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Full Length Research Paper

Analysis of technical efficiency of artisanal fishery enterprises in Ijebu waterside of Ogun State, Nigeria

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This study was carried out to analyze the technical efficiency of artisanal fisheries in Ijebu waterside of Ogun State, Nigeria. The objective was to analyze the socio-economic characteristics of the fisherfolks; estimate the technical efficiencies of artisanal fisherfolks and determine the factors influencing the technical efficiencies of artisanal fisheries in the study area. A multistage sampling technique was used to select a total of 400 fishers from the study area. Primary data were collected using structured questionnaire as interview guide, on the socio-economic characteristics, production inputs and output prices. Stochastic production frontier model was used to estimate the technical efficiencies of artisanal fishery system and the factors influencing the technical efficiencies of the fishers. The study revealed that majority of the fishers was still in their active age and fairly educated. The results of the maximum likelihood estimates of the parameters for the technical efficiency of the fisherfolks revealed that number of fishing gears, outboard engine, litres of kerosene used and quantity of bait used were found to be significant variables in the fish catch level. The inefficiency function of the sampled fisherfolks revealed that age of the fisherfolks, household size, gender and mode of operation were found to be significant factors determining the level of efficiency with a mean technical efficiency of 0.77. The study concluded that age, experience, household size, distance to the fishing ground and the mode of technology adopted were the significant variables influencing the level of technical efficiency of the fisherfolks in the study area.

Key words: Artisanal fisheries, socio-economic characteristics, technical efficiency.

BACKGROUND TO THE STUDY

Fishery is an important sub-sector in the economic development of many developed and developing countries. About 40 million people are employed directly in the fishery sub-sectors of artisanal (small-scale) fishing, fish farming, processing, preservation and marketing worldwide (Ajao et al., 2004). Fish is a source of high-quality protein that can be produced more cheaply than any other animal protein for human consumption. It is also medically recommended for pregnant women, children and adults because of its high-level protein, digestibility and lack of cholesterols, preventive recipe for heart attack or failure and stroke (Ajao et al., 2006).

The government in Nigeria has recognized the relevance of the fisheries sub-sector, which is composed of the marine, brackish and freshwater. The small scale fishery has come to become a permanent feature in the fisheries of developing countries including Nigeria. Nigeria is a country with a large population of artisanal fishermen of over 264,557 fisherfolks earning their living by operating the coastal non trawling zone of five nautical miles from the nation's coastline (FDF, 1995).

Fishing is one of the oldest livelihood income-generating activities of man since the world was created (Christopher et al., 2003). The history of fishing industry in dates back to the pre-colonial era where basically small-scale fishing (artisanal) has been a major source Nigeria of food for the inhabitants of coastal and riverine areas. It also provides employment and economic benefit

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to those engaged in artisanal fishery activity. Artisanal fisheries utilize open access resources in which the only human intervention is the harvesting of fish stocks (Ajenifuya, 1998).

FAO (2005) has identified and opined that Nigeria is one of the countries in the region with great potentials to attain sustainable fish production since the country is blessed with about 960 km of coastline comprising lagoons, estuaries, wetland and series of interconnecting creeks.

The fishery sector accounts for about two percent of GDP, forty percent of the animal protein intake in the rural areas and remain a principal source of livelihood for over three million people in Nigeria. Thus, the challenge to increase the efficiency in fish production in Nigeria appears to be more than ever. However, the slow pace of the agricultural sector (for example, fishery subsector of agriculture) cannot sustain the ever increasing population estimated to be 140 million (2006 Population Census) in which low level of efficiency and capital investment have been implicated (Kareem et al., 2008).

The inflationary trend in the nation‟s economy has resulted in the inability of the populace to afford animal protein. The importation of beef and chicken which provided the bulk of protein in Nigeria diets is now being restricted by government necessitating the search for other local protein sources thereby making the demand for fish to increase (Tobor, 1994).

The need for balance diet in any economy is apparent and cannot be over-emphasized. Also, the success of any nation‟s development programme is dependent on its human resources which must be provided with adequate diet in order to function efficiently. The major foods in Nigeria are largely deficient in protein such that a high proportion of people feed on food richer in carbohydrate (for example, rice, millet, yam, etc.) than protein (Tobor, 1994).

