

ASSESSMENT OF FACTORS ASSOCIATED WITH COMMERCIALIZATION OF NIFFR (NATIONAL INSTITUTE FOR FRESHWATER FISHERIES RESEARCH) TECHNOLOGIES IN NIGER STATE, NIGERIA.

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ABSTRACT

This study examined factors associated with commercialization of NIFFR technologies in some selected fish farming locations in Niger state. A well structured questionnaire was used for data collection. A total sample size of eighty (80) respondents showed male gender dominance with 64% and a high percentage of tertiary education graduates of 44%. For technological awareness, Heteroclaris, Water hardness kits and floating fish feed had 61%, 53.8% and 95% respectively. Also, the result established a high level of penetration and awareness of NIFFR technologies thereby establishing a positive influence on fish farming in the study area with willingness of respondent to partner with NIFFR to commercialize available technologies. The research work was able to identify access to market, strong and well organized skills, good knowledge and understanding as some of the strongest policies that can help support commercialization of NIFFR technologies.

Keyword: NIFFR, assessment, technologies, commercialization and fish farming.

INTRODUCTION

Nigeria is blessed with vast fish farming prospect but under-utilized, fish food is an excellent source of protein for ever increasing population globally and more importantly in Asia, Africa and developing countries (Frid, *et al.*, 2012; Oliver, *et al.*, 2017 and FAO 2018). Products and by products obtained from fish form direct and indirect raw material products for human consumption. The indirect consumption for humans helps to achieve a healthy labour force, stability and economic growth. However, the continuous threats to farmed fish production which arises from occasional temperature rise, flood, draught, other associated climatic conditions, challenges of increased population and depletion of natural fish stock globally calls for a proactive commercialization of fisheries research technologies. Although, extension of research findings, training of farmers remains a core and an important aspect of adoption and which has proven to be useful in knowledge transfers (Anderson, *et al.* 2007; Ohikere, *et al.*, 2011 and Olaoye, *et al.*, 2016; Azumah, *et al.*, 2018) a far more reaching effective way by which extension work thrives remain through commercialization of technologically tested innovations and in particular fish farm using extension workers (Mahaliyanaarachchi, *et al.* 2006). Commercialization is synonymously used to refer to mass production of intellectual activity, research, invention, modernization, re-structuring or creation of a new product. It is important to state that commercialization of fish farming (aquaculture) technologies will profit scientists/researchers but the

resultant mass production of these aquaculture technologies will help to penetrate existing markets, increase adoption, increase knowledge of fish farming, increase production, increase harvest, increase income, increase the use of modern technological tool, increase contributions to sustaining fish farming practices vis-à-vis making food available to non fish farming population (Mahaliyanaarachchi and Bandara, 2006; Datta, *et al.*, 2014; Samson, *et al.*, 2015; Basir, *et al.*, 2017; Kaminski, *et al.*, 2017).

Commercialization of fish farming technologies is more effective through awareness and mass production. Commercialization of fish farming technologies will help to fight poverty, low income, unemployment and climate change shock in many developing and low income countries as well as Sub-Saharan African (SSA) countries. Commercialization is a tool which can help cushion the effect of some many economic, low production and inefficiency in the fish farming when it is adequately transferred (Ahmad, *et al.*, 2017; Azumah, *et al.*, 2018). The product of technological transfer can bring about a steady increase in fish farming productivity (Bush & Marschke 2014; Diana, *et al.*, 2013; Sampson, *et al.*, 2015; Ohikere and Arudi, 2011 and Oliver, *et al.*, 2017) while Nigeria stands to be propelled by the available number of dams, water and a suitable conditions for aquaculture production in Nigeria (Ozigbo, *et al.*, 2014; Landu, *et al.*, 2019). However, the challenge is that many research institutes, like NIFFR, has not been able to commercialize several of their research innovations and technologies. It is

against this backdrop that the study was carried out with the following objectives:

- i. assess the level of awareness of NIFFR technology in New Bussa and environ;
- ii. ascertain willingness of respondent to invest in available NIFFR technologies;
- iii. assess the factors associated with commercialization of NIFFR technologies and
- iv. investigate factors militating against commercialization of NIFFR technologies.

