

## 1 Capabilities for Use of Improved Catfish Production Technologies among Fish Farmers in 2 Delta State, Nigeria

### 5 Abstract

6 The study was carried out to assess capabilities for use of improved catfish production  
7 technologies among fish farmers in Delta State, Nigeria. Data were collected from a sample of  
8 50 fish farmers using questionnaire. Frequency, percentage and mean score were used in  
9 analyzing data for the study. Findings reveal that majority (70.0%) of the respondents were male,  
10 40.0% were aged between 25 and 34 years, 72.0% were married, 60.0% had a household size of  
11 6-10 persons, 50.0% got an annual income of above ₦300,000 with 92.0% having formal  
12 education. Sources of funds for the respondents were personal savings (60.0%), friends/relations  
13 (20.0%), cooperative society (12.0%) and loans from banks (8.0%). Results show that improved  
14 catfish production technologies used by the respondents included fortification of cat fish feeds  
15 using root and tuber crops (M= 2.2), improved techniques in pond construction and maintenance  
16 (M= 1.7), non-conventional feed stuff for catfish (M= 1.6), fertilization and liming of catfish  
17 pond (M= 1.6), improving water quality in catfish culture (M= 1.3), prevention and control of  
18 catfish diseases (M=1.0), among others. Constraints to use of improved catfish production  
19 technologies were inadequate processing and storage facilities (M= 2.5), disease infestation (M=  
20 2.3), high cost of feed (M= 2.2), high cost of inputs (M= 2.1), inadequate funds (M= 2.1), poor  
21 market network (M= 2.0), etc. It is recommended that financial institutions should ensure  
22 availability of credit facilities to enable catfish farmers make provision for improved processing  
23 and storage facilities in order to boost their productivity.

24  
25 **Keywords:** Capabilities, catfish, technologies, farmers, Delta state, Nigeria

### 26 Introduction

27 Fish farming occupies a unique position in the agricultural sector of the Nigeria economy.  
28 The contribution of the fisheries sub-sector to GDP rose from N76.76 billion in 2001 to N162.61  
29 billion in 2005 [1]. Fish farming is the principal form of aquaculture. It involves raising fish  
30 commercially in tanks or enclosures, usually for food. Nigeria has a vast network of land waters  
31 like rivers, flood plains, natural and man-made lake and reservoirs [2]. All these great potentials  
32 need to be effectively harnessed to provide sufficient fish protein for the teaming population,  
33 create job opportunities and reduce poverty. Modern fish farming involving the use of improved  
34 technologies is the only solution to the excess demand for fish in Nigeria. It is worthy of note  
35 that fish production in Nigeria is from three major subsectors: artisanal, aquaculture and  
36 industrial [3]. Artisanal fishing has been noted to contribute the largest proportion because the

37 majority of the fishers in Nigeria are artisanal fishers operating with crude fishing tools and  
38 implements, little or no credit facilities, and lack of skills.

39 According to [4], artisanal fish production contributed 85.5%-89.5% while aquaculture  
40 and industrial production stood at 5.5%-12.0% of the total local fish production in Nigeria,  
41 respectively. Contribution of aquaculture has been reported to be on the increase since 2001 in  
42 Nigeria. Despite the abundant human and non-human resources that the nation is blessed with,  
43 the country is yet to bridge the gap between the demand and supply of fish, thereby making the  
44 nation one of the protein deficient nations. Improved aquaculture technologies could cover fish  
45 management areas such as fish enclosure technologies, neutralizers, fertilizers, fish stock  
46 selectivity, fish stock management, fish nutrition technologies, integration, pond bottom  
47 excavation, fish culture systems, fish harvesting gear system drainage systems, among others.