Efficiency refers to the relationship between all outputs and inputs in a production process (Rodríguez Díaz et al., 2004). The performance of a farm can be evaluated based on different efficiency measures, namely technical, allocative and economic efficiency. More specifically, the measures that originate from the seminal work on technical efficiency by Farell (1957), where technical efficiency is defined as the ability of a farm to produce the maximum feasible output from a given bundle of inputs, or to use minimum feasible amounts of inputs to produce a given level of output. These two definitions of technical efficiency lead to what is respectively known as the „output-oriented‟ and the „input-oriented‟ efficiency measures (Coelli et al., 2002; Dhungana et al., 2004; Rodríguez Diaz et al., 2004). Input-oriented models were chosen in this study to reflect the reality where the main aim is not to increase production but to use different resources more efficiently (Rodríguez Diaz et al., 2004).

Technical efficiency itself can be further decomposed into two components: scale efficiency and pure technical efficiency. The former relates to the most efficient scale of operation in the sense of maximizing average productivity. Pure technical efficiency, however, is obtained when separating the scale effect from the technical efficiency (Fare et al., 1994).

For calculating the efficiency of an individual input, sub-vector efficiency measures are introduced, in order to generate technical efficiency measures for a subset of inputs rather than for the entire vector of inputs. The concept looks at the possible reduction in a subset of inputs, holding all other inputs and output constant (Oude-Lansink et al., 2002, 2004; Oude-Lansink and Silva, 2003; Fare et al., 1994).

According to Farrel (1957), efficiency implies an efficient utilization of resources in the production process. However, resource productivity is definable in terms of individual resource inputs or in terms of a combination of them. For instance, labour productivity is defined as the ratio of total output to labour inputs. Similarly, with respect to land, capital, water and management productivities can each be defined as the ratio of total output to inputs of land, capital, water and management respectively. Furthermore, his definition of efficiency is couched on three related terms. Firstly, he defines technical efficiency as the measure of firms‟ success in producing maximum output from a given sets of inputs. Secondly, he defines „price efficiency‟ as the measure of a firm‟s success in choosing an optimal set of inputs. This is an indication of the gains that can be obtained by varying the input ratios on certain assumptions about the future price structure. Thirdly, he defines „overall efficiency‟ as the simple product of the technical and price efficiencies.

Knowledge of the efficiency level at both the firm and fleet level and its determinant factors are valuable information for understanding the problems of fisheries subsector of agriculture. Technical efficiency can be measured by different techniques (Färe et al., 1994), but given the stochastic nature of fishing, the stochastic frontier approach has so far been advocated in the literature (Kirkley et al., 1995).

Despite the numerous benefits of fish to human beings and its importance in the society, the contribution to the Gross Domestic product is yet to materialize. This means that the sustainability of fishery system may not be fully achieved due to lack of technical know-how.

Nigeria was estimated to have reached a fish supply deficit of about 2.5 million tonnes in the early 1980s. From 1982, it was projected that the deficit would increase to about 3 million tonnes by year 2007. By 2011, the deficit is no doubt raised above 3 million tonnes. As a measure to bridge the wide gap between domestic fish demand and its domestic fish supply, a number of industrial fisheries companies promoted fish importation as one of the ways to solve the problem. However, this importation of fish has caused a considerable drain on Nigeria‟s foreign reserve (Tobor, 1994).

Also, despite the rapid development and widespread use of stochastic frontier approaches in assessing efficiency in many industries, such studies on artisanal fisheries are scanty in the study area and Nigeria in general. Thus, implying that, there is inadequate empirical information on the technical efficiency of artisanal fishery in the study area which is expected to serve as knowledge base for expanding output of fishery enterprise as a way of increasing local fish production in the state and the country in general.

The main objective of the study is therefore to analyze the technical efficiency of artisanal (capture) fishery enterprises in Ijebu waterside of Ogun State, Nigeria. The specific objectives are to: analyze the socio-economic characteristics of the artisanal fisherfolks in the study area, estimate the technical efficiency of artisanal fisherfolks, and proffer possible recommendations with a view to increasing the level of productivity and efficiency in artisanal fisheries business.

