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Determinants of Productivity among Catfish Farmers in Niger State, Nigeria

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ABSTRACT

This study was conducted to investigate the determinants of productivity among catfish farmers in Niger State, Nigeria. Borgu Local Government Area was purposively selected because catfish farming is largely practiced in the area. Within the area, data were collected with the aid of well-structured questionnaires administered randomly to 120 fish farmers using the two-stage random sampling technique. Descriptive statistics, Total Factor Productivity Analysis and Ordinary Least Square Regression Model were used to isolate the factors that affect fish farmers' productivity in the area. Majority of the farmers (93.33%) were males; between ages of 41-60 years (72.5%); married (85.84%); with household size of 1 to 6 (74.17%) and had secondary education (74.17%). Most of the respondents stocked their fish in ponds with sizes ranging from 101M2 to 150M2 (40.83%) or 151M2 to 200M2 (39.17%). More so, 69.17% of the respondents' ponds were hired / leased and only 14.17% of them funded their production basically with loans. 55% of them combined personal savings and loans to fund the production whereas the rest 37 (30.83%) made use of only personal savings. The result showed that only 6 (5%) of the respondents had Total Factor Productivity (TFP)<1, and only 12(10%) had TFP = 1. Majority (75) of them (62.5%) had TFP between 1.01 and 2.00, while 27 (22.5%) had TFP>2. The result of Double Log Production Function showed that the coefficients of pond size (per 10M2) and quantity of feed (per 0.1 tons) were statistically significant at 1% p>1, while that of farming experience was significant at 5% (p>5), all with positive coefficients. The adjusted R-squared of 0.8241 explained the coefficient of variation of the catfish farmers' productivity model. It is recommended that farmers in the study area should be provided with more irrigation facilities in order to provide sustainable impoundment for more ponds as well as cheap / subsidized feed, and adequate training / extension education that could compensate for low level of experience among majority of them.

1.0 INTRODUCTION

Agriculture, including fish farming is by far the largest water user in the world today. Vast areas of the world are already irrigated, and irrigation development continues to increase in an attempt to meet the world's increasing demand for food. Agricultural waters are primarily got from surface waters. Excess waters are released back into many streams and rivers. Beyond the sheer volume of use, agricultural uses ofwater are

critical because of the often significant changes in downstream water quality due to use of agro-chemicals, erosion, and stream diversions (which may affect water volume). In Nigeria, level of irrigation is still low: irrigated land constitutes only 3% of total landarea, as against 9.6% and 12.7% in South Africa and Morroco, respectively (Olasumbo, 2001).

Nigeria is endowed with abundant water resources (about 960km of coastline), and is believed to be the largest consumer of fish and fish products in Africa (Oderinde, 1998) It is bounded in the south by the Atlantic Ocean, adjacent to a coastline of over 850 km long. The coastal zone, extending northwards to about 40 km, is characterized by enormous water resource potential, particularly the lagoons, creeks and estuaries. The country receives an estimated 560 xl09 M^3 of atmospheric water annually. Thus, Nigeria's land surface is well-drained by rivers and streams, River Niger being the most prominent (Olasumbo, 2001).

According to FAO, in spite of various efforts since the 1950s, returns on government and international aquaculture investments in Sub-Saharan Africa appeared to be insignificant (FAO, 2004) with less than 5% of the suitable land area being used (Kapetsky, 2004). In Nigeria for example, local fish production has been below demand with imports accounting for about US$48.8m in 2002 (CBN, 2004). Nigeria is one of the largest fish importers, importing about 700,000 tonnes of fish annually to augment domestic production of 700,000 tonnes, which constitutes 50% of the total demand (Miller and Atanda, 2004).

The Nigeria fishery sub- sector plays an important role in the socio – economic development of the economy. The sector serves as an income source, facilitates the development of cottage industries and provides employment opportunities for the myriad of people engaged in fishery production, processing and marketing (Eyo, 1992; and Akeredolu, 1990). It equally serves as an important protein supplement to meat protein, more so because of the persistent rise in cost of meat (Oladeji and Oyesola, 2002). The development of the fish industry will increase local production of fish and save much of the foreign exchange being used for fish importation. Specifically, it has a special role of ensuring food security, alleviating poverty and provision of animal protein.

