents

Base on the result shown in table 4.12 below, it is noted that 32% farmers are using pellet feed, 27% of the farmers are using powdery feed, and 21% of fishery farmers are using both maggot feed and dead animal respectively. Also, it is shown that the mean efficiency increases as a result of method of feeding adopted by the fishery farmers.

Table 12. Feeding Method

Method of Feeding	Frequency	Percentage	Mean Efficiency
Pellet Feed	43	32	0.97
Powdery Feed	36	27	0.96
Maggot Feed	31	21	0.94
Dead Animal	31	21	0.86
TOTAL	**141**	**100**	

Source: Field Survey, 2009.

Analysis of Stochastic Frontier Estimation

The Frontier was estimated using maximum likelihood estimate approach (MLE) through the Frontier 4.1 Program developed and licensed by Coelli (1994). The results of MLE are given below:

Table 13. Maximum Likelihood Estimate Result

Variable	Parameter	Coefficient	Standard Error	T-ratio.
Production Function				
Pond Size	β_1	2.688***	0.1569	17.1267
Fingerlings	β_2	0.1912**	-0.4896	3.9093
Feeds	β_3	-0.0335	-0.0152	2.19626
Hired Labour	β_4	-0.0322	-0.0365	0.8815
Family Labour	β_5	0.488***	0.1150	4.2440
Inefficiency Model				
Constant Term	δ_0	-0.4911***	1.4197	-5.9808
Age of the Farmers	δ_1	-3.0621***	0.6708	-4.5645

Table 13. Maximum Likelihood Estimate Result (Contd…..)

Variable	Parameter	Coefficient	Standard Error	T-ratio.
Year of Schooling.	δ_2	-1.5500***	0.5928	-2.6148
Farming Experience	δ_3	-0.1432***	-0.0268	-5.3439
Sigma-Squared.	δ^2	-1.0561***	0.2894	3.6490
Gamma	Y	0.9978		
Log Likelihood.		58.39		

Source: Computed from MLE results.

Note: Asterisks indicate significance.

*** Significant at 1% Level.

** Significant at 5% Level.

From the table, the positive and highly significant co-efficient of fingerlings and other variables confirm the expected positive relationship between output of fish production and the variables i.e (Fingerlings & other variables) showing that they are important factor in explaining changes in output of farmers. The more the fingerlings and other variables used in production, the more the yield. Labour has a negative co-efficient and not statistically significant showing that it is not an important the explain changes in output of fishery production. However, the co-efficient of feed is negative but it is statistically significant showing that it is inversely related to output level.

Inefficiency variables: Capital, Year of Schooling and farming experience all have negative co-efficient. The negative sign of the partners in the inefficiency function means that the associated variables have a positive effect on technical efficiency. This is in accordance with a priori expectation as also confirmed by Ojo and Ajibefun (2000), indicating that the level of technical efficiency would significantly increase with rising level of education, farming experience and initial capital used for production.

The table above shows the log likelihood function is estimated to be 58.39. It is evident from the table shows that the estimated of sigma-Square δ^2 (1.0561) is statistically significant and different from zero at (=0.01). This indicates a good first and correctness of the specified distribution assumption of composite error term. The estimate of the gamma (Y) parameter is quite large (0.9978), which means that systematic influences that are unexplained by the production function are the dominant sources of random errors. In other words, it means that inefficiency effects are highly significant in the analysis of the value of output of farmers. The negative of the parameters in the inefficient function means that the associated variables have a positive effect on the technical efficiency.

Production Elasticity and Return to Scale

Production elasticity measures the proportional change in output resulting from a proportional changes in the inputs level, with all other inputs held constant. The co-efficient obtained from MLE can be interpreted as the elasticity of output with result to the inputs. Based on this, production elasticity estimates and return to scale are shown in the table below:

Table 14. Elasticity and Return to Scale of Smallholders Fishery Farmers

Inputs	Elasticity.
Fingerlings.	0.1914
Feeds.	-0.0335
Labour.	-0.0322
Other Variables.	0.4880
Return to Scale.	0.6137

Source: computed from Data.

From the table, estimated elasticity of explanatory variables shows that fingerlings and others variables were positive decreasing function to factors indicating the variables allocation and use were in stage of economic relevance of the production function (Stage II) while feed and labour were negative decreasing function to factor indicating over use and in stage III. The return to scale (RTS) was 0.6137 indicating a positive decreasing return to scale and production was in stage II.

