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SOCIO- ECONOMIC ANALYSIS OF CATFISH FARMING IN UVWIE LOCAL GOVERNMENT AREA, OF DELTA STATE, NIGERIA

***[1]AKARUE .O. Blessing & AREGBOR O. Emily**
[1]Department of Agricultural Science Education,
College of Education, Warri Delta State, Nigeria
[2] Edjeba town Warri Delta State
****E-mail of corresponding author: blessingakarue4edu@ gmail.com***
Mobile: 08036690792, 08121407476

ABSTRACT
The study was on the socio-economic analysis of Fish farmers in Uvwie south Local Government area of Delta State, Nigeria. The study described the socio-economic characteristics of the farmers, determined the profitability of the fish farmers, constraint of fish farming, and the factors affecting fish production. A two multistage random sampling technique was used to draw samples of 90 farmers for the study as follows: Stage one involved the purposively selecting Ekpan fish farm settlement from the three in the study areas. The next stage was the random selection of 100 fish catfish farmers for the study. Data for the study were collected from primary sources using a set of structured questionnaire, a total of 87 questionnaires were returned and found useful for the analysis. The data obtained were analysed using descriptive statistics, gross margin, and multiple regressions. The result showed that majority of farmers accounting for 50.57 percent were male while majority of the respondents representing 40percent had secondary school education. The result also showed that 83.91 percent of them had spent between 1 and 5 years in fish farming. The profitability analysis showed a gross margin per farmer ₦ 43,106,380.00 naira with BCR =1.75, ESR=0.11, POR=0.75 and GR=0.57.In determining the factors affecting fish farming, education and labour were significant at 5% while pond size and farm size were significant at 1% High cost of transport, lack of finance, price fluctuation, high cost of storage etc were major problems encountered by the farmers. These problems if addressed will go a long way to improve fish farming.
K**eywords:** Fish farming, gross margin, multiple regression, Uvwie, constraint Delta state

INTRODUCTION
Fish is a vital source of food for people. It is man's most important single source of high-quality protein, providing 10 of animal protein consumed by the world's population (FAO, 1997). It is a particularly important protein source in regions where livestock is relatively scarce.
FAO (2000) states that fish supplies less than 10 percent of animal protein consumed in North America and Europe, 26 percent in Asia, 22 percent in China and 17 percent in Africa while in Nigeria it is estimated to be 40 percent (1994).

According to FAO (2003) Fish plays a vital role in feeding the world's population and contributing significantly to the dietary protein intake of hundreds of millions of the populace on a global scale. Almost 16 percent of total average intake of animal protein was attributed to fish in 1998.Corroborating position In developing countries, fish is a highly acceptable food that supplies as much as 40 percent of all animal protein availability of the countries where fish is the main source of animal protein.(Ele 2013)

The growth of a country's population is usually accompanied by increases in the demands for the basic necessities of life including water, food and shelter. This is the case with the unrestricted increase in the demand for protein rich food items of animals origin especially (FAO) The Food and Agriculture Organisation (1999), recommended that an individual takes 55 grams per capuit of animal protein per day for sustainable growth and development. However, the animal protein consumption in Nigeria is less than 8 gram per person per day, which is a far cry from the FAO minimum recommendation (Niang and Jubrin, 2001). The major animal protein source in the country include cattle, goat, sheep, poultry and fish. Out of these sources, fish and fish products provide more than 60 percent of the total protein intakes in adults especially in rural areas (Adekoya, 2004). Therefore, the importance of the fishing industry to the sustainability of animal protein supply in the country cannot be over-emphasized.

Also, aside from being consumed by man, its products serve as a source of protein role medically as it replenishes the body with vitamins A and D, calcium, phosphorus and lysine, sulphur and amino acids. With the attendant benefit of fish consumption, its production becomes a cause for concern, as most of the fishes available for consumption in circulation in the country are gotten from artisanal (small scale) fishery. The artisanal sector is however characterized by subsistence fishing, remoteness and difficult to access outdated and out modeled fishing gears and grafts. Hence, the need for a better and more convenient method of production is highly encourage.