Fish farming is still underdeveloped in many parts of the world, especially in developing countries. Recently, the government of Kenya identified the enormous potential of fish farming and developed an Economic Stimulus Programme with the main aim of increasing fish production, enhancing food security, improving livelihoods of farmers, and providing employment for the teeming youth population of the country (Uhuru 2010). In Nigeria, there have been several government interventions also towards poverty alleviation using the potentials of fish farming especially in the areas of catfish fingerling production, grow-out production and fish processing.

According to FAO (2007), Nigeria is the largest aquaculture producer in Africa with production output of over 15,489 tones per annum. The fisheries sector provides a substantial proportion of employment, especially in the rural areas: the sector is a principal source of livelihood for more than three million people in Nigeria (Ekunwe and Emokaro, 2009). However, one of the major challenges of fish farming as with most other forms of production is inefficiency. Hence, FAO (1997) asserted that increasing efficiency of resource use and productivity at the farm level is one of the pre-requisites for sustainable aquaculture.

The total runoff in a river basin is the upper limit to water availability and could be taken as the potential water availability for a given basin. Borgu Local Government area plays host to the Kainji Dam. Impoundment of the dam is so enormous that it could be easily and rightly deduced that the area has a fair share of the vast fishery resources in Nigeria, including rivers, dams, streams and ponds as well as plays host to the National Institute for Freshwater Fisheries Research (NIFFR) and the Federal College of Freshwater Fisheries Technology (FCFFT), New Bussa. A common observation is that the area supplies fish and fisheries products in abundance to different parts of the country.

Unfortunately however, despite the abundant fishery resources in Nigeria, local production has failed to meet the country's fish demand (FAO, 1995). Considering the perceived high level of catfish farming going on in Borgu L G A, it is only pertinent to carry out this manner of survey so as to improve the knowledge base, and improve on limited literature in the subject area. A study such as this can provide some of the information needed by policy makers to improve productivity of catfish farming in Nigeria as a good fish farming development policy will require data from many parts of the country (Singh, *et al.*, 2009).

3.0. METHODOLOGY

3.1. Study Area: This study was carried out in Borgu Local Government Area of Niger State. The local government occupies a land area of about 16,000 square kilometer and lies between longitudes 2° E and 4° E of the Greenwich Meridian and between latitudes 9° E and 11° N of the Equator. The zone experience both wet and dry season annually. The predominant occupation of the inhabitants is farming, although the area also harbors very large number of civil servants and traders especially around New Bussa Metropolis.

3.2. Sampling Technique: Borgu Local Government Area was purposively selected as a case study because catfish farming is largely practiced in the area. Then within the area, data were collected with the aid of well-structured questionnaires administered randomly to 120 fish farmers using the two-stage random sampling technique. In the two-stage sampling technique used in the study, the sample frame was first broken into three

strata according to the three agricultural extension blocks of Niger State Agricultural Development Programme (ADP) in Borgu Local Government Area namely; Babana, Shagunu and New Bussa, followed by simple random sampling of fish farms from each of the three strata. The selection was proportionate to size such that in a total of 120 fish farmers selected, 22 were from Babana, 14 were from Shagunu, while the remaining 84 were from New Bussa.

3.3. Methods of Data Collection: Primary data (well structured questionnaire administered to fish farmers to collect information on their socio-economic characteristics, production inputs as well as prices of inputs and outputs) and secondary data were used for the study.