Technical Efficiency of Fishery Farmers in the Study Area

Table 15. Frequency Distribution of Technical Efficiency Estimates

Technical Efficiency	Frequency	Percentage
0.3< TE ≤ 0.7	5	4
0.7< TE ≤ 0.9	6.3	45.6
0.9< TE < 1	73	50.4
TOTAL.	**141**	**100**

Sources: Computed from data.

The above table shows frequency distribution of individuals technical efficiency estimate. It is shown from the table, the highest percentage of technical efficiency fall between 0.9 <1 while the least percentage fall between 0.3 and 0.7. This implies that technical efficiency clustered around the upper and the technical distribution this indicating that most of the fishery farmers are close to fall technical efficiency. This result is in line with the findings of Schultz (1956), which states that small scale farmers are efficiency in the use of their production unit.

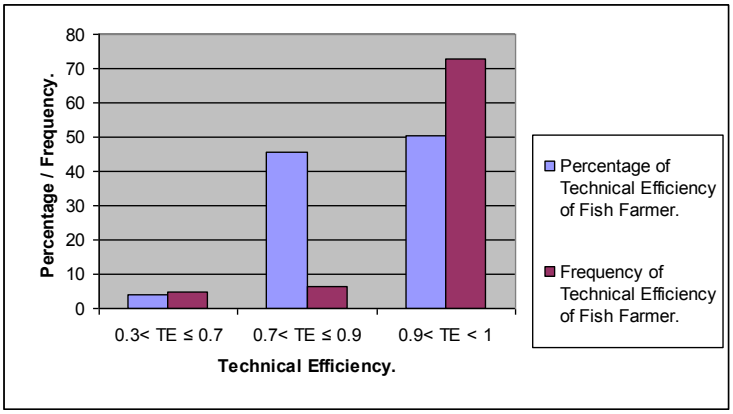

Figure 2. Frequency Distribution of Technical Efficiency Estimates

SUMMARY OF THE RESEARCH FINDING

The study assessed the fishery production in Ijebu-Ode Local Government of Ogun State. The socio-economic characteristics considered were age, gender, fishing experience, year of schooling, reason for taking up fishing as a profession, major occupation, type of labour, sources of fund for fishing operation.

The result shows 89.6 percent of the fishermen were male and 10.4 percent were female. Also, 12 percent of the respondents are single, 83.2 percent are married, and 1.6 percent is divorced while 3.2 percent are widowed. It implies that happy home has a significant role to play in the farmer efficiency and performance since the result revealed that the rate of divorced and widowed among the respondent were low and accounting for 1.6% and 3.2% respectively. It was found our that non-formal education, primary education and secondary education are 60%, 3.2% and 5.6% respectively while those attend tertiary is 2.4%. The age of the respondents that are more active and below 20 years has the lowest percentage of 0.8%.

The farming experience has been discovered to influence the farmer efficiency or output level. It indicated that a young school leaver and newcomer into the production should seek for advice and experience before venture into production. Given the specification of stochastic frontier production function, farmers on the average have high level of technical efficiency, given resources at their disposal, with the predicted technical efficiencies dust ring around 0.7 and 0.9. Fingerlings and other variables are significant and positive showing that they are important factors explaining changes in output. Feed is negative but statistically significant while labour has a negative co-efficient and not statistically significant.

However, the level of the observed technical efficiencies has been shown to be significantly influenced by capital, year of schooling and farming experience. Finally, the result shows that the elasticity means value of the farm output is estimated to be 0.6137 indicating a positive decreasing return to scale. Thus, production was in stage II.

RECOMMENDATIONS

Based on the outcome of this study, the following recommendations were needed: -

1. Firstly, adequate farm inputs like feed, fingerings should be made available and affordable to farmers in the study area on time through a clear-cut linkage supply.
2. Secondly, extension agent should play active role in disseminates useful information's practices that will increase farmer's productivity.
3. Thirdly, the study made recommendation to encourage young people to practice fish farming. Also, suggestion was made to carry out further research on fish farming as related to food security and food sufficiency.
4. Lastly, Government should encourage researchers on the genetic marketing and industrial technologies necessary to enhance productivity and impact of fish transformation. This will save as a measure to drive down the cost of production and develop new uses for fish.