Therefore, to help overcome these problems and meet the ever increasing demand for fish, the art of fish farming has evolved and has expanded rapidly and is now the fastest food producing industry in the world. FAO (2000) estimate that by 2030, over half of the fishes consumed by the world's people will be produced by fish farming as presently 40 percent of the world fish production is gotten from this source. FAO (1998) states that fish farming could actually cover the gap between supply and demand. Hence a critical and in-depth look into the economics of fish farming particularly catfish is necessary and timely. It has been asserted by Adederan (2002) and Ugwumba (2005) that the only way of boosting fish production and thereby move the country towards self-sufficiency in fish production is by embarking on fish farming especially cat fish farming. This has prompted the Federal Government of Nigeria to package the presidential initiative on fisheries and aquaculture development in 2003 to provide financial and technical assistance to government programmes and projects encourage fish production.

Regardless these effort of government, fish production has remained low in the country as well as in Delta State. This has been attributed to inadequate supplies from local catfish farmers due to the use of poor quality cat fish seeds, inadequate information, poor infrastructural facilities and low capital investment (Ugwumba et al, 2006; Adeagwu, 2007; Ugwumba and Ninabuife, 2008). Greater improvement in cat fish production can be achieved with a proper analysis that will lead to knowledge of the level of profitability of catfish farming and constraints to production which constitute the basis for the study.

Statement of Problem

Inspite of the increasing growth being witnessed by other source of animal protein such as livestock and poultry, the problem of protein deficiency has continued unbolted in Nigeria. Therefore there is need to explore aquaculture as a means of curbing this menace. It has been reported that the only alternative way of boosting fish production and moving the country towards self sufficiency in fish production is by embarking on fish farming especially catfish farming (Eyo, Falayi and Adelawo, 2003). This is very

important because of the dwindling supply of fish from capture fisheries, which supplies about 85 to 90 percent of total fish output in the country (Areola, 2002 and FAO, 2007).

Also, the low level of fish production is due to although resource use constraints such as feed supply, low managerial know-how, low capital have retarded the pace of development in the fish farming sub-sector . Ugwumba et al (2006), Adeogun (2007). A great deal of opportunity still abounds in small scale fish farming business.

Past record indicates that catfish production can assist poor resource, small scale farmers (Emokoro and Erahabor, 2006) who contributed more than 90 percent of agricultural output in Nigeria in particular (FMAWR, 2008) and sub Sahara Africa in general (Spencer, 2002) to rise beyond the level of subsistence to higher level of profitability through more efficient use of their production resources.

It is against this background that the study will embark upon with a view of providing answers to the following research questions. Is catfish production in the study area profitable? Are resource employed in catfish production efficiently utilized? What factors determine revenue in catfish production? Are there constraints associated with catfish production that could be faced by practicing perspective catfish farmer?

Objective of the Study

The main objective of the study is to determine the socio- economic analysis of catfish production in Ekpan, Uvwie Local Government Area of Delta State.

The specific objectives are:

1. To examine the socio-economic characteristics of catfish producers in the study area.
2. To establish the economic status (profitability) of catfish production in the study area.
3. To identify constraints to catfish production.
4. To determine the factors that affects the catfish production.

RESEARCH METHODOLOGY

This study was conducted in Effurun and its environs in Uvwie Local Government Area of Delta State, Nigeria..Ekpan farm settlement was purposively selected because it was the first fish pond settlement an the biggest. The area falls into the tropical rainforest and mangrove forest with high humidity and it lies along the coastline of Delta State. The rainy season is between April and October and dry season is between November and March. The topography reveals at fairly level areas with some of the areas highly water logged. The vegetation and rainfall pattern favours the growth of crops like cassava, maize, okra, vegetables with other activities like fishing and poultry farming. Apart from farming, the inhabitants also engaged in other occupations like trading and commerce.

A two multistage random sampling technique was used to draw samples of 90 farmers for the study as follows: Stage one involved the purposively selecting Ekpan fish farm settlement from the three in the study areas. The next stage was the random selection of 100 fish catfish farmers for the study. Data for the study were collected from primary sources using a set of structured questionnaire or interview schedule. In all, 100 copies of the questionnaire were administered. However, 87 copies of the returned questionnaire were found useful and there after utilized to collate data for analysis Primary data was obtained between July and August 2011. Data were collected on respondent's socio-economic variables such as age, household size, educational level, fish farming experience, cost of feed, pond types, water supply methods, feeding method, stock size, and farm area. Quantities and unit prices of output and input items were also obtained for the determination of net farm income. Secondary sources of data from Journals and other publications related to fisheries.