48 Aquaculture fish production has maximally increased and has the under listed advantages  
49 which include fish grow quickly and can get a return on investment fast; fish farmers must not  
50 live next to ocean, lake, river or stream to farm fish although a constant source of clear fresh  
51 water is required for fish farming; there is ready market for fish both locally and internationally;  
52 demand can be met in a timely and efficient manner, small quantity can be harvested for sell to  
53 avoid spoilage; fish rarely suffer from diseases unlike other types of livestock; land unsuited to  
54 other productive uses - even small plots can be used for fish farming; once established, fish  
55 farms are easy to maintain leaving more time for other tasks and; fish is very nutritious,  
56 providing a good source of high quality protein and other essential nutrients which are especially  
57 important for mothers and growing children [5]

58 Access to accurate and adequate information on fish production technologies by farmers  
59 is essential for increased fish production. Such information must come from credible sources at

60 the right time and the farmers should be able to utilize them correctly. Information on fish  
61 farming technologies needed by farmers cover a wide range of areas such as pond construction  
62 and management, breed selection, stocking, feeding, water management, spawning, sorting,  
63 harvesting, processing, storage, marketing and record-keeping [6]. The technologies used by  
64 most Nigerian fish farmers are relatively simple, often based on small modifications that improve  
65 the growth and survival rates of the target species, e.g. improving food, seeds, oxygen levels and  
66 protection from predators.

67 High cost of fish feed, low level of credit, poor transportation network among others have  
68 been identified as the problems of catfish improved technologies usage by researchers such as  
69 [7]. Many small-scale farmers in Nigeria and Delta State in particular are yet to integrate fish  
70 production technologies into their fish farming system hence the need for this study. The study  
71 was designed to provide answers to the following research questions: What are the socio-  
72 economic characteristics of the catfish farmers? What are sources of funds available for the  
73 catfish farmers? What are sources of information used by the catfish farmers? What are  
74 improved catfish production technologies used by the farmers? What are constraints to use of  
75 improved catfish production technologies by the farmers?

### 76 **Purpose of the Study**

77 The purpose of this study was to assess capabilities for use of improved catfish production  
78 technologies among fish farmers in Delta State, Nigeria.

79 Specifically, the study sought to:

- 80 i. describe the socio-economic characteristics of the catfish farmers;
- 81 ii. identify sources of funds available to catfish farmers;
- 82 iii. ascertain sources of information used by catfish farmers;
- 83 iv. ascertain improved catfish production technologies used by catfish farmers; and
- 84 v. identify constraints to use of catfish production technologies by the farmers.

## 85 **Methodology**

86           The study was conducted in Delta State, Nigeria. The state is found in the Niger Delta  
87 Area of Nigeria. It is located between longitude 5°00' and 6°45' East and latitude 5°00' and  
88 6°30' North with a total land area of 7,440 km of which one third is swampy and water logged.  
89 Delta State is bounded on the North by Edo State, on the East by Anambra State, on the South by  
90 Baylesa State and the West by Atlantic Ocean. The state consists of 25 local government areas. It  
91 is divided into three Agricultural Zones by Delta State Agricultural Development Programme  
92 (DTADP). These zones include Delta North, Central and Delta South having Agbor, Effurun and  
93 Warri as the headquarters, respectively. One (Central Agricultural Zone) out of the three  
94 agricultural zones was selected for the study. There are six local government areas in the zone,  
95 namely; Ethiope East, Ethiope West, Ughelli North, Ughelli South, Okpe and Isoko North.  
96 Ughelli North was selected purposively for this study. This is as a result of having fish farming  
97 as a predominant activity in the area. Ughelli North Local Government Area is made up of seven  
98 (7) communities comprising Ughelli, Agbarha, Ogor, Ewreni, Owheru Agbarho and Orogun.  
99 Ughelli North covers an area of 50km<sup>2</sup> with population of about 323,478 [8].

100           Ughelli North is described as one of the major food baskets of the state since greater  
101 percentage of people in the area are predominantly farmers and depend solely on agriculture for  
102 livelihood. The inhabitants of the area are engaged in farming activities such as crop and  
103 livestock production as well as fish farming. Crops produced are rice, cassava, yam, maize,  
104 cocoyam, okra, melon, cowpea and pigeon pea. The climate is characterized by two distinct  
105 seasons (rainy and dry season). The main annual rainfall is between 1,500mm and 1,600mm and  
106 is distributed through April to October every year. In the area of catfish farming, the Delta State  
107 Agricultural Development Programme (DSADP) has disseminated improved catfish production

108 technologies to the farmers in the area to create business opportunities in catfish farming and to  
109 alleviate poverty.

110         The population of the study comprises all the catfish farmers in Ughelli North LGA. A  
111 multi-stage sampling procedure was used to select 5 communities in the LGA. In stage 1, all the  
112 communities in the LGA were selected. Stage 2 involves selection of 10 catfish farmers from  
113 each of the communities using simple random sampling technique. This gave a total of 50  
114 respondents used for the study. Questionnaire was used to collect data from a sample of 50  
115 respondents. Data were analyzed using frequency, percentage and mean score.

116

## 117 **Results and Discussion**

### 118 **Socio-economic characteristics of the catfish farmers**

119 Majority (70.0%) of the respondents were male while 30.0% were female (Table 1). This  
120 implies that fish farming in the study area is dominated by male folks. This is to enable them as  
121 head of households to obtain income that will make them to be economically strong to take care  
122 of family responsibilities.

123 Table 2 show that 40.0% of the respondents were aged 25-34years, 20.0% were between  
124 45 and 54 years, 16.0% were aged 35-44years, among others. This implies that the respondents  
125 were middle-aged, energetic and in their productive years hence greater involvement on the use  
126 of catfish production technologies.

127 A greater percentage (72.0%) of the respondents were married while 12.0% and 12.0%  
128 were single and widowed respectively (Table 1). This implies that most of the respondents were  
129 married, having greater responsibility that has made them to engage in fish farming for economic  
130 empowerment.

131 Results in Table 1 reveal that 92.0% of the respondents had formal education in school  
132 while 8.0% had non-formal education. It implies that the respondents were literate enough which  
133 will help them on the use of catfish production technologies for greater productivity. The  
134 findings agree with [9] who stated that most fish farmers in his study area had formal education.

135 About 60.0% of the respondents had a household size of 6-10 persons, 30.0% and 10.0%  
136 had above 10 persons and 1-5 persons respectively (Table 1). This implies that the respondents  
137 had a relatively large. This implies that the respondents had fairly large size of family members  
138 who can serve as source of labour used in catfish production.

139 Table 1 show that 40.0% of the respondents had a farming experience of 1-10 years,  
140 36.0% had 11-20 years while 24.0% had above 20 years. This implies that the respondents have  
141 been involved in catfish production for a long period of time which could be an added advantage  
142 that will help them to improve on methods used in fish farming.

143 Entries in Table 1 indicate that 50.0% of the respondents got an annual income of above  
144 ₦300,000, about 30.0% obtained ₦200,001-₦300,000, among others. This indicates that the  
145 respondents had reasonable amount of money from sale of fish which will enable them to be able  
146 to take care of their family responsibilities economically.

147 All (100.0%) the respondents had extension contact in the last one year (Table 1). It  
148 shows that the respondents were visited by extension agents and information they got from them  
149 could improve their catfish production.

150 A greater percentage (60.0%) of the respondents had an extension contact more than  
151 twice while 40.0% had between 1 and 2 times (Table 1). This implies that the respondents had  
152 adequate extension service coverage which will enhance adoption of catfish production  
153 technologies.

154 Results in Table 1 show that 34.0% of the respondents were civil servants, 30.0% were  
155 engaged in farming, 20.0% were traders while 16.0% were hairdressers. This implies that the  
156 predominant occupation of the respondents in the study area was civil service.