3.4. Methods of Data Analysis

Descriptive statistics, Total Factor Productivity Analysis and Ordinary Least Square Regression Model were used

Total Factor Productivity

The equation was used to assess the level of catfish farmers' productivity in the study area. The equation is stated as:

Total Factor Productivity = value of total output / value of total input …….(1)

Double Logarithm Regression Model: Double Logarithm form is a functional form in which variables are transformed using the natural logarithm transformation. Double log means the dependent and all independent variables are all logged. It can also be called log-log form or specification. The double logarithm function model was used to examine the factors affecting output of catfish farmers' in the study area. The model that was adapted from Ibitola *et al* (2019), with little modification to accommodate the differences in factors, is stated thus:

$LnY = \beta 0 + \beta 1LnX1 + \beta 2LnX2 + \beta 3LnX3 + \beta 4LnX4 + \beta 5LnX5 + \beta 6LnX6 + \beta i$(2)

Where,

Y = (catfish farmers' Productivity = output in kg)
The explanatory variables include:
X1 = labour in man-days (family labour = 0, if otherwise 1)
X2 = pond size (per $10M^2$)
X3 = number of fingerlings
X4 = stocking rate (Number of fingerlings / M^2)
X5 = quantity of feed (per 0.1 tons)
X6 = farming experience (in years)
□i = vector of parameters to be estimated
□i = error term
□i = vector of parameters to be estimated
□i = error term

4.0. RESULTS AND DISCUSSIONS

4.1. Socio-economic Characteristics of the Respondents

The result on Table 1 (below) shows that most of the respondents (93.33%) were males. This agrees with the general norm as it relates to farming and as supported by several literature that have identified that greater proportion of women are more in the marketing and/or the processing aspects of farming (Effiong, 2016; Eyo 1983; Nwabeze and Madu, 2016). Majority of the catfish farmers (84.66%) were still in their active working age; 14.16 % being between age of 18 and 40 and 72.5 % being between 41 and 60 years. This is a good indicator of which policy makers can harness to boost fish production in the area. This may not be unrelated with the fact that the local government plays host to Federal College of Freshwater Fisheries Technology and the National Institute for Freshwater Fisheries Research both in New Bussa as well as the presence of the Kainji Dam and other water bodies including River Oli in the area -; the greater concentration of the catfish farmers within New Bussa Metropolis is an indication.

The study also revealed that most (83.84%) of the farmers were married; had family size of 1 – 6 (74.17%) and at least secondary school level education (98.335%) with tertiary education contributing the lesser part (24.165%) as against 74.17% from secondary school level of education. It is not uncommon that more married people than single individuals go into farming activities (Madu, 2016; Ibitola *et. al.,* 2019,; Oyewo, *et. al.*, 2014). Married men and women take up such responsibility, with regards to the tedious nature of farming, perhaps since they have to meet up with their enormous family responsibilities. Married people are also by implication older individuals in most cases and would have gathered the required capital over the years than single individuals some of whom will still be attending schools. On the other hand, the predominance of the smallest household size (household size of 1 – 6 persons), in catfish farming perhaps stems from the fact that majority of them according to the result were non-indigenes / visitors in the area. If the indigenes dominated the production, one would also expect a corresponding large family size owing to the Hausa and Muslim tradition of the practice of polygamy. It is also pertinent to note that the study has shown that catfish farming in the area is practiced by literates – There was no respondent without any formal education

The study also revealed that the production is dominated by new entrants (people with lesser years of experience), with 42.5% having only 1 – 5 years and 36.67% having 5 – 10 years of experience. This is an indication that interest in catfish farming is recently growing in the area.

Policy makers could key into this by bringing on intervention programmes to boost catfish production in

the area thereby bridging the gap of food insecurity in Nigeria. Government intervention would be of significant importance considering that the study also revealed that only 30.83% of the respondents could use only personal savings to fund their production activities. More so, most of the ponds (69.17%) were either hired or leased and majorly, larger pond sizes
101 M^2 – 150 M^2 (40.83%) or 151 M^2 – 2000 M^2 were required.

