

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

5 | Abstract

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

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

26 | Arrange the keywords alphabetically from ascending or descending order

27 | Introduction

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

37 aquaculture and industrial [3]. Artisanal fishing has been noted to contribute the largest
38 proportion because the majority of the fishers in Nigeria are artisanal fishers operating with
39 crude fishing tools and implements, little or no credit facilities, and lack of skills.

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

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

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

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

78 **Purpose of the Study**

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

81 Specifically, the study sought to:

- 82 i. describe the socio-economic characteristics of the catfish farmers;
- 83 ii. identify sources of funds available to catfish farmers;

- 84 iii. ascertain sources of information used by catfish farmers;
- 85 iv. ascertain improved catfish production technologies used by catfish farmers; and
- 86 v. identify constraints to use of catfish production technologies by the farmers.

87 **Methodology**

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

103 Ughelli North is described as one of the major food baskets of the state since greater
104 percentage of people in the area are predominantly farmers and depend solely on agriculture for
105 livelihood. The inhabitants of the area are engaged in farming activities such as crop and
106 livestock production as well as fish farming. Crops produced are rice, cassava, yam, maize,
107 cocoyam, okra, melon, cowpea and pigeon pea. The climate is characterized by two distinct

108 | seasons (rainy and dry season). The main annual rainfall is between 1,500 mm and 1,600 mm
109 | **andwhich** is distributed through April to October every year. In the area of catfish farming, the
110 | Delta State Agricultural Development Programme (DSADP) has disseminated improved catfish
111 | production technologies to the farmers in the area to create business opportunities in catfish
112 | farming and to alleviate poverty (citation?).

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

119 | **Provide GPS showing the sampling location**

120 **Results and Discussion**

121 **Socio-economic characteristics of the catfish farmers**

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

126 Table 2 showed ed that 40.0% of the respondents were aged 25-34years, 20.0% were
127 between 45 and 54 years, 16.0% were aged 35-44years, among others (where is the remaining
128 24%.use pie chart for complete % distribution). This implies that the respondents were middle-
129 aged, energetic and in their productive years hence greater involvement on the use of catfish
130 production technologies.

131 A greater percentage (72.0%) of the respondents were married while 12.0% and 12.0%
132 were single and widowed respectively(where is the raming 4%) (Table 1). This implies that most
133 of the respondents were married, having greater responsibility that has made them to engage in
134 fish farming for economic empowerment.

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

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

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

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

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

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

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

161

162 | **Table 1: Distribution of sSocio-Economic cCharacteristics of the Rrespondents (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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165 Sources of fund available to catfish farmers

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

173 **Table 2: Percentage Distribution of Sources of Fund for the Respondents (n=50)**
 174

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

175 Sources of information used by cat fish farmers

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

183 **Table 3: Distribution of the Respondents According to their Sources of Information**
 184 **(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

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

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

193 **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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196 **Constraints to use of catfish production technologies by the farmers**

197 Findings in Table 5 reveal constraints to use of catfish production technologies by
 198 farmers which include inadequate processing and storage facilities (M= 2.5), disease infestation
 199 (M= 2.3), high cost of feed (M= 2.2), high cost of inputs (M= 2.1), inadequate funds (M= 2.1),
 200 poor market network (M= 2.0), high cost of transportation (M= 1.5), poor supply electricity (M=
 201 1.3), inadequate water supply (M= 1.3), among others. It implies that the respondents were
 202 highly constrained by processing and storage facilities which hinder optimum production of fish
 203 in the study area.

204 **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

205

206 **Conclusion and Recommendations**

207 The study concluded that the respondents were mostly male and in their productive age.

208 **Additionally, funds** used for catfish productions were obtained from informal sources
 209 such as personal savings and friends/relations. Also, major constraints **to use of the** improved
 210 catfish production technologies include: inadequate processing, **and** storage facilities, disease
 211 infestation, high cost of feed, high cost of inputs, inadequate funds, etc. The study recommends

212 that financial institutions should ensure availability of credit facilities to enable catfish farmers
213 make provision for improved processing and storage facilities in order to boost their
214 productivity.

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