DATA AND RESEARCH METHODOLOGY

A multistage sampling technique was used to select a total of 400 fishers from the study area. Primary data were collected using structured questionnaire as interview guide, on the socio-economic characteristics, production inputs and output prices. Stochastic production frontier model was used to estimate the technical efficiency of artisanal fishery system and the factors influencing the technical efficiency of the fishers.

Empirical model specification for the study

In this study, the Cobb-Douglas functional form was chosen because of the ease it provides in computation and interpretation. Furthermore, the large number of explanatory variables makes it near impossible to estimate a more flexible functional form such as the translog functional form. This study adopted this approach and estimated the stochastic frontier production and the inefficiency model in one step using the Frontier 4.1 software. Stochastic frontier analysis was used to estimate the technical efficiencies of artisanal fishermen from the production inputs as indicated in the model specification of equation (2).

Therefore, the stochastic frontier catch function for artisanal fisherfolks in the study area is implicitly specified by:

$$Q = f(LNX_i; \psi_i) \exp^{(vi-ui)} \quad (1)$$

Equation 1 is thus linearised as stated:

$$LNCL = \psi_o + \psi_1 LNFSGR + \psi_2 LNVESSEL + \psi_3 LNGRTHP + \psi_4 LNCREW + \psi_5 LNFUEL + \psi_6 LNKERO + \psi_7 LNOIL + \psi_8 LNBAIT + \psi_9 LNFOOD + \psi_{10} LNBATRY + \psi_{11} LNMISC + v_i - \mu_I \quad (2)$$

where, CL = catch level (or fish catch) in kg; FSGR = length of fishing gear in meters; VESSEL= size of vessel/canoe in meters; GRTHP = capacity of outboard engine (Horse power); CREW = number of crew/skippers per canoe per fishing trip; FUEL = fuel (petrol) in litres; KERO = kerosene used in litres; OIL = amount of oil used in the fish expedition; BAIT = number of baits used in the fish expedition; FOOD = kilogram of food used in the fish expedition; BATRY = number of battery used for torch-light during the fish expedition; MISC = number of miscellaneous items which include plastic container, hand paddler, etc.; ψ_o = constant terms; LN = natural logarithm; v_i and u_i are as earlier defined.

A priori expectation

The variables included in the model include catch level in kg, length of fishing gears in meters, vessel size in meters, capacity of outboard engine (Horse power), number of crews, amount of fuel consumed in litres, number of non-fishing activities, access to credit and miscellaneous in quantity. These variables were postulated to influence catch per unit effort (CPUE) (Akanni and Akinwunmi, 2007).

RESULTS AND DISCUSSION

Socio-demographic characteristics of sampled fisherfolks

The results of the socio-economic characteristics of the fisherfolks interviewed in the study area are as presented in Tables 1, 2 and 3. The socio-demographic characteristics include: age, gender, marital status, household size, educational attainment, membership of social organizations, fishing involvement, years of experience, method of introduction, and the identification of the most serious problems.

The distribution of the fisherfolks by age shows that most (52.5%) are within the age range of 41-50 years. The mean age of the fisherfolks was found to be 47.3±7.06 years. The mean age result shows that most of the fisherfolks are still within the active work range.

The distribution of the respondents by gender (sex) shows that majority (99 percent) were males. This shows the dominance of males in artisanal fisheries enterprise of the study area. The marital status results also showed that majority of the fisherfolks are married with 98.5%. This result implies that more family labour would be available for the fishing activities. The results of the household size revealed that majority of the respondents are within the household range of 5-6 persons. The mean household size and standard deviation was 5.3±1.07 while the modal size was 8 persons. These results have direct implication with respect to majority of the respon-

Table 1. Socio-demographic characteristics of the sampled fisherfolks in the study area.

Socio-demographic characteristics	No. of Fishers	Percentage	Mean	Min.	Max.	Standard deviation
Age						
31-40	84	21.0				
41-50	210	52.5	47.3	32	62	7.06
51-60	102	25.5				
61-70	4	1.0				
Gender						
Male	396	99.0	NA	NA	NA	NA
Female	4	1.0				
Marital status						
Single	6	1.5	NA	NA	NA	NA
Married	394	98.5				
Household Size						
3-4	95	23.8				
5-6	245	61.2	5.3	3	8	1.07
7- 8	60	15.0				
Educational attainment						
No formal education	29	7.2	NA	NA	NA	NA
Primary school education	162	40.5				
Secondary School	190	47.5				
OND/NCE	19	4.8				

Source: Data Analysis (2010).