Table (i) Socio-economic Distribution of the Respondents

GENDER	FREQUENCY	PERCENTAGE (%)
Male	112	93.33
Female	8	6.67
AGE		
18 – 40 years	17	14.16
41 – 60 years	87	72.5
61 years and above	16	13.34
MARITAL STATUS		
Single	12	10
Married	103	85.84
Divorced	0	0
Separated	1	0.83
Widowed	4	3.33
HOUSEHOLD SIZE		
1 – 6	89	74.17
7 – 12	21	17.5
13 and above	10	8.33
LEVEL OF EDUCATION		
No formal education	0	0
Primary ,,	2	1.665
Secondary ,,	89	74.17
Tertiary ,,	29	24.165
CATFISH FARMING EXPERIENCE		
1 – 5 years	51	42.5
6 – 10 years	44	36.67
11 – 15 years	22	18.33
16 years and above	3	2.5
POND SIZE		
< 50 M^2	11	9.17
51 M^2 – 100 M^2	6	5
101 M^2 – 150 M^2	49	40.83
151 M^2 – 200 M^2	47	39.17
201 M^2 and above	7	5.83
POND OWNERSHIP		
Personally owned	37	30.83
Hired / leased	83	69.17
SOURCE OF CAPITAL		
Personal savings only	37	30.83
Loan only	17	14.17
Personal savings and loan	66	55

Table ii below shows the distribution of the respondents according to their annual farming expenditure and thus an estimate of the required capital for one year production cycle.

It is important to note however that most of the farmers, especially those within New Bussa metropolis were having mainly two production cycles within a year. Where that was possible, it implies that the farmer would require about half the expenditure and then re-invest the turn over for the second cycle of production. Majority of them (27.5 %) spent between (₦)400, 000 to (₦)600,000 or (22.5%) between (₦)600, 000 to (₦)800, 000 annually. Using the middle value of each range as representative figure and ₦1, 100, 000 to represent above ₦1, 000, 000 , the mean annual farming expenditure was got as ₦646, 666. 67. This shows that catfish farming in the area is capital intensive. The mean annual farming expenditure reported here is by far higher than ₦4178, 063. 18 mean household expenditure reported by ibitola *et al,* (2019) for maize farmers in Oyo State.

Table (ii)Distribution of Respondents by Annual Farming Expenditure

EXPENDITURE (₦)	FREQUENCY	PERCENTAGE (%)
< 200, 000	10	8.33
200, 000 – 400, 000	14	11.67
400, 000 – 600, 000	33	27.5
600, 000 – 800, 000	27	22.5
800, 000 – 1, 000, 000	13	10.83
Above 1, 000, 000	23	19.17
Total	120	100

Table iii below shows that 10% of the respondents simply break even after the production cycle. That is to say; they are neither losing nor gaining. Or they simply engage in catfish farming as a way of saving money (No interest expected). It also shows that 5 % are losing part of their investment at the end of the production. Inexperience and unforeseen occurrences such as theft, flooding and disease outbreak may account for that. In simple term, those 5 % get less than I unit of output for every I unit of input. The number of catfish farmers that are producing profitably is 62.5% + 22.5% = 85%. This 85% and especially the 22.5% getting more than double returns on their investment could wisely plough back part of their profit into the catfish business to bring about expansion. Looking at the gender distribution of the TFP in Table iv, one can easily deduce that only 3 out of the 8 females engaged in catfish farming were producing profitably. The tedious nature of farming activities may have to account for this as men are the stronger sex. Examining the result from the age point of view, Table v, shows that majority of those who produced less profitably were either the younger ones, who were likely to be less experienced, and/or the aged ones who could likely be producing for leisure or did not have the capacity to meet up with the labour intensive nature of catfish farming. Nevertheless, on a general note it can be deduced from Tables iii to Table v that catfish farming in the area is very profitable.

Table (iii) Total Factor Productivity (TFP) Distribution of Respondents

TFP	FREQUENCY	PERCENTAGE (%)
< 1	**6**	**5**
= 1	**12**	**10**
1.01 – 2	**75**	**62.5**
> 2	**27**	**22.5**
Total	**120**	**100**

Table (iv) Total Factor Productivity Distribution of Respondents based on Gender

GENDER	**TFP < 1**	**TFP = 1**	**TFP of 1.01 – 2**	**TFP > 2**	Total
Male	5	8	72	27	112
Female	1	4	3	0	8
Total	6	12	75	27	120

Table (v) Total Factor Productivity Distribution of Respondents based on Age

AGE	TFP < 1	TFP = 1	TFP of 1.01 – 2	TFP > 2	Total
18 – 40	2	2	9	4	17
41 – 60	1	6	57	23	87
61 and above	3	4	9	0	16
Total	6	12	75	27	120

Table vi below shows the results of Double Logarithm Regression Analysis for the relationships between farmer's socio-economic characteristics and catfish output. It shows that years of farming experience, quantity of feed in (per 0.1 tons) and pond size (per $10M^{2)}$) were the major socioeconomic factors that significantly influenced catfish output at 5%, 1% and 1% respectively. The R-squared of 0.8241 indicated that the variables accounted for 82.41 percent of the variation in catfish output. The positive coefficient of all the variables in the model indicates that they all had direct relationship with the inputs and the outputs used in catfish production.

