

## Fish farmers' post-intervention utilisation of promoted aquaculture practices under the National Fadama Development Project III in Oyo State

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### ABSTRACT

Continuous utilisation of aquaculture practices promoted under Fadama III could help in the drive towards diversification of Nigeria's economy. This study assessed the utilisation of aquaculture practices promoted by Fadama III in Oyo state, years after the project had been rested. One Hundred and twenty farmers were sampled using a multistage sampling procedure. Using interview schedule data were collected on fish farmers' socioeconomic and enterprise characteristics, utilisation of promoted aquaculture practices under Fadama III, benefits derived and constraints to utilisation of the practices. Data were analysed using frequency, percentage, means, Chi Square and Pearson Product Moment Correlation at  $p=0.05$ . Fish farmers were aged  $47.0\pm 17.3$  years, mostly male (72.9%) and married (72.5%) with more than 10 years of working experience (95.9%). There was high level of utilisation of improved feed production and feeding technique by 89.2%. Benefits from use of the practices ranged from better pond management (80.8%), improved fish health (55.3%) and efficient use of resources (48.3%). Fish farmers were however mostly constrained by high start-up cost of promoted practices (86.7%) and market-price fluctuation (75.0%). There were significant relationships between type of fish raised ( $\chi^2=12.210$ ), main source of labour ( $\chi^2=18.738$ ) and utilisation of promoted aquaculture practices. Also, perceived benefits of utilising promoted aquaculture practices ( $r=0.195$ ) and utilisation of these practices were positively correlated. Microfinance banks should be mobilized to provide soft loan to fish farmers to cushion constraint of high start-up capital.

**Keyword:** Aquaculture practices, Perceived benefits, Utilisation constraints

### INTRODUCTION

Fish is a major contributor to the Nigerian population's nutritional requirements and has become an important supplement to meat due to its cheaper cost; contributing about 40% of animal protein intake. Fish production maintains a prominent position in the agricultural sector with 3-4% contribution to the annual Gross Domestic Product (FAO, 2013). Apart from providing the bulk and most affordable source of animal protein, it generates employment and income for almost 2 million Nigerians (FAO, 2014).

Nigeria is endowed with large water bodies and therefore has a high potential for marine and freshwater fisheries. However, there is still a huge supply-to-demand gap for fish and fish products with a domestic output of 0.6 million metric tons and a supply shortfall of 0.9 million metric tons (Global Agricultural Information Network Report, 2014). Consequently, this supply deficit has led the country to import about 60% of the fish consumed, making it one of the largest importers of fish in West Africa (Ndiaye, 2013). This has prompted consistent focus of domestic fish production as one of the priority value chains for development by various national interventions by Nigerian government in order to increase annual fish

production and achieve self-sufficiency in fish production and supply (Tijani, 2011).

In spite of this, the fish farm industry in Nigeria is still at its infant stage when compared to the large market potential for its production and marketing (Osarenren and Adams, 2012), perhaps because aquaculture in Nigeria is still predominantly operated at subsistence level in freshwaters with commercial farming yet to become widespread. Nwachukwu and Onuegbu (2007) report that most fish farmers operate small-scale farms ranging from homestead concrete ponds (25-40m) to small earthen ponds (0.02-0.2 hectares). However, with the great resource potential of over 1.75 million hectares of inland water surface suitable for fish production (FAO, 2006), the development of aquaculture can be enhanced by the utilisation of modern aquaculture practices.

Modern aquaculture practice is the adoption and use of innovations in fish farming. The degree of aquaculture practice put to use affects productivity, benefits derived and its subsequent development. When effectively and efficiently utilised, a good aquaculture practice yields several benefits including profit making, job creation, provision of raw material for several industries and increase in foreign exchange earnings (FAO, 2006).