Analytical Framework

Data analysis was by means of descriptive statistics including means, frequency distribution, percentages, and parametric statistics of the multiple regression form.

The specific objective and hypothesis of the study was analyzed with descriptive and inferential statistics. The inferential statistics include gross margin analyses, regression analysis.

The gross margin analysis and profitability ratio were used to examine the cost and returns of fish farming in the study area while production function was employed to determine the productivity of the farm.

The following analysis was adopted from Dejunji, Adesina and Ezekiel (2007) but with a little adjustment in regarding the variables.

GM = TR – TVC

Where

GM = Gross Margin (N)

TR = Total Revenue (N)

TVC = Total variable cost (N)

The performance and economic worth of the respondents can be determined by the use of the following profitability ratios.

(i) Benefit cost ratio - BCR = TR/TC

(ii) Expense Structure ratio ESR = FC/VC

(iii) Rate of return POR =NR/TC

(iv) Gross ratio GR = TC/TR

The production function postulated for fish farmers in the study area is shown in the explicit form using three functional forms ;The linear, semi log, Cobb-Douglas, production function were evaluated using ordinary least square method.

The explicit forms of the functional forms were as follows:

Linear function

$$TRN = b_0 + b_1 COF + b_2 LIC + b_3 GEN + b_4 AGE + b_5 EDU + b_6 FAMEXP + b_7 LAB + b_8 FASIZE + b_9 POSIZE + e$$

Semi Log function

$$TRN = b_0 + b_1 \log COF + b_2 \log LIC + b_3 \log GEN + b_4 \log AGE + b_5 \log EDU + b_6 \log FAMEXP + b_7 \log LAB + b_8 \log FASIZE + b_9 \log POSIZE + e$$

Double Log function

$$\log TRN = b_0 + b_1 \log COF + b_2 \log LIC + b_3 \log GEN + b_4 \log AGE + b_5 \log EDU + b_6 \log FAMEXP + b_7 \log LAB + b_8 \log FASIZE + b_9 \log POSIZE + e$$

Where

TRN = Total revenue (N)

COF = Cost of feeds

LIC = Liming cost

GEN = Gender respondent farmer (Dummy 1 = male, 2 = female)

AGE = Age of farmers (years)

EDU = Educational level (years)

FAMEXP =Farming experience in years

LAB = Labour (Mandays)
FASIZE = Farm size (kg of fish raised)
POSIZE = Size of pond (square meter)
bi = parameters to be estimated
e = stochastic error term (error term assume to have a zero mean and constant variance)

RESULTS AND DISCUSSIONS

Socio-economic statistics of the respondents

A summary of the socio-economic statistics of the respondents is shown in Table 1 Based on gender, those who are males are 50.57% while females are 49.43%, indicating that the majority of the respondents were males. This is in agreement with Ele(2008) and Ele at al (2013). Regarding the age of the farmers 21-30 years constituted 28.74%, of the respondents, 31-40years of age represent 45.97%, 41-50 years of age represent 24.14%, 51-60years of age represent 0% and 61- 70 years were 1.15%. The age distribution of majority of the respondents was within the range of 31-40 representing 45.97% of the total respondents.

From the results it shows that based on the marital status. the majority of the respondents were married people which are73.56%.

The non formal education holders were 4.60%,secondary school holders are 45.97%, primary school are 4.6%, NCE/OND are 18.39%, B.Sc./B.Ed./HND are 24.13%, Master are 2.3% and Ph.D. are 0%. The results show that the majority of respondent were secondary school holder constituting 45.97%.

From the above, it shows that based an experience in years, this shows that 1-5 years are 86.21%, 6-10years are 16.09% and 11 above one 1.15%. The result also shows that the majority (86.21%) of the respondents had 1-5years farming experience.

Based on family size, the result indicated that family 1-5persons was 40.23%, while those with 6-10persins was 33.33%, Thus based on the analysis majority of the respondents were family size with 1-5 persons. The result also shows that majority of the farmers were part-time farmers presented by 58.62 percent while those who were full time farmers were 41.38 percent. The table above shows that the distribution of respondent by size of pond, this shows that 8 by 12 of size of pound represent 1.15%, 12 by 50 represent 21.84%, 15 by 50 represent 34.48%, 18 by 30 represent 1.15%, 20 by 30 represent 23%, 30 by 40 represent 2.3% and 60 by 50 represent 1.15%!. The above table shows that the majority of the distribution of respondents by size of pond is 15 by 50 which 34.48% is.