Table 2. Socio-demographic characteristics of the sampled fisherfolks in the study area.

Socio-economic characteristics	No. of Fishers	Percentage	Mean	Min.	Max.	Standard deviation
Membership of social organization						
Cooperative society	44	11.0	NA	NA	NA	NA
Community social club	24	6.0				
Non-membership	332	83.0				
Fishing involvement						
Full-time	377	94.2	NA	NA	NA	NA
Part-time	23	5.8				
Experience (years)						
1 – 10	18	4.5				
11 – 20	142	35.5				
21 – 30	214	53.5	23.8	10	42	7.05
31 – 40	23	5.8				
41- 50	3	0.8				
Method of introduction						
Inheritance	355	888	NA	NA	NA	NA
Friends	45	11.2				

Source: Data Analysis (2010).

Table 3. Catch characteristics of an average fisherfolk in the study area.

Socio-demographic characteristics	Frequency	Percentage	Mean	Min.	Max.	Standard deviation
Categorization of Catches per year (kg/yr)						
19000 – 39000	171	42.8				
39001 – 59000	96	24.0				
59001 – 79000	107	26.8	5.1320E4	19200	1.28E5	21278.58
79001 – 99000	15	3.8				
119001 – 139000	11	2.8				
Type of technology used						
Manually propelled	180	45	NA	NA	NA	NA
Motorized	220	55				
Number of trips (per week)						
3- 4	33	8.2				
4- 5	367	91.8	4.09	3	5	0.749
Size of Boat (m^2)						
5 – 6	194	48.5	6.87	5	10	1.148
7 – 8	189	47.2				
9 - 10	17	4.2				
Numbers of crew						
1	140	35.0				
2	256	64.0	1.66	1	3	0.495
3	4	1.0				
Family involvement in fishing						
Yes	385	96.2	NA	NA	NA	NA
No	15	3.8				
How catches are sold						
Landing site and local market	304	76.0	NA	NA	NA	NA
Local market	96	24.0				
How prices are determined						
Fisherfolks	25	6.2	NA	NA	NA	NA
Customers Haggling/ bargain	375	93.8				
Most ranked serious problems						
Lack of capital	226	56.5	NA	NA	NA	NA
Lack of preservation equipment	78	19.5				
Lack of credit facilities	29	7.2				
High cost of fishing inputs	26	6.5				
Infrastructure (electricity, portable Water etc.)	24	6.0				
Environmental (water hyacinth)	17	4.2				

Source: Data analysis (2010).

dents being married with 98.5%.

Education plays a significant role in skill acquisition and knowledge transfer. It enhances technology adoption as well as the ability to plan and take risks. The distributions of the educational attainment of the respondents show that most of the fisherfolks had secondary education as the highest educational attainment with 47.5%.

Table 2 results showed that most of the respondents (83%) do not belong to any cooperative society. This probably implies that the fishing business does not allow for too much social interactions. The results also revealed that majority of the respondents (94%) engaged in fishing business on a full time basis and that fisherfolks have the tendency to read and write and adopt any new technology as a result of their average level of educational attainment (that is, secondary school level). This result agrees with that of Akanni and Akinwunmi (2007) who asserted that educated fisherfolks have greater likelihood to understand the working mechanism of the motorized engines and therefore should be able to use it more than the illiterate class of fisherfolks.

Table 2 also shows the number of years the respondents have started fishing business. Majority (about 53%) started fishing business between 21-30 years, followed by 11-20 years and the least being 41-50 years. The mean years of experience and the standard deviation was 23.8 ± 7.05 and the modal years of experience was 42 years. The result implies that the fishers are experienced. Hence, it would enhance the catch per unit effort of the fisherfolks and invariably productivity in output (catches). Akanni (2008), Cheung et al. (2007) and Parity (2006) also asserted in their findings that as the fishermen gathered more experience over time, their efficiency increases and therefore fish catch level also increases.