The coefficient of farming experience (0.1772) indicates that the number of years of farming experience was a significant factor, positively related to catfish output. Hence an additional year of experience in farming increased the output of a catfish farmer by approximately 17.72kg. Okoye *et al.,*(2009) opined that greater experience enables a farmer to adopt new technologies or to take risk whereas Adah, Olukosi, Ahmed, and Balogun (2007) sees it that farming experience improves decision making and enhances better farm management.

Labour input follows the expected positive sign though with insignificant coefficient of 0.1033. It therefore implies that an increase in labour by one man-day will lead to an increase in catfish output by 10.33kg. Singh (2007) also identified labour as a major determinant of fish productivity in West Tripura. The main aspects of labour identified were in feed formulation, excavation works, harvesting and haulage. The farmer in putting additional one man- day may have to consider the cost of the labour and the price of 10.33kg of the catfish. Pond size had a significant positive relationship with output at 5%. This relationship could have been negative if the ponds were underutilized. The sign of the coefficient suggested that an additional $10M^2$ stocked by the farmer would increase output by 53.12kg.

Quantity of feed (per 0.1 tons) had significant positive relationship with output with coefficient of 0.6878. This implies that additional 100kg or 0.1 tons will increase catfish output by 68.78kg. Iwu *et al* (2015) as well as Singh (2007) also identified that quantity of feed had significant positive effect on technical efficiency of fish farmers in the same study area. Stocking rate and number of fingerlings had insignificant positive relationship with output. That is to say the more the number of fingerling or stocking rate the greater the output. However, it is important to note that this relationship with stocking rate can only go on up to the point that the ponds are not overstocked. Suffice it to say that the catfish farmers in the area are not overstocking their ponds.

The R and adjusted R-squared were 0.8337 and 0.8241 respectively, indicating that 82.41% of the catfish farmers' resources were used for productive farm activities.

Table (vi) Result of the Double Logarithm Production Function Analysis of Catfish Output

Variables	**Coefficient**	**Standard error**	**P > / t /**
Constant	**0.1467**	**0.2085**	**0.659**
Pond size(M^2)	**0.5312**	**0.5311**	**0.000**
Years of experience	**0.1772**	**0.0764**	**0.007**
Quantity of feed (kg)	**0.6878**	**0.7137**	**0.000**
Labour (Man -days)	**0.1033**	**0.0529**	**0.416**
No. of fingerlings	**0.0744**	**0.0525**	**0.233**
Stocking rate (no. /M^2)	**0.0345**	**0.0498**	**0.178**

CONCLUSION AND RECOMMENDATIONS

Number of years of experience as well as pond size and quantity of feed have been identified as the major determinants of catfish output (having significant positive effect on catfish output). Stocking rate, number of fingerlings stocked and quantity of labour also had positive but insignificant effect on catfish output in the study area.

It is therefore recommended that adequate training and extension programmes be organized and funded in fish farming communities in Nigeria to compensate for inadequate experience among some farmers. Furthermore, provision of subsidies, irrigation

facilities and accessible credit facilities may help to enable farmers reduce the challenge they are facing in acquiring more ponds and that of high feed cost.

REFERENCES

Akeredolu, M.O. (1990). Constraints to technology transfer in artisanal fisheries. Ph.D. Aquaculture Planning in Africa, ADCP/REP/75/1, pp. 61 -65. Central Bank of Niegria 2004. Statistical Bulletin, 264 - 267.