The establishment in 1968 of Lake Research now known as National Institute for Freshwater has over the years, in line with her mandate, developed many technologies to help increase fish farming activities.

METHODOLOGY

The study was carried out among fish farmers in Dikko, Bida, Mokwa, New Bussa and its environ in Niger State, Nigeria. Niger state lies between latitude 10°00'0.00"N and longitude 6°00'0.00"E and boarder by Kwara, Kogi, FCT and Kaduna state. The study used a multi stage sampling technique to select and administer questionnaire. Questionnaire distribution was according to level of activity: Dikko (17), Bida (21), Mokwa (14) and New Bussa (28). Respondents were randomly selected from the total cluster of fish farmers in the towns chosen for the exercise having some criteria such as fish farming experience, age, knowledge of NIFFR technologies, level of aquaculture activities and other relevant characteristics necessary to achieve the predetermined objectives of the study. A well structured questionnaire was administered to Eighty (80) fish farmers from a total population sample size of 100 respondents from the all the different locations.

Krejcie and Morgan (1970) finite sample size determination was adopted for sample size determination given as:

$$n = \frac{X^2 NP(1-P)}{ME^2 (N-1) + X^2 P(1-P)} \dots\dots \text{Equation 1}$$

$$n = \frac{1.96^2 * (100) * 0.5(1-0.5)}{(0.05)^2 * (100-1) + 1.96^2 * 0.5(1-0.5)} \dots\dots \text{Equation 2}$$

$$= 80 \text{ (eighty respondent).}$$

Where

n = expected sample size

X² = the confidence level 1.96 (as per table of area under normal curve for the given confidence level)

ME² = 0.05 (degree of accuracy expected usually expressed as a proportion 0.05)

N = 100 (Total population of the study)

P = .5 (most conservative sample size of the population proportion)

RESULTS AND DISCUSSIONS

The result under sub-headings of socio-economic information, NIFFR technologies used, training, factor associated with commercialization of fish farming technologies present the study findings.

Socio – economic information

Study shows male dominance of 64% which agrees with Olaoye, *et al.*, (2016) that fish farming industry remains dominated by male gender. Majority, 57.5%, of the respondents were between the age range of 21-40 as 42.5% falls between 41-60 years. The mean age of 33year suggests those respondents are energetic in their youthful productive age which agrees with the study of (Olaoye, et al., 2016; Okonji and Osayi, 2016). Majority (61.2%) of respondents are married while 38.8% are single as observed also by Adelakun, *et al.*, (2015). Moreso, 61.2% of the respondents are literate having HND/university education, the result is in conformity with Okonji and Osayi (2016), Sanni (2018) of the sector having a high level of literacy among respondents which is probably responsible for a high percentage of awareness, knowledge and use of NIFFR technologies among respondents.

Table 1: Socioeconomic characteristics of Respondents

Respondent age	percentage	Mean
< 20	0	
21-25yr	15	
26-30yr	17	
31-35yr	30	33
36-40yr	15	
>41yr	22.5	
Gender		
Male	63.8	
Female	36.2	
Educational qualification		
Primary	11	
Secondary	17.5	
Tertiary	44	
No formal education	27.5	

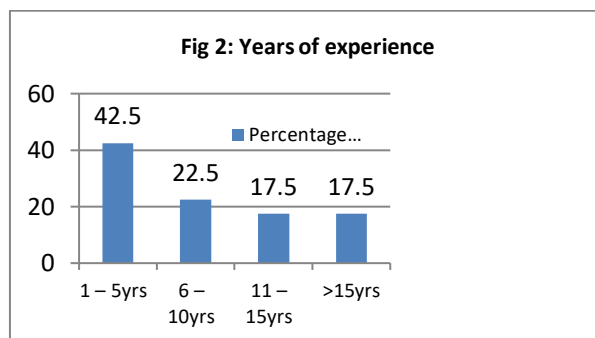
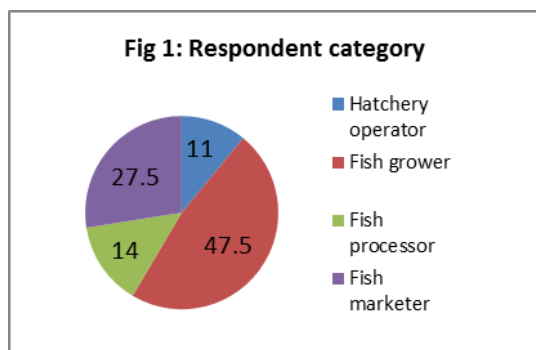