Majority (88.8%) of the respondents accepted that they got the idea of fishing through inheritance (that is, parents involvement in fishing activities) while others (11.2%) got the knowledge through friends persuasion. This implies that majority started right from childhood (Table 2). This result also corroborates the mean years of experience (42 years) of fishers in fishing business.

Catch characteristics of the sampled fisherfolks

The distribution of respondents by the quantity of catches per year as indicated in Table 3 shows that majority catch different fish species ranging between 19000 and 39000 kg per year with an average of 5.1320E4. This implies that fishing business is profitable as the fisherfolks operate an open access fishing (that is, absence of limitation to fishing activity) system.

Table 3 also shows the type of technology being used in the study area. It revealed that 55% of the fisherfolks made use of the motorized technology (outboard engine) while about 45% used manually propelled technologies (paddled type). This result shows an improvement in the use of technology in Ogun State, compared to the findings of Adeokun et al. (2006) who found out that 71% of the fisherfolks used unmotorized hand operated canoes (manually propelled technology). However, Table 3 also shows that majority (91.8%) of the respondents engaged in fishing expedition (number of trips) between 4 and 5 times a week with an average and standard deviation of 4.09 ± 0.749. This result might have contributed to the quantity of fish catch accruable to fishers per year which eventually lead to high income.

The distribution of the sizes of different vessels being used in the fishing communities (Table 3) shows that about half of the respondents (48.5%) used between 5-6 m^2 length canoe, followed by 7-8 m^2 length with 47.2%, and the least being between 9-10 m^2 length with 4.2%. The mean size of canoe and standard deviation is 6.87 ± 1.15 (m^2). The results of the mean size of canoe clearly depict the subsistence nature of the artisanal fishery system in the study area. The table also revealed that majority (64%) of the respondents goes for fishing expedition with at least 2 crew members. The average standard deviation for crew members was 1.66 ± 0.495. More so, majority (96.2%) involved their family members in fishing activities. This result might be due to their large household size as stated earlier (that is, 5-6 persons per household).

Most of the respondents (76%) often sell their catches at landing site and local market while others (24%) sell at local market only. Price of fish species are determined through customers haggling (that is, 93.8% by bargaining power), while about 6.2% of fishers only determined the prices of their fish species. More so, the most serious problem limiting the operation of the fisherfolks had been attributed to lack of capital to buy a high capacity outboard engine, fishing gear, and the purchase of bigger size of dug-out canoes.

Distribution of respondents by tribe in each village of the study area

Figure 1 shows the distribution of different tribes of the fisherfolks among the villages in the study area. The results show that there are more of Ilaje tribe in Igbosere, Olosumeta, JK Camp, Bolorunduro, Aba-Gold, Aba-Olori respectively. However, there are more of Ijebu tribe in Igbeki, Ilete, Oke-Oso, Ije-gbe, Oka, Isekun, Enuwaya, Akede, Mosafejo respectively while Ghanian tribe are not much pronounced in almost all the villages. This result shows the proportion of the Ijebu tribe in the study area. This might not be unconnected to the fact that the study area is mostly the riverine area of the state which is Ijebu water side. This is also depicted in Figure 1.

Table 4 also shows the estimated technical efficiency model and inefficiency function of the sample fisherfolks. The results showed education, age, number of trips, gender and mode of operations to be positive while years of experience, household size and gender were found to be negative. A negative sign means that the variable increases efficiency while positive coefficient means a decrease in efficiency level. The negative coefficient of the years of experience for instance has influence on catch efficiency. This implies that with increase in the number of years in fishing, the fisherfolks tend to be more efficient. This agrees with the findings of Ajibefun and Daramola (1999). It should be noted that the signs of the coefficients in the inefficiency model are interpreted in the opposite way. However, age, household size, distance,