Also from table 1, shows that based on extension service, the people that says yes (that they encounter extension services) represent 36.78% and people that say no represent63.22%. The above table shows that the majority of the respondents are No (that is no extension services).

Also the result on source of working capital indicated that personal saving was represented by 36.78%, this was followed by those who sourced their working capital from loan representing 12.64%, those who source their working capital from family represent 14.94%, those who sourced their working capital from cooperatives was represented by 14.94% and those who sourced their working capital from other sources e.g. osusu accounted for 20.69%. Eighteen and thirty nine percent (18.39%) of the farmers stocked between 800 and 1000 fish per pond, 78.16% stocked between 1001 and 2000 fishes and 3.45% stocked more than 2000 fishes. However result is in consonance with the LSADA(2005) where stocking density is at least 1000 juveniles per square meter and 2 to 3 juveniles per square meter in earthen pond

Table 1. Socio-economic statistics of the respondents

Parameters	Range / Classification	Frequency	Percent (%)	Cumulative percentage
Gender	**Male**	**44**	**50.57**	**50.57**
	Female	43	49.43	100.00
	Total	87	100.00	
Age of respondents	21 – 30	25	28.74	28.74
	31 – 40	40	45.98	74.72
	41 – 50	21	24.14	98,86
	Above 50	01	01.15	100.00
	Total	**87**	**100.00**	
Marital Status	Singled	22	25.29	25.29
	Married	64	73.56	98.85
	Widowed	01	01.15	100.00
	Total	**87**	**100.00**	
Educational	No formal education	04	04.60	04.60
Qualification	Primary education	04	04.60	09.20
	Secondary education	40	45.97	55.17
	Tertiary education	39	44.83	100.00
	Total	**87**	**100.00**	
Farming Experience	1 – 5	73	83.91	83.91
	6 – 10	13	14.94	98.85
	Above	01	01.15	100.00
	Total	**87**	**100.00**	
House hold size	1 – 5	35	40.23	40.23
	6 – 10	29	33.33	73.56
	N/A	23	26.44	100.00
	Total	**87**	**100.00**	
farming as major Occupation	Yes	36	41.38	41.38
	No	51	58.62	100.00
	Total	**87**	**100.00**	
Stocking density	800- 1000	16	18.39%	18.39
	1001-2000	68	78.16%	97.55
	>2000	3	3.45%	100.00
	Total	**87**	**100.00**	
Source of working capital	Loan	11	12.64	12.64
	Family	13	14.94	27.58
	Personal/saving	32	36.78	64.36
	Cooperative	13	14.94	79.30
	Others	18	20.69	100.00
	Total	87	100.0	
Extension service	Yes	32	36.78	36.78
	No	55	63.22	100.00
	Total	87	100.00	

Source; Field survey, 2011

Table 2: Distribution of Respondent by Problems Encountered

Problem encountered	No. of Respondents	% Distribution	Rank
Lack of extension	47	47%	4th
Lack of fingerling	10	10%	5th
Lack of good road	82	82%	1st
Theft	74	74%	2nd
Pest and diseases	71	71%	3rd
Level acquisition	6	6%	6th
Multiple response		100%	

Source; Field survey, 2011

The problems encountered by farmers are presented in Table 2. Access to their farm as due to poor road network accounted for 82 percent, this was followed by theft which accounted for 74 percent while pest and diseases accounted for 71percent. However lack of extension services was represented by 47 percent. Thus based on the analysis in table 2 majority of the problems encountered by the farmers was lack of good road, theft and pest and disease. This result is in agreement with the findings of Adewuyi et al., (2010). Major constraints limiting improved output included cost of inputs (27.1%), Finance (20.8%), Theft by Labour (13.5%), equipments (13.5%), Land (10.4%), Climatic variation (7.3%) and water pollution/cost (7.3%). In a similar vein Ele et al (2013) noted that the major constraints affecting fish farming in Calabar were high cost of inputs, lack of adequate finance, access to credit facilities, security and farm labour problems. Also, El-Naggar et al (2008) examined the economics of fish farming in Behera Governorate of Egypt. They reported that, high prices of fish feed; declining fish prices and lack of finance were the top ranking serious constraints facing fish farmers in that area. Finally according to Ugwuba and Chukwuji (2010) the problems that servers as constrain to the growth of the aquaculture industry in the country includes: poor storage facilities, high cost of labor, high cost of transportation, lack of capital and poaching by birds, reptiles and snakes