With growing concerns to boost aquaculture production and increase the income of fish farmers, efforts have been made to develop new aquaculture management practices. There have been records of successful introduction of such practices in Bangladesh and Ghana (Thompson, Sultana and Khan, 2005). In Nigeria, the National Fadama Development project (NFDP) III sought to achieve this objective by promoting some aquaculture practices. While attempts have been made to evaluate the adoption of these practices in the general project evaluation, continuous utilisation of these practices is germane to achieving a sustainable fish farming practices that will bring about self sufficiency in fish farming, thereby saving huge foreign exchange investment in fish and fish products importation. This becomes imperative in the current efforts aimed at economic diversifications that are envisaged to bail Nigeria out of its heavy oil dependent mono-economy. It is against this background that this study was conceived to assess the utilisation of aquaculture practices promoted by Fadama III in Oyo state, years after Fadama III had been rested. The specific objectives of the study were to:

1. profile fish farmers' socioeconomic and enterprise characteristics
2. determine the fish farmers' utilisation of promoted aquaculture practices under NFDP III in the study area
3. ascertain the perceived benefits of utilising promoted aquaculture practices under NFDP III
4. identify perceived constraints to utilising promoted aquaculture practices under NFDP III

## METHODOLOGY

This study was carried out in Oyo state. The state covers a total of 27,249 square kilometres with a rainforest vegetation pattern in the south and guinea savannah in the north under two distinct climate seasons. The prevailing climate and soil characteristics support the cultivation of food crops and tree crops like cocoa, oil palm, kola nut, walnut and citrus. Other agricultural activities that thrive in the state include fish farming, livestock production and agro-processing. Multi-stage sampling procedure was used to select respondents for the study. In the first stage, two out of the twenty local government areas that participated in the National Fadama Development Project (NFDP) III were randomly selected. In the second stage, Economic Interest Groups (EIGs) that were fish-farming specific were isolated from the Fadama Community Association (FCAs) in the local government areas.

In all, a total of 18 fish farming EIGs were isolated. In the third stage, using sampling proportionate to size, 120 farmers were randomly selected from the 18 EIGs. Variables measured include fish farmers' Socioeconomic and enterprise characteristics, benefits of utilising promoted aquaculture practices and constraints that impeded their utilisation of these practices. The dependent variable was the utilisation of promoted aquaculture practices. This was measured by asking the respondents to indicate if their utilisation of these promoted practices was high, moderate or low since the programme was rested. Data was collected through interview schedule and analyzed using descriptive (frequency, percentages and means) and inferential (Chi Square and Pearson Product Moment Correlation) statistics at  $p=0.05$ .

## RESULTS AND DISCUSSION

### Respondents' socioeconomic and enterprise characteristics

Data in Table 1 shows that more than half (55.0%) of the respondents were between 30-49 years with a mean age of  $47.0 \pm 17.3$  years, implying that most of the farmers are in their productive age, thus, they have a higher tendency to cope with the demands of the enterprise and exploit innovative management practices they are exposed to. Majority of the respondents were male (72.9%) and married (72.5%). This is in tandem with the assertion of Abiona *et al.* (2012) that fisheries activities are mostly male-dominated. Oladoja *et al.* (2008) assert that marriage confer some level of responsibility and commitment on married individuals. This implies that the respondents have family obligations to meet and will be willing to take advantage of initiatives to first and foremost boost production, and exploit economic advantage thereof for their family welfare. Information in Table 1 further reveals that 95.9% of the respondents had more than 10 years of fish-farming experience. A household size of 4-6 persons was the modal category. These indicate that most of the respondents are not novice in this enterprise and have a relatively sizeable household to cater for. Over two-thirds (68.3%) earned more than ₦20,000.00, as weekly income from the sales of mature fish. This, in estimates, fetches majority of fish farmers an average monthly earning ₦ 60,000 which points to the fact that respondents earn a relatively moderate income from this enterprise and are likely to seek for opportunities to boost their production.

Available data in Table 1 further indicates that over three-quarters (76.7%) of the respondents raised Catfish while others (23.3%) raised Tilapia. This can be attributed to the market demand for cat fish, its resilience to harsh environmental conditions and

ability to utilise diverse feed materials. More than half (55.8%) engaged family labour in production activities which is predicated on the need to take advantage of the fairly large household size thereby reducing the cost of production. Most of the respondents (80.8%) used earthen ponds with about

two-thirds (66.7%) having less than 9 ponds, indicating that the respondents operate on a small scale. The higher use of earthen ponds is likely to be due to the relatively low cost of maintaining earthen ponds compared to concrete ponds even though the latter has its peculiar advantages.