Ekunwe, P.A and Emokaro, C.O., (2009). Technical Efficiencies of Catfish Farmers in Kaduna, *Nigeria Journal of Applied Sciences Research* 5 (7): 802 – 805

Effiong, B. N. (2016). Fish processing, preservation and value addition p 202- 228. In: Fish farming, the value chain approach; Madu (2016) In Him Resource LTD, Palmgrove, Lagos, Nigeria. Pp 276

Eyo, A. A. (1983).The significance of fish handling, preservation and processing In the development of Nigeria inland fishery with special reference to Kainji Lake production.*Third Annual Conference, Fisheries Society of Nigeria, FISON.* P 115 - 122

Food and Agricultural Organization. (FAO) (2004). The state of world fisheries and aquaculture. Rome: FAO Fisheries.

FAO (1995). The State of World: Fishery and Agriculture Fisheries Department, Rome.

FAO (1997).Survey and analysis of aquaculture development research priorities and capacities in Asia. FAO Fisheries Circular. No 930, FAO, Rome, Italy.

FAO (2007): State of World Fisheries and Aquaculture http://www.fao.org/statist/fisoft/fish plu.asp

Ibitola O.R.; Fasakin I.J.; Popoola O.O.; Olajide O.O. (2019). Determinants of Maize Framers' Productivity among Smallholder Farmers in Oyo State, Nigeria. *Greener Journal of Agricultural Sciences* 9(2), pp. 189-198,

Iwu, I. M.; Iwu, C. J. and Aguihe E. O.(2015)Technical Efficiency of Fish Farms in Borgu Local Government Area, Niger State, Nigeria.*International Journal of Applied Research and Technology* Esxon Publishers *Vol. 4, No. 9, September 2015. 110 – 115.*

Kapetsky JM (2004). A Strategic Assessment of warm water fish farming potential in Africa. 67 Rome: Food and Agricultural Organization.

Madu, C. T. (2016). Introducing fish farming/ Aquaculture and the entrepreneurial opportunities: an overview: p 1- 14. In: Fish farming, the value chain approach; Madu (2016) In Him Resource LTD, Palmgrove, Lagos, Nigeria. Pp 276

Miller J, Atanda T (2004). "Opportunities in Aquaculture and Fisheries in Nigeria". Fish Farming Big Industry in the Future. National Agriculture Focus. *An Agricultural News Magazine* Published by Foundation Consultants Limited, Abuja.October Edition. (1) 4: 10.

Nwabeze, G. O. and C. T. Madu (2016).Marketing of fish p229-239. In: Fish farming, the value chain approach; Madu (2016) In Him Resource LTD, Palmgrove, Lagos, Nigeria. Pp 276

Oderinde, A.O., (1998) Economic viability of Fish farming in Ibadan Metropolis. *Unpublished MSc thesis (Dept. of Agric. Economics*, Ibadan).Pp.1-22.

Oladeji, J.O. and O.B. Oyesola (2002). *African Journal of Livestock Extension* Vol. 1, pp50

Olasumbo, M. 2001. Water resources management and development in Nigeria - issues and challenges in a new millennium. *An Inaugural Lecture delivered at the University of Agriculture on Wednesday, 22nd of August 2001 at* FUNAB, Abeokuta*.,*

Oyewo, I.O, Raufu M.O, Adesope A. A, Akanni O.F. Adio, A.B (2014). Factors affecting Maize Production in Oluyole Local Government Area, Oyo State Scientia Agriculture www.pscipub.com/SA 7 (2): 70-75

Singh K., Dey M.M., Rabbani A.G., Sudhakaran P.O. and Thapa O. (2009) Technical Efficiency of Freshwater Aquaculture and Its Determinants in Tripura, *India. Agricultural Economics Research Review* Vol 22(1): 185 – 195.

Singh K.(2007). Economics and Determinants of Fish Production and Its Effects on Family Income Inequality in West Tripura District of Tripura*Ind. Jn. of Agri. Econ.* 62,(1), pp 114 - 126

Uhuru M K 2010 Budget speech for the fiscal year 2010/2011 Effective dates 1st July 2010 – 30th June 2011. Available on the internet at: www.treasury.go.ke.

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