Figure 1 shows the categories of respondents. There is a fair spread of respondent around fish farming activities. About half of the respondents (47%) were fish growers which is responsible for the high rate of adoption of floating feed and *Heteroclaris technology*, about 27% are marketers, 14% are fish processors. The low percentage of hatchery operators (11%) is associated with the technicality involved in hatchery management. Many fish farmers will prefer a risk aversion and take advantage of the presence of NIFFR to engage in hatchery operation service and

set up while fish growers will buy their fingerlings from NIFFR hatchery section.

Figure 2 shows years of experience where about 43% of the respondents is within the first 5 years. The mean years of experience is 3 years indicating that most of the fish farmers have passed the trial stage. The statistic shows that a high percentage of fish farmers are experienced and people are beginning to embrace fish farming via NIFFR fish farming technologies (Sanni 2018).

Table 3: Objective 1. Test on assessment of NIFFR technologies used by fish farmers

NIFFR fisheries technologies	Percentage
A. Fry/ fingerling	
Heteroclaris	61.3
All male Tilapia	25
Broodstock	13.7
Total	
B. Water quality testing kits	
Water hardness kit	31
Hydro transparency monitor	12.5
Dissolved oxygen kit	25
PH guard kit	18.7
Metabolic Waste Siphon (Manual)	11.3
Turbidity can	1.3
C. Fish Feed	
Floating Fish feeds for: fingerlings, juveniles, growers and broodstock	95
Crust of Moina dormant cell (Zooplankton)	5
D. Fish Marketing	
NIFFR Retail Fish Table	6.25
E. Fish preservation & Processing	
Ice box	5
F. Fish Farming system	
Integrated fish farming(Fish cum poultry)	3.75
Rice-fish Farming	8.75

Table 3 shows assessment of NIFFR technologies available on the farm. Majority (61%) of the respondents stocked NIFFR *Heteroclaras*. *Heteroclaras* have some pertinent adaptive features such as it is rugged, high resistance to disease, consume less feed, attain bigger sizes and weighs much higher at harvest when compared with other *clarias* species (Okunsebor and Ayuma, 2011, Ovie and Ovie, 2014 and Sanni, 2018). The quality of water is important in fish farming, bad water quality affects retards growth and affects the health

of the fish (Mannan, et al., 2012). It was observed that 31% of the respondents use NIFFR water hardness kits to test quality of water in their fish farms as many use simple extension training knowledge transferred to test water quality. Majority (95%) use NIFFR floating fish feed technologies which is a result of adoption training and extension activities undertaken by National Institute for Freshwater Fisheries Research (Ayanda, et al., 2014, Nwabeze, et al., 2014 and Nwabeze, et al., 2019).

Table 4

Objective 2. Test on willingness to invest in NIFFR fishery technologies.

NIFFR fisheries technologies	Percentage
A. Fry/ fingerling	
Heteroclaras	85
All male Tilapia	43.8
Broodstock	17.5
B. Water quality testing kits	
Water hardness kit	53.8
Hydro transparency monitor	40
Dissolved oxygen kit	60
PH guard kit	46
Metabolic Waste Siphon (Manual)	14
Turbidity can	23.8
C. Fish Feed	
Floating Fish feeds for: fingerlings, juveniles, growers and broodstock	95
Crust of Moina dormant cell (Zooplankton)	-
D. Fish Marketing	
NIFFR Retail Fish Table	44
E. Fish Preservation & Processing	
Ice box	33.8
F. Fish Farming system	
Integrated fish farming(Fish cum poultry)	80
Rice-fish Farming	12.5

Table 4 confirms that fishers agrees that commercialization of NIFFR inventions is relevant to the fishery industry as 85%,53%and 95% are willing to partner with NIFFR in the commercialization of *heteroclaras*, water hardness kit, and floating fish feed respectively. The willingness to invest requires

training to be able to adopt, maintain and sustain the use of the technology. To further strengthen objective 2, tests were conducted to analyse respondents' opinion on training interest and willingness to pay for the training conducted by NIFFR. Table 5 and 6 reveals the result of study.