CONCLUSION

The result of the study shows that although the farmers are small-scale and resources poor, they are fairly efficient in the use resources at their disposal. Expansion in the pond size and

other resources will bring more than proportionate increase in output because results shows feed and labour are still underutilized. Also, high level of education (year of schooling) and farming experience contribute to improve the level of technical efficiency of farmers in the study are thus reduce the level of technical efficiency. Lasting solution to major problems affecting the fishery farmer's productivity will also contribute to high output level and thereby measuring the farmer's income.

REFERENCES

1. Adeleke O.A., Fabiyi T.L., Ajiboye A. and Matanmi H.M. (2008). Application of Stochastic Frontier Analysis in The Estimation of Technical Efficiency of Cassava Farmers in Oluyole and Akinyele Local Government Areas of Oyo State. Research Journal of Agronomy. 2, 71-77.
2. Adeoti I.A. (2 001): Economic Analysis of Formal and Informal Irrigated Farming in Kwara State, Nigeria. Unpublished Ph.d Thesis, Department of Agricultural . Economics, University of Ibadan.
3. African Studies Centre (ASC, 2006) Farming as a Livelihood Sources for Urban Dwellers: Results from a Research Project in Nakuru Kenya.
4. Aigner D., Lovell C.A.K and Schmidt P. (1977). Formulation and Estimation of Stochastic Frontier Production Models. Journal of Econometrics. 6 pp 21-37
5. Ajewole O.C. and Folayan J.A. (2008). Stochastic Frontier Analysis of Technical Efficiency in Dry Season Vegetable Production in Ekiti State, Nigeria. Agricultural Journal. 3, pp 252-257.
6. Ajibefun, I.A and Abdulkadri. A.O. (1999) "An Investigation of Technical Inefficiency of Production of Farmers Under the National Directorate of Employment in Ondo State, Nigeria", Applied Economic Letters, Vol.6, pp 111-114.
7. Ajibefun I.A (2004). Analysis of Policy Issues in Technical Efficiency of Small Scale Farmers Using the Stochastic Frontier Production Function with Application to Nigerian Farmers. Economic Journal.
8. Allen O.A. and Unwen A.R.(1972). Vegetable production in south Asia, Allen and Unwen Ltd. Second Edition,pp.52, 16-22.
9. Akinwunmi, J.A (1970) Economics of Maize Production in Oyo Division of Western State, Nigeria, Unpublished M.Sc. Dissertation, University of Ibadan.
10. Akinwunmi, A.A and Djoto, K.K. (1996) "Farm size, Relative Efficiency and Agrarian Policy in Cote d'Ivoire: Profit Function Analysis of Rice Farmers", Agricultural Economics, 14, pp93-102.
11. Awasthi C.P. and Abidi A.B. (1987). Biochemical composition and nutritional values of some common leafy vegetable. Progress Horticulture (1985).17(2):118-121.
12. Battese, G.E. (1997) "A Note on the Estimation of Cobb-Douglas Production Function when some Explanatory Variables have Zero Values", Journal of Agricultural Economics, Vol. 48, No. 2, pp250-252.
13. Battese, G.E. (1992) "Frontier Production Functions and Technical Efficiency: A Survey of Empirical Applications in Agricultural Economics", Agricultural Economics, (7) pp 185-208.

14. Battese, G.E. and Coelli, T.J. (1992) "Frontier Production Functions, Technical Efficiency and Panel Data: With Application to Paddy Farmers in India", Journal of Productivity Analysis, 3, pp 153-169.
15. Battese, G.E. and Coelli, T.J. (1995) "A Model for Technical Inefficiency Effects in a Stochastic Frontier Production Function for Panel data", Empirical Economics, 20, pp 325-332.
16. Bravo-Ureta B.E and Pinheiro A.E, (1993). Efficiency Analysis of Developing Country Agriculture: A Review of the Stochastic Frontier Function Literature. ARER April 1993, pp 88-109.
17. Coelli T., Prasada R. and Battese G. (1998). An Introduction to Efficiency and Productivity Analysis. Boston, Kluwer Academic Press.
18. Coelli T. and Battese G. (1996). Identification of Factors which Influence Technical Inefficiency of Indian Farmers. Australian Journal of Agricultural Economics, 40 (2), 103-128.
19. Danso G.K., Drechel P., Akinbolu S.S. and Gyiele L.A. (2003). Review of Studies and Literature on the Profitability and Sustainability of Urban and Peri-urban Agriculture. FAO Final Report (PR 25314) IWMI, Accra (Mimeo).
20. De zeeuw H. (2004). Introduction to Urban Agriculture. Nairobi Course Leuden, Urban Harvest. RAUF.
21. Del Rosario P.J., Cornelio Y. Jimenez Polanco L., Rusell A., Lopez H. and Escarraman P. (2000). Manajo de Residuos Solidiosy Agricultura Urbana Enla Audad de Santiago de Los Calballeros. Centro de Estudios Urbanos y Regionales, Pontificia Universidad Catolica Madre y Maestra.Santiago de los Caballeros, Dominican Republic.
22. Drakakis-Smith D. (1995). Third world Cities Sustainable Urban Development. Urban studies 32(4-5): 659-677.
23. Drescher A. and Laquinta D.(1999) Urban and Peri-Urban Agriculture. A New Challenge for the UN Food and Agricultural Organisation (FAO) Internal Report, Rome.
24. Eqziabher D., Lee-Smith D.G., Maxwell P.A., Memon L.T.A., Mougeot and Sawio C.J. (1994). Cities Feeding People: An Examination of Urban Agriculture in East Africa International Development Research Centre, Ottawa, Canada.
25. Ezendinma C. and Chukuezi C.(1999). A comparative Analysis of Urban Agriculture Enterprises in Lagos and PortHarcourt, Nigeria. Environment and Urbanization. 11(2) pp 135-144.
26. F.A.O. (2001a). A Briefing Guide for the Successful Implementation of Urban and Peri-Urban Agriculture in Developing Countries and Countries of Transition. Revision 2, Handbook Series. Volume III. Rome.
27. Farrel J.M (1957). The Measurement of Productive Efficiency. Journal Royal Stats, 111: 253-290
28. Farrel, M.J. (1957) "The Measurement of Productive Efficiency" Journal of the Royal Statistical Society Series A 120, pp 253-281.

29. Fialor S. (2002). Profitability and Sustainability of Urban and Peri-Urban Agriculture (UPA) in Kumasi. FAO/IBSRAM (IWMI) DAEFM-KNUST Project (PR 17951). Submitted to FAO via IWMI. Ghana pp33.
30. Gerstl S.(2001). The Economic Costs and Impacts of Home Gardening in Ouagadougou, Burkina faso. Inaugural Dissertation zur Erlangurg der Wuerde eine Doktorin der philophie, vorgelegt der philosophisch Naturwissenchftlichen, fakultat der universitaet Bassel. Bassel, Swizerland pp 424.
31. Gestl S., Cisse G. and Tanner M. (2002). Economic Impact of Urban Agriculture on Home Gardeners in Ouagadougou. Urban Agriculture Magazine. No 7. August 2002. Economics of Urban Agriculture. Leusden, RAUF.
32. Gockwski J. , Nelly N., Soua Mboo, Elong P. and David O.(2004). Livelihood Study of Urban Agriculturalists in Yaounde Inc. Nolte ed. Urban Harvest Pilot site Younde Final Report 23.
33. IFPRI (1996). International Food Policy Research Institute. Urbanization and Agriculture in the Year 2020, News and Views, April.
34. International Water Management Institute (2007), Recognizing Informal Irrigation in Urban and peri-Urban West Africa.
35. Kessler A. (2002b). Economic Strategies of Different Plant Production Farming Systems of Urban and Peri-Urban Agriculture in West Africa. Urban Agriculture Magazine No 7. August , 2002. Economics of Urban Agriculture. Leusden, the Netherlands, RUAF.
36. Lagos State Government (2006). THE AUTHENTIC CENSUS: Lagos State Social Security Exercise and Population Figure.
37. Lappe F. and Collins J.(1997). Food First, Beyond the Myth of Scarcity. Boston, Houghton Mufflin.
38. Martins Upton (1996): The Economics of Tropical Farming System.
39. Maxwell D. (1999). Urban Food Security in Sub-Saharan Africa. In M.Koc, R.MacRae, L.J.A. Mougeot andJ.Welsh, eds. For Hunger-proof Cities: Sustainable Urban Food system, pp 26-29. Ottawa, Canada, IDRC.
40. Meeusen W. and Vanden Bioeck (1997): 'Efficiency Estimation from Cobb Douglas Production Function with Composed Error'. International Economics Review. Vol 18, pp 435-444. Milk Marketing Board, United Kingdom.
41. Nkegbe P.K. (2002). Benefit-Costs Analysis of Irrigated Vegetable Production in urBan and Peri-Urban Tamale. University for Development Studies, Tamale, Ghana. (B.Sc Thesis).
42. NPC (2007). Advertorial-National Population Commission: Lagos State claim on the Provisional Result of the 2006 Census is Unfounded. NPC, Feb 8th, 2007.
43. Obwona M. (2000). Determinants of Technical Efficiency among Small and Medium Scale Farmers in Uganda. A Case Study of Tobacco Growers. A Final Report Presented at AERC Bi-annual Workshop at Nairobi, Kenya.
44. Ogundairo K. and Ojo S.O (2005). The Determinants of Technical Efficiency in Mixed-crop Food Production in Nigeria. A Stochastic Parametric Approach. Applied Tropical Agriculture.

45. Ogunjobi, O.P. (1999) "Efficiency of Small Holder Cocoa Farmers in Ondo State: Traditional Agricultural Division in Kwara State of Nigeria, Journal of Rural Economics and Development Vol. 9, No. 2 pp 119-132.
46. Ojo S.O and Ajibefun I.A (2000). Effects of Training on Labour Productivity and Efficiency in Oil Palm Production in Ondo State. Nigeria Journal of Sustainable Agriculture and Environment. 2 pp 275-279.
47. Olayide, S.O. (1980) "Agricultural Technology and Nigeria's Small Farmers" In Nigerian Small Farmers-Problems and Prospects in Integrated Rural Development.
48. Olayide, S.O and E.O Heady (1982) Introduction to Agricultural Production Economics, Ibadan, Ibadan University Press.
49. Paddison R., Findlay A. M and Dawson J. (1990). Retailing in Less-Developed Countries. In Findlay et al (eds).pp 3-15
50. Parikh A., Ali F. and Shah M.K. (1995). Measurement of Economic Efficiency in Pakistani Agriculture. American Journal of Agricultural Economics, 77, pp675-685.
51. Pinstrup-Anderson P.(1994). World Food Trends and Future Food Security, Food Policy Report, International Food Policy Research Institute, Washington.
52. Prain G.(2006). Participatory Technology Development for Sustainable Intensification of Urban Agriculture in R.van Veenhizen, 2006. Cities Farming for the Future: Urban Agriculture for Green and Productive Cities. Leusden, RAUF/IDRC/IIRR
53. Sawio C. (1998). Managing Urban Agriculture in Dares Salam. Cities Feeding People Repot. Ottawa, Canada, IDRC.
54. Seyoum E.T., Battese G.E. and Fleming E.M. (1998). Technical Efficiency and Productivity of Maize Production in Eastern Ethiopia. A Study of Farmers within and outside the Sasakawa- Global 2000 project, Agricultural Economics, 19, 341-348.
55. Tadesse B. and Krishnaworthy S. (1997). Technical Efficiency in Paddy Farms of Tamil Nadu. An Analysis Based Farm Size and Ecological Zone. Agricultural Economics, 16, pp 185-192.
56. Timmer C.P. 91970). On Measuting Technical Efficiency, Food Research Studies. Vol 9, pp 99-171.
57. Udoh E.J. and Akpan B.S. (2007). Measuring Technical Efficiency of Water leaf Production in Akwa Ibom State, Nigeria. American-Eurasian Journal and Environmental Science. 2, pp 518-522.
58. UN-Habitat (2001). The Global Report on Human Settlements: Cities in a Globalizing World.
59. UN-Habitat (UN centre for Human Settlements) 1996. An Urbanizing World. Oxford University Press, Oxford.
60. Upton, M (1973) Farm Management in Africa: The Principles of Production Planning: Oxford University Press, London.
61. Walton J. and Seddon D.(1994). Free Markets and Food Riots. Blackwell, Oxford. World Bank (1995). World Development Reports ,1995. Oxford University Press, oxford.