157

158 **Table 1: Distribution of socio-economic characteristics of the respondents (n=50)**

<b>Socio-economic characteristics</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Sex</b>		
Male	35	70.0
Female	15	30.0
<b>Age (years)</b>		
25-34	20	40.0
35-44	8	16.0
45-54	10	20.0
55-64	5	10.0
Above 64	7	14.0
<b>Marital status</b>		
Single	6	12.0
Married	36	72.0
Widowed	6	12.0
Separated	2	4.0
<b>Level of education</b>		
Non-formal education	4	8
Primary education	30	60
Secondary education	16	32
Tertiary education	-	-
<b>Household size (numbers)</b>		
1-5	5	10.0
6-10	30	60.0
Above 10	15	30.0
<b>Farming experience (years)</b>		
1-10	20	40.0
11- 20	18	36.0
Above 20	12	24.0
<b>Estimated annual income (Naira)</b>		
≤100,000	4	8.0
100,001-200,000	6	12.0
200,001-300,000	15	30.0
Above 300,000	25	50.0
<b>Extension contact</b>		
Yes	50	100.0
No	-	-
<b>Number of visits</b>		
1-2	20	40.0
Above 2	30	60.0
<b>Major occupation</b>		
Farming	15	30.0
Trading	10	20.0
Hair dressing	8	16.0
Civil service	17	34.0

159

160



161 **Sources of fund available to catfish farmers**

162  
 163 Results in Table 2 show sources of fund available to catfish farmers which include  
 164 personal savings (60.0%), friends/relations (20.0%), cooperative society (12.0%) and loans from  
 165 banks (8.0%). This implies that the respondents obtained funds mostly from informal sources.  
 166 High dependence on informal sources could be attributed to certain factors such as lack of access  
 167 to credit facilities, delay in disbursement, lack of collateral, high interest rates, fear and  
 168 uncertainties characterized by formal credit institutions.

169 **Table 2: Percentage distribution of sources of fund for the respondents (n=50)**

170

Sources of fund	Frequency	Percentage
Personal savings	30	60.0
Friends/relations	10	20.0
Cooperative society /isusu	6	12.0
Loans from banks	4	8.0

171  
 172 **Sources of information used by cat fish farmers**

173 Sources of information used by catfish farmers were extension agents (40.0%), radio  
 174 (20.0%), research institutes (20.0%), fellow farmers (10.0%) and television (10.0%) (Table 3).  
 175 This implies that the respondents received adequate information from extension agents which  
 176 could boost their productivity and enhance increase in income. This is in line with [10] who  
 177 observed that extension agents were the major source of information for the farmers in the study  
 178 area.

179 **Table 3: Distribution of the respondents according to their sources of information (n=50)**

Sources of information	Frequency	Percentage
Radio	10	20.0
Television	5	10.0
Extension agents	20	40.0
Research institutes	10	20.0
Fellow farmers	5	10.0

180 **Improved catfish production technologies used by farmers**

181 Results in Table 4 indicate improved catfish production technologies used by farmers  
 182 which include fortification of cat fish feeds using root and tuber crops (M= 2.2), improved  
 183 techniques in pond construction and maintenance (M= 1.7), non-conventional feed stuff for  
 184 catfish (M= 1.6), fertilization and liming of catfish pond (M= 1.6), improving water quality in  
 185 catfish culture (M= 1.3), prevention and control of catfish diseases (M=1.0), among others. This  
 186 implies that the catfish farmers were using improved production technologies that will increase  
 187 productivity which brings about high returns.

188 **Table 4: Mean score of improved catfish production technologies used by farmers**

<b>Technologies</b>	<b>Mean score</b>
Improved techniques in pond construction and maintenance	1.7
Techniques of improving water quality in catfish culture	1.3
Feed management for efficient catfish pond	0.9
Fortification of catfish feeds using root and tuber crops	2.2
Fertilization and liming of catfish pond	1.6
Non-conventional feed stuff for catfish	1.6
Prevention and control of catfish diseases	1.0
Control of predations in catfish pond	0.8
Techniques for hatchery and triggering production	0.5
Integrated fish farming for increased catfish production	0.2