Cost and Return Analysis

The average total cost per kilogram of fish produced was N59.67k, while the average total revenue per kilogram of fish raised was N104.64 (Table 4). This give a gross margin of N50.92 per kilogram of fish raised. This result is at variance with that of Olagunji et al (2007), where the total cost for kilogram of fish and revenue per kilogram of fish raised was N204.00 and N194.60 respectively. The results implied that variable is high while profit is not very high thus giving as a gross margin of N50.92 per kilogram raised.

Table 3.: Estimated Cost and Benefit for the Catfish farmer (N=87)

Variable	Amount	% of total	% of total sales (revenue)
Cost of cat fish feeds	27,196,900	53.83	30.71
Cost of fish seeds (fingerlings)	6,858,200	13.57	07.74
Cost of liming	1,863,600	03.69	02.10
Water pump (hiring)	6,332,950	12.54	07.15
Fuel	1,504,500	02.98	01.70
Cost of pond rentage	5,062,500	10.02	05.72
Labour	1,701,000	03.37	01.92
Total variable cost (TVC)	45,459,150	100.00	51.33
Total fixed cost (TFC)	5,062,500		
TC (TVC + TFC)	50,521,650		
Total revenue	88,565,500		
GM = (TR-TVC)	43,106,350		
MR = (TR-TC)	38,042,850		
TR/kg raised	104.61		
TC/kg raise	59.67		
TVC/kg raised	53.70		
GM/kg raised	50.92		
NR/kg raised	44.94		
BCR	1.75		
ESR	0.11		
POR	0.75		
GR	0.57		

Source: Field Survey, 2011

Profitability Estimate

As earlier mentioned several variables where used to test the profitability of the fish farmer in the study area. These include the BCR, ESR, ROR, and GR. From results presented in Table 3, the Benefit Cost Ratio (BCR) was 1.75; this ratio is according to Olagunji et al (2007) is based on the concept of discount method of project evaluation. According to them, as a rule of thumb, project with cost ratio greater than one, equal to one or less than one indicate profit, break-even or less respectively. Since the ratio of 1.75 is greater than one, enterprise is believed to be profitable.

(i) GROSS RATION (GR): the ratio 01.57 implies that from every ₦1. 00 returns to the enterprise, ₦57 is he spent.

(ii) RATE OF RETURN (ROR): The rate of return in fish production in the study area is 75%. This shows that for every ₦1. 00 invested, 75 kobo is gained by the respondent.

(iii) EXPENSE STRUCTURE RATIO (ESR): The value of the ratio is 0.11 which implies that about 11% of the total cost of production is made of fixed cost component. This makes the business worthwhile since increase in the production with variable cost will increase the total revenue leaving the fixed cost unchanged. However this value was lower than of Olaguji et al (2007) they An ESR of 43

Similarly Kudi, et al (2008) conducted a study in Kaduna state, in Nigeria, where they examined the resources, cost and returns and other factors affecting fish production. The findings corroborate this work;

it indicated that land, water, labour and capital were the main resources employed in fish production. The costs and returns analysis indicated that, variable cost constituted 97.63% of the total cost of fish production in the study area, while the fixed cost constituted 2.37%. Amongst the variable inputs, fingerlings/juveniles (42.82%) and feed (34.70%) constituted the highest (77.52%) to cost of production, while hired labour constitutes 16.91%. The cost of production was N571, 231.79, the total revenue of N5, 853, 625.64 and the net income was N5, 282, 393.85 indicating that fish production was highly profitable. Finally this result s result is in agreement with the findings of Adewuyi et al., (2010);Ajao, (2006); Kudi,et al (2008); El-Naggar,et al (2008).and Kassali,et al (2011).

Estimated production function

The determination of the factors affecting fish production in the study area, a structural relationship was specified. Total revenue was regressed on the demographic characteristics of the farmers, socio-economic characteristic and other independent variable such as cost of feed, cost of living, size of ponds etc.

Though three functional models (linear, semi-log and double log) were used as shown above, the lead equation was double log. The choice of this production is predicated on its conformation to a priori expectation in terms of signs and magnitude of the coefficient, the number of significant variable and the coefficient of multiple determinations (Olayemi and Olayide, 1981)

Table 4. ANOVA Analysis for fish farming

Model		Sum of squares	Df	Mean square	F	Sig
1.	Regression	2.741	9	.305	12.524	.000[a]
	Residual	1.775	73	.024		
	Total	4.517	82			

a. Predictors: (constant), POS, GEN, EXP, EDU, LC, COF, AEG, FRK, MAN.

b. Dependent variable: REV

Table 5. Multiple regression analysis for fish farming

Model		**Unstandardized coefficients**		**Standardized coefficients**	**T**	**Sig**
		B	**Std. Error**	**Beta**		
1.	(Constant)	5.841	1.111		5.258	.000
	COF	.000	.096	.000	.002	.998
	LC	.141	.094	.115	1.492	.140
	GEN	-.302	.183	-.195	-1.649	.104
	AEG	.630	.865	.063	.729	.408
	EDU	-.257	.129	-.153	-1.992	.050
	EXP	.164	.078	.177	2.110	.038
	MAN	-.577	.449	-.159	-1.283	.204
	FRK	.461	.057	.856	8.036	.000
	POS	.291	.077	-.411	-3.767	.000
	F-statistics	12.524				
	R^2	0.607				
	R^2 Adj	0.558				
	Durbin-Watson	2.2				

a. Dependent variable: REV

The regression result therefore presented is the double log

$Q = 5.841 + 0.000x_1 + 0.141x_2 – 0.302x_3 + 0.630x_4 \quad -0.257x_5 + 0.164x_6 – 0.577x_7 + 0.461x_8 – 0.291x_9$

(0.002) (1.492) -(1.649) (0.729) (-1.992) (2.100) (-1.283) (8.036) (-3.767)

(0.002) (1.492) -(1.649) (0.729)

$-0.257x_5 + 0.164x_6 – 0.577x_7 + 0.461x_8 – 0.291$

(-1.992) (2.100) (-1.283) (8.036) (-3.767)

The values in parenthesis under regression coefficient are the t-values.

The R^2 for the estimated regression showed that about 60.7% of variation in total revenue of fish farmer in the study area was explained by the explanatory variable with the remaining 39.3% unexplained, this is due to random variable (U_i)

Five of the estimated coefficients; cost of feed (x_i), cost of living (x_2) age (x_3), farming experience (x_6), and farm size (x_8) have positive signs which indicated that an increase in any of the five variables would increase the level of total revenue of the respondent ceteris paribus.

However, the other coefficient of sex (x_3), education (x_5), labour (x_6) and pond size (x_9) had negative signs, which indicated that an increase in any of these variables would decrease the total revenue of the respondents ceteris paribus.

From the results also, education, farming experience, farm size and pond size were significant at 5%.

CONCLUSION AND RECOMMENDATION

In conclusion, production of catfish was highly profitable and it is related to size of the enterprise. Other variables that contributed to the profitability include age, educational status and the number of labour used. It was therefore recommended that more people should be encouraged to participate in the business so as to increase their income. Also, the Association of catfish farmers should organize training, workshops and seminars for their members so that they could have access to improved method and technologies of catfish production.

REFERENCES

Adediran, I. A. (1999). Super-Intensive Fish Culture Using Water Recirculating System. Proceedings of Seminar on Fish Farming, Success Attitude Development Centre (SADC). Pp. 1-4, Lagos, Nigeria.

Adekoya, B. B. & Miller, J. W. (2004). Fish Cage Culture Potential in Nigeria – An Overview. National Culture Agric Focus, 15:10.

Adewuyi, S. A., Phillip, B. B., Ayinde, I. A., and Akerele, D. (2010).Analysis of profitability of fish farming in Ogun State, Nigeria. *J Hum Ecol 31(3)*: 179-184

Adeyeye, A. J.& Dittoh, J. S. (1982). Essential of Agricultural Economics. Impact Publishers. Ibadan. Pp. 113 – 116.

Ajao, A.O. (2006): Economic of Fish Farming in Oyo State, Nigeria. Ph.D. Thesis, Department of Agricultural Economics. Obafemi Awolowo University, Ile-Ife, Nigeria.