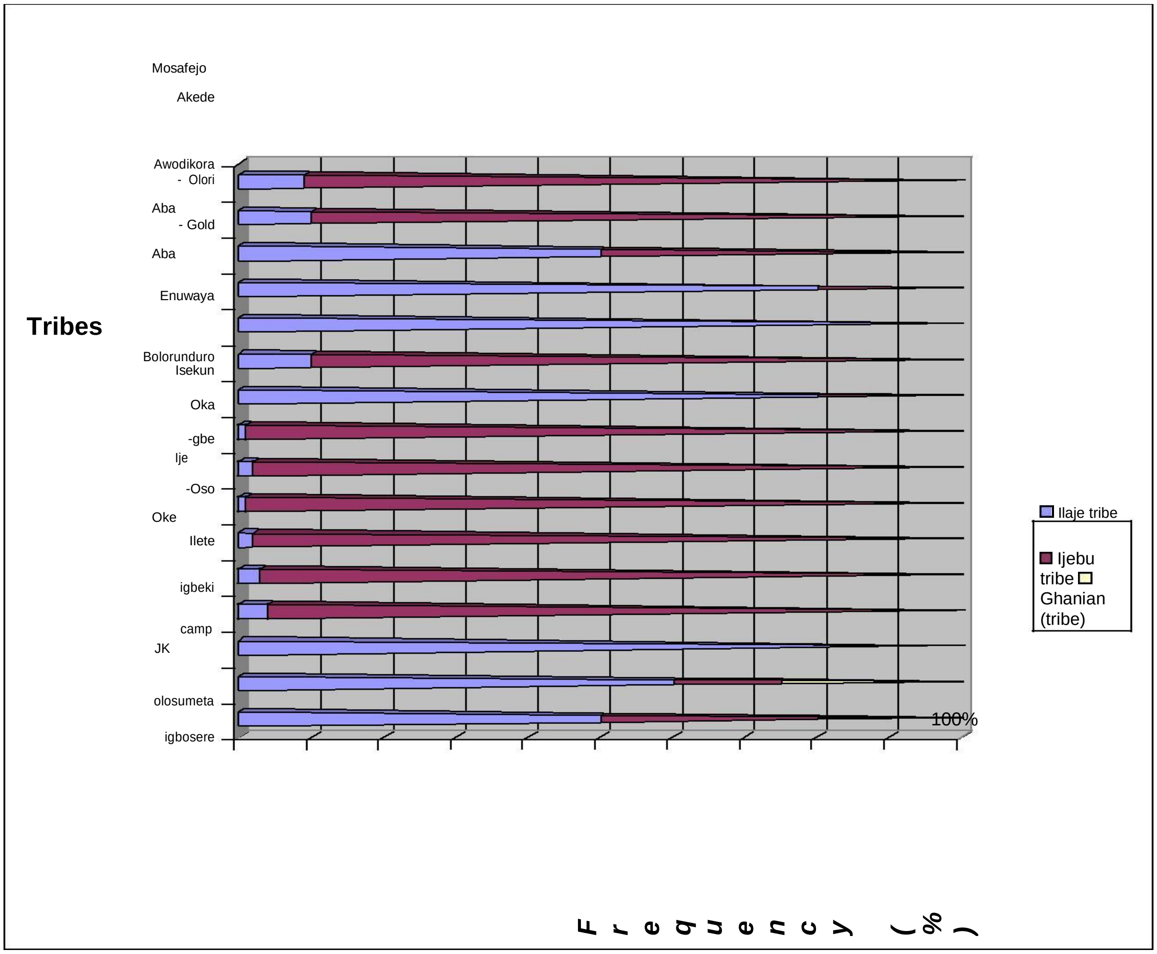

Figure 4. Distribution of respondents by tribe in each village of the study area. Source: Data analysis (2010).

gender, and mode of operation were found to be significant determinants of the level of efficiency of the fisherfolks.

As revealed in Table 4, sigma squared (σ^2) of 0.97 is significant at 10% probability level. This however implies a wide variation in the level of technical efficiency. More so, it shows the correctness of the specified distribution assumption of the composite error term. The gamma (γ) value of 0.99 shows the amount of variation resulting from the technical inefficiencies of the fisherfolks. This also suggest that the technical efficiency are significant in the model and that the specified model better fits the data than the deterministic or average production function model. This however supports the finding of Rahji and Omotesho (2006).

The log likelihood function is often used to determine the differences between the restricted and unrestricted models while the likelihood ratio (LR) test is used to determine the goodness of the model using the table of Kodde and Palm (1986). However, the value shows the rejection of the null hypothesis (H_0:β_1=$\beta_{2...}\beta_{11}$ = 0 and H_0:= δ_1 = $\delta_{2....}\delta_9$ =0) and the acceptance of the alternative hypothesis, which specifies the significance of the variables as a determinant of the efficiency level in the study area.