Table 4b: Willingness on partnership arrangement with NIFFR on NIFFR Fisheries technology

Partnership	Percentage
Yes	81.3
No	18.7

Partnership arrangement

The study observed that majority (81.3%) of the respondents were willing to go into partnership

business arrangement with NIFFR having taken into cognizance the relevance of NIFFR technologies to fish farming production in the area studied.

Table 5. Test on willingness to pay for training.

Amount(#)	Percentage
< 5,000	25
≥5,000	11.25
Not ready to pay	63.75

The study revealed that a large percentages of the respondents are willing to undergo training but a large population are ready to pay for the training. It is assumed that because the technology are not

commercialized, the potentials and gains of commercialized NIFFR fishery technologies has not been fully maximized by the farmers

Table 6: Test on training interest indicated by respondents

Training on Fish Products	Percentage(%)
Fish Chin chin	57.5
Retort pouch	31.3
NIFFR Fish Flakes	52.5
Tapoica Fish Flakes	52.5

Multiple responses

Table 6 shows that many of the respondents are willing to undergo training in value added products. About 58% are willing to undergo training in fish

chin- chin, 52.5% of the respondents are willing to either undergo training in either NIFFR fish flakes or Tapioca production technology.

Table 7. Objective 3. Test on factors that support commercialization of NIFFR fisheries technologies

Options	S.A	A	U	D	S.D
Access to market and information	34	25	13		
Transaction cost of commercialization	18	28	21		3
Effective fishery management regime	14	32	22		
Working together as a form of collective action	17	36	18		
Appropriate allocation of rights	19	27	23		
Strong and well organized skills	25	30	21		
Good knowledge and understanding	30	35	17	1	
Formulate the general policy of commercialization	10	39	21		
Create awareness of the policy	13	34	18		
Invite applications	7	36	21		
Classifying communities in terms of readiness	11	34	19	1	
Implementation of policy	17	33	20		1

Table 7 analysis the factors that respondents believe will support commercialization NIFFR fisheries technologies. Technological innovation is important in the world (Mowery, D.C., *et.al.*, 2004), there are also several factors that determines knowledge and technological transfers globally (Landry, 2007), 34 respondents strongly agreed while 25 agreed in table 7 believes that NIFFR technologies's access to market and their rich information which has about 34

respondents who strongly agreed and 25 agreed several challenges exist for these technologies to be transferred (Ohikere and Arudi, 2011) which are peculiar to regions and the industry. For agriculture, some of the challenges comes from the type of technology manufactured and the availability of fisheries extension services. Table 11 highlights some of the perceived constraints in commercialization of NIFFR technologies.

Table 8. Objective 4: Test on some constraint to usage of NIFFR fisheries technologies by farmers.

Options	S.A	A	U	D	S.D
Out of reach for farmers	48	21	6	4	2
Not effective	8	10	24	35	1
Very costly for the farmers	9	21	38	10	3
Highly technical	5	29	31	16	1

Not accessible	13	35	19	3	1
Administrative bottle neck	11	28	34	7	3
Non availability of NIFFR fisheries technologies	10	22	26	8	2
Poor durability	8	14	38	18	2
Produce for the elites	12	29	21	17	8

CONCLUSION AND RECOMMENDATION

The result of the study shows that National Institute For Freshwater Fisheries Research (NIFFR) has a high technology penetration in the study area with *Heteroclaris* and floating fish feed technology. Respondents also showed willingness to participate in training which indicates that NIFFR technology and activities have a positive influence on fish farming activity in the study area. