

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

3 4 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 Study Area

87 The study was conducted in Delta State, Nigeria. The state is found in the Niger Delta
88 Area of Nigeria. It is located between longitude 5°00' and 6°45' East and latitude 5°00' and
89 6°30' North with a total land area of 7,440 km of which one third is swampy and water logged.
90 Delta State is bounded on the North by Edo State, on the East by Anambra State, on the South by
91 Baylesa State and the West by Atlantic Ocean. The state consists of 25 local government areas. It
92 is divided into three Agricultural Zones by Delta State Agricultural Development Programme
93 (DTADP). These zones include Delta North, Central and Delta South having Agbor, Effurun and
94 Warri as the headquarters, respectively. One (Central Agricultural Zone) out of the three
95 agricultural zones was selected for the study. There are six local government areas in the zone,
96 namely; Ethiope East, Ethiope West, Ughelli North, Ughelli South, Okpe and Isoko North.
97 Ughelli North was selected purposively for this study. This is as a result of having fish farming
98 as a predominant activity in the area. Ughelli North Local Government Area is made up of seven
99 (7) communities comprising Ughelli, Agbarha, Ogor, Ewreni, Owheru Agbarho and Orogun.
100 Ughelli North covers an area of 50km² with population of about 323,478 [8].

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

Comment [M1]: Include this sub-heading.
Map of such research would be very important.

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

111 Methods of Data Analysis

Comment [M2]: Include this sub-heading

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

118

UNDER PEER REVIEW

119 Results and Discussion

120 Socio-economic characteristics of the catfish farmers

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

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

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

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

Comment [M3]: State the name of study area instead.

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

Comment [M4]: Incomplete and also repeated

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

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

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

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

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

159

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

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

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

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

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

172

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

173
174 **Sources of information used by cat fish farmers**

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

181 **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

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

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

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

Technologies	Mean score
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

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192

193 **Constraints to use of catfish production technologies by the farmers**

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

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

Constraints	Mean score
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

202

203 **Conclusion and Recommendations**

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

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

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