The mean technical efficiency (TE) is estimated to be 0.77, indicating that the realized output could be increased by about 23% by adopting the practices of the best fisherfolks.

SUMMARY OF FINDINGS

The major findings of this study include:

(i) Majority of the respondents were between the age range of 41 to 50 years with a mean age of 47 years. High proportions of the fisherfolks were males that are married having household size ranging between 5 and 6 persons but fairly educated.

(ii) Majority of the respondents does not socialize; they mostly engage in fishing business on a fulltime level. Majority had between 21 and 30 years of experience in

Table 4. Estimated catch efficiency model and inefficiency function of the sampled fisherfolks.

Variable	ML Estimation
Catch function	
Intercept	7.014(7.242)*
Ln Gear	0.108(3.08)*
Ln Vessel	0.068(0.664)
Ln Engine	0.187 (3.74)*
Ln Crew	0.083(0.980)
Ln Fuel	-0.002(-0.146)
Ln Kero	-0.039(-1.2)
Ln Oil	0.005(0.656)
Ln Bait	-0.074(-1.226)
Ln Food	0.072 (0.772)
Ln Battery	1.052 (3.807)*
Ln Miscellaneous	-0.046(-0.597)
Inefficiency function	
Intercept	1.202(-1.895)*
Ln Edu	0.007(0.303)
Ln Age	0.678(4.307)*
Ln Exp	-0.041(-0.622)
Ln Trip	0.037 (0.368)
Ln Hhsize	-0.434(-4.304)*
Ln Dst	-0.172(-1.498)**
Ln Gender	0.057(0.155)
Ln Credit	0.629(3.558)*
Ln Mo	0.071(-1.112)
Diagnosis statistics	
Sigma square ($\sigma^2_s = \sigma^2_u + \sigma^2_v$)	0.078 (11.204)
Gamma $\gamma = \sigma^2_u/\sigma^2_s$	0.011(0.316)
Log Likelihood function	-64.853
LR Test	89.727
Number of observations	400
Average TE	0.77

Source: Data analysis (2010). * significant at 5-percent probability level; ** significant at 10-percent probability level. Values in parentheses are t-statistics; N.B: (P<0.01=2.58; P<0.05=1.64; P<0.10= 1.28).

fishing business with a mean age of 23.8 years. The respondents accepted that they got the idea of fishing business through inheritance.

(iii) The study revealed that fisherfolks had fish catch ranging between 19000 and 39000 kg/year. Motorized technology was more prominent in use among the fisherfolks. High proportion of the respondents used canoes (boat) length ranging between 5 and 6 m^2 with an average of 6.87 m^2. Results showed that majority went on fishing expedition with about two crew members, with high proportion involving their family members in fishing activities.

(iv) Majority sell catches at landing site and local market. High proportions of the fisherfolks determined the price of fish species per kilogram through customers" haggling. It was also discovered that the most serious ranked limiting problem in the operations of the fishers was lack of capital to buy a high capacity outboard engine, fishing gear and bigger canoes.

(v) The results of the maximum likelihood estimates of the parameters in the Cobb-Douglas production function for the catch efficiency of the sampled fisherfolks revealed that number of fishing gears, outboard engine, litres of kerosene used, quantity of bait and battery were found to be significant variables in the fish output determining technical efficiency.

(vi) The inefficiency function revealed that age of the fisherfolks, household size, gender and mode of operations were found to be significant factors determining the level of technical efficiency of fishers with the mean TE of 0.77.

CONCLUSION AND RECOMMENDATIONS

This study concluded that there was an observed inefficiency among the fishers in the study area. The possibility of increasing fish output by an average of 23% can be achieved in the short run by adopting the practices of the best fishers.

The findings from this study have policy implication as it will assist the government in the overall socio-economic development of the artisanal fisherfolks in the state and the country in general. The Nigerian government should therefore subsidize the cost of fishing gear and other significant inputs in the model, especially the outboard engine that enhances catch per unit effort of the fishers. The Nigerian government should continually enhance the giving of technical advice to fishers on how best to use the various fishing technologies especially the outboard engine that is significant with a view to improving the inefficiency observed among the fisherfolks in the study area.

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