189

190

## 191 **Constraints to use of catfish production technologies by the farmers**

192 Findings in Table 5 reveal constraints to use of catfish production technologies by  
 193 farmers which include inadequate processing and storage facilities (M= 2.5), disease infestation  
 194 (M= 2.3), high cost of feed (M= 2.2), high cost of inputs (M= 2.1), inadequate funds (M= 2.1),  
 195 poor market network (M= 2.0), high cost of transportation (M= 1.5), poor supply electricity (M=  
 196 1.3), inadequate water supply (M= 1.3), among others. It implies that the respondents were  
 197 highly constrained by processing and storage facilities which hinder optimum production of fish  
 198 in the study area.

199 **Table 5: Mean score of constraints to use of catfish production technologies by farmers**

<b>Constraints</b>	<b>Mean score</b>
Inadequate funds	2.1
High cost of inputs	2.1
Poor market network	2.0
Inadequate processing and storage facilities	2.5
Poor weather conditions	1.4
High cost of feed	2.2
High cost of transportation	1.5
Poor pricing by buyers	1.0
Lack of access to credit facilities	1.4
Poor road network	1.4
Inadequate technological knowledge	1.3
Disease infestation	2.3
Inadequate water supply	1.3
Poor supply of electricity	1.3

200

## 201 **Conclusion and Recommendations**

202 The study concluded that the respondents were mostly male and in their productive age.  
 203 Additionally, funds used for catfish production were obtained from informal sources such as  
 204 personal savings and friends/relations. Also, major constraints to use of improved catfish  
 205 production technologies include inadequate processing and storage facilities, disease infestation,  
 206 high cost of feed, high cost of inputs, inadequate funds, etc. The study recommends that financial

207 institutions should ensure availability of credit facilities to enable catfish farmers make provision  
208 for improved processing and storage facilities in order to boost their productivity.

## 209 **References**

- 210  
211 1. Central Bank of Nigeria (CBN). Annual Report and Statement of Accounts. CBN, Abuja.  
212 2015.
- 213 2. Olagunju FI, Adesiyon IO, Ezekiel AA.. Economic viability of catfish production in  
214 Oyo State, Nigeria. *Journal of Human Ecology*. 2007; 21(2): 121-124.  
215
- 216 3. Shaming K. Economic analysis of different tilapia pond culture system in Egypt. Twelfth  
217 Annual Technical Report, CRSP Office of International Research and Development,  
218 Oregon State University, USA. 2013; 181-189.  
219
- 220 4. Central Bank of Nigeria (CBN). Annual Report and Statement of Accounts. CBN, Abuja.  
221 2015.  
222
- 223 5. Ofuoku AN, Emah GN, Itedjere BE. Information utilization among rural fish farmers in  
224 Central Agricultural Zone of Delta State, Nigeria. *World Journal of Agricultural Science*.  
225 2008; 4 (5): 558–564.  
226
- 227 6. Ifejika, K, Ayanda, L. Determination of yield performance in small-scale fish farming in  
228 Alimosho Local Government Area of Lagos State. *International Journal of Agriculture  
229 and Rural Development*. 2012; 2 (1): 9-14.  
230
- 231
- 232 7. Amali I, Solomon S. Analysis of profitability of Fish farming in Ogun state, Nigeria.  
233 *Journal Human Ecology*. 2010; 31(3): 179-184.  
234
- 235
- 236 8. National Population Commission (NPC). National Population Census Projected Figure  
237 for Delta State. National Population Commission Publication, Abuja, Nigeria. 2006.  
238
- 239 9. Adeleke BA. Aquaculture technology awareness, transfer and adoption among fish  
240 farmers in Oyo town and its environs. M.Sc. Thesis University of Ibadan. 2006; 35.  
241
- 242 10. Yahaya OT. Determinants of adoption of Information and Communication Technologies  
243 for agricultural extension delivery and rural development in Nigeria. Ph. D Thesis,  
244 University of Ibadan. 2006; 24.