**Table 1: Distribution of respondents by their Socioeconomic and enterprise characteristics (n= 120)**

Variable	Frequency	Percentage	Mean
<b>Age (years)</b>			
30-49	29	24.2	
40-49	37	30.8	
50 and above	54	45.0	47.0±17.3
<b>Sex</b>			
Male	73	60.8	
Female	47	39.2	
<b>Marital status</b>			
Single	3	2.5	
Married	87	72.5	
Divorced	1	0.8	
Widowed	29	24.2	
<b>Household size</b>			
1-3	14	11.7	
4-6	54	45.0	
7-9	38	31.7	
>9	14	11.6	
<b>Fish farming experience (years)</b>			
5-10	5	4.1	
11-15	80	66.7	
16-20	12	10.0	
>20	23	19.2	
<b>Estimated weekly income from sale of mature fish (₦)</b>			
≤₦10,000	10	8.3	
10,001-20,000	28	23.3	
≥20,001	82	68.3	
<b>Main type of fish raised</b>			
Catfish	92	76.7	
Tilapia	28	23.3	
<b>Main type of pond used</b>			
Earthen ponds	97	80.8	
Concrete tanks	23	19.2	
<b>Number of ponds?</b>			
1-4	35	29.2	
5-8	45	37.5	
9-12	40	33.3	

Source: Field Survey, 2015

### Utilisation of promoted aquaculture practices under NFDPIII

Results in Table 2 shows that there was a high level of utilisation of improved feed production and feeding technique by 89.2% and selective harvesting technique by 56.6%. Feeding and nutrition play a very important role in the success of fish production and is the largest operational cost of growing fish, constituting more than 50% of the

variable cost as indicated by Ozigbo, Anyadike, Adebite and Kolawole (2014). The promoted practices of maggot production from fresh poultry droppings (70.0%) and homestead fish production (56.7%) had a moderate level of utilisation among the respondents, while the least utilised promoted practices were water quality maintenance using physical and chemical parameters (68.3%), inclusion of Vitamin C and other nutrient supplements in feed to improve performance

(66.4%), use of reflexive materials on fishing grounds (55.5%) and appropriate frequency of changing water in ponds (48.3%). The high cost of the nutrient supplements, the small scale of

production and high level of technical expertise required to carry out the promoted practices may have been responsible for this.

**Table 2: Distribution of respondents according to utilisation of promoted aquaculture practices under NFDP III**

Promoted aquaculture practices under NFDP III	High Utilisation (%)	Moderate Utilisation (%)	Low Utilisation (%)
Homestead fish production	43.3	56.7	0.0
Maggot production from fresh poultry dropping	23.3	70.0	6.7
Improved feed production and feeding technique	89.2	7.5	3.3
Appropriate frequency of changing water in ponds	23.3	28.4	48.3
Use of reflective materials on fishing grounds	12.6	31.9	55.5
Inclusion of vitamin C and nutrient supplements in feed to improve performance of fish	12.6	21.0	66.4
Selective harvesting technique	56.6	24.2	19.2
Water quality management using physical and chemical parameters	7.5	24.2	68.3

Source: Field Survey, 2015

### Perceived benefits of utilising promoted aquaculture practices under NFDP III

Data in Table 3 reveals the perceived benefits of utilising promoted aquaculture practice under NFDP III. Better pond management (80.8%), improved fish health (55.3%) and efficient use of resources (48.3%) were highly benefited to the targeted fish farmers, while reduction in production time (78.2%), increased productivity (71.7%), increase in income (49.2%) and reduced pests and diseases (43.2%) were moderately

benefited the respondents. In the opinion of Olajide, Raheem and Oyedele (2014), widespread information dissemination as implicated in Fadama project intervention may have popularized likely benefits of engaging in fish production enterprise as farmers were reported to have been exposed to not less than ten different sources of information. These sources included radio, economic interest groups, the Fadama state facilitators and desk officers as well as a dedicated Fadama radio programme.

**Table 3: Perceived benefits of utilising promoted aquaculture practices under NFDP III**

Perceived benefits of utilising promoted aquaculture practices	High benefit Freq. (%)	Moderate benefit Freq. (%)	Low benefit Freq. (%)
Better pond management	97 (80.8)	21 (17.5)	2 (1.7)
Increased productivity	28 (23.3)	86 (71.7)	6 (5.0)
Increased income	39 (32.5)	59 (49.2)	22 (18.3)
Improved fish health	67 (55.3)	40 (33.6)	12 (10.1)
Reduction in production time	13 (10.9)	93 (78.2)	13 (10.9)
Reduced pest and diseases	40 (33.6)	52 (43.7)	27 (22.7)
Efficient use of productive resources	58 (48.3)	41 (34.2)	21 (17.5)