Ele, I. E. (2008). An empirical analysis of fish production in the major fishing systems of the Cross River Basin, Nigeria. Unpublished Ph.D thesis, University of Calabar.

Ele,I.E,Ibok, O,W, Antia-Obong,E,A, Okon, I.E & Udoh E.S (2013) Economic Analysis of Fish Farming in Calabar, Cross River State, Nigeria *Greener Journal of Agricultural Sciences* Vol. 3(7), pp. 542-549, July 2013.

El-Naggar, G., Nasr-Alla, A., and Kareem, R. O. (2008). Economic analysis of fish farming in Behera Governorate of Egypt. In: Elghobashy, H., Fitzsimmons, K., Diab, A.S. ,eds. Proceedings of 8th International Symposium on Tilapia in Aquaculture, Cairo, Egypt, 12–14 Oct 2008. Vol. 1. "From the pharaohs to the future".

Food and Agriculture Organisation (FAO) (1991). Fish for Food and Employment. Food and Agricultural Organisation, Rome, Italy.

Gamel, E., Ahmed, N. & Kereem, R. O. (2006). Economic Analysis of Fish Farming in Behera Government of Egypt. http://lagarizona.edu/azaqua/ista/istab/abstract.

Global Agricultural Information Network (GAIN) (2007). Nigeria Fishery Products, Nigeria's Fish Market.

Kassali, R., Baruwa, O. I., and Mariama, B. M. (2011). Economics of fish production and marketing in urban areas of Tillabery and Niamey in Niger Republic. *International Journal of Agricultural & Rural Development. 4(2)*:65-71

Kudi, T. M., Bako,P. F., and Atala, T. K. (2008). Economics of fish production in Kaduna State Nigeria. *ARPN Journal of Agricultural and Biological Science 3(5 & 6)*:17-21

Lagos state Agricultural Development Authority (2005): Report on the status of Aquaculture in Lagos State.

Nathan, S. (2006). Small-Scale Catfish Production: Introduction. Retrieved from: http://www.vaexedu/aquaculture2/FSA/ small%20scale%20catfish%20productin.

Oduke, H. (2007). Fish Farming in the Tropics. A Functional Approach, Maxiprints, Awka, Nigeria Book Review.

Odukwe, A. (2007). Fish Farming in the Tropics: Functional Approach. Maxiprints, Awka, Nigeria Book Review.

Olagunju, F. I., Adesiyan I. O. & Ezekiel, A. A. (2007). Economics Viability of Catfish Production in Oyo State, *Nigeria. J. Hum Ecol.* 2:121-124.

Osawe, M. (2007). Technical Know-How of Catfish Grow-Out for Table Size in 4-6 Months. Pro. Seminar on Modern Fish Farming by Dynamo Catfish Production. Pp. 1-14, Lagos, Nigeria.

Ugwumba, C.O.A., M.O. Ugboaja and E.C. Orji, 2006. Sustanable Catfish Seeds Production in Anambra State. In : Asumugha, Olojede, Ikeorgu, Ano and Herbert (eds.), Repositioning Agriculture for Sustainable Millenium Development Goals in Nigeria: Proc. Agricultural Society of Nigeria (ASON) 40thnAnnual Conference , pp 512–514. Umudike, Umuahia, Nigeria

Ugwumba, C.O.A. and E.C. Orji, 2007. Comparative Study on Financial Implications of Flow-through and Re-circulating Aquaculture Practices in Anambra State, Nigeria. Nigerian J. Res. Prod.,10: 62–68

Ugwumba, C.O.A. and E.L.C. Nnabuife, 2008. Comparative Study on the Utilization of Commertial Feed and Home-made Feed in Catfish Production for Sustainable Aquaculture. Multidiscipl. J. Res. Dev., 10: 164–169

Ugwuba C.O.A. and C.O. Chukwuji, 2010. The Economics of Catfish Production in Anambra State, Nigeria:A Profit Function Approach. *Journal of Agriculture and Social Sciences*, 6(4): 105-109.

Slang, V. C. (1973). Comparison on the Economic Potential of Agricultural Land, Animal Husbandry and Oceans Fishers. The Case of Aiwa Agriculture F.A.O Technical Conference on Aquaculture, Layota Japan.