Source: Field Survey, 2015

### Perceived constraints to utilisation of promoted aquaculture practices under NFDP III

Results in Table 4 shows that respondents indicated high start-up cost of promoted practices (86.7%), market-price fluctuation (75.0%), physical exertion (71.7%), insufficient water supply (66.7%) and increase in cost of production (59.2%) as perceived constraints to utilisation of the promoted aquaculture practices. This is likely to be the reason for the low utilisation of some of the promoted practices in spite of their benefits. This view is supported by the assertion of Okunlola, Oludare and Akinwalere (2011) that new technologies are usually more expensive and could pose a constraint

to its adoption by the farmers. Conversely, inaccessible promoted practice inputs (70.0%), insufficient labour (68.3%), poaching/predators' attack (68.3%), inadequate technical support (63.3%) and low patronage (63.3%) were not perceived as constraints to utilisation of promoted aquaculture practices under NFDP III. All of these can be variedly explained in terms of ease of access to inputs, greater use of family labour, training and the support received by the fishery and aquaculture economic group from FADAMA officers.

**Table 4: Distribution respondents according to perceived constraints to utilisation of promoted aquaculture practices under NFDPIII**

Perceived Constraints to utilisation of promoted aquaculture practices	Yes	No
High start-up cost of promoted practice	104 (86.7)	16 (13.3)
Promoted practice inputs not readily available	36 (30.0)	84 (70.0)
Increase in cost of production	71 (59.2)	49 (40.8)
Inadequate technical support	44 (36.7)	76 (63.3)
Physical exertion	86 (71.7)	34 (28.3)
Low patronage	44 (36.7)	76 (63.3)
Market price fluctuation	90 (70.5)	30 (25.0)
Insufficient water supply	80 (66.7)	40 (33.3)

Source: Field Survey, 2015

Figures in parentheses are percentages

#### Relationship and correlation analyses of respondents' enterprise characteristics, perceived benefits, perceived constraints and utilisation of promoted aquaculture practices under NFDPIII

Available data in Table 5 shows that a significant relationship existed between the type of fish raised ( $\chi^2=12.210$ ), main source of labour ( $\chi^2=18.738$ ) and utilisation of promoted aquaculture practices. This implies that the level of utilisation of promoted aquaculture practices under NFDPIII is influenced by the type of fish raised (whether Catfish or Tilapia) and the main source of labour (family labour or hired labour) used. There was a significant correlation between perceived benefits of utilising promoted aquaculture practices ( $r=-$

0.195) and utilisation of these practices, suggesting that the perceived benefit derived from utilising promoted aquaculture practices is a significant factor to the utilisation of such practices, therefore, as more benefits are derived from these promoted practices, there is commensurate utilisation.

However, there was no significant relationship between type of pond used ( $\chi^2=10.061$ ), perceived constraints to utilisation of promoted aquaculture practices ( $r=-0.024$ ) and utilisation of promoted aquaculture practices. This implies that the level of utilisation of the promoted aquaculture practices is irrespective of type of ponds used in raising fish. Also, the constraints the fish farmers grappled with did not deter utilisation even though it was adjudged low.

**Table 5: Relationship between enterprise characteristics, perceived benefits, perceived constraints and utilisation of promoted aquaculture practices under NFDPIII.**

Variables	$\chi^2$	DF	r	P	Decision
Type of fish raised	12.210	2	-	0.002	Significant
Type of labour used	18.738	2	-	0.002	Significant
Number of ponds used	6.623	4	-	0.157	Not Significant
Type of pond used	10.061	2	-	0.303	Not Significant
Perceived benefits	-	-	-0.195	0.033	Significant
Perceived constraints	-	-	-0.024	0.794	Not Significant

#### CONCLUSION AND RECOMMENDATIONS

Most fish farmers reached under Fadama III are middle age, mostly male and married and vastly experience. Improved feed production and feeding technique are still being utilised and fish farmers benefited in terms of better pond management, improved fish health and efficient use of resources. Fish farmers are constrained by high start-up cost of promoted practices and market-price fluctuation. Perceived benefits of utilising promoted aquaculture practices helped in enhancing utilisation of these practices, despite daunting constraints. It is recommended that microfinance banks should be mobilized by government in terms of favourable policy to provide soft loan to fish

farmers to cushion constraint of high start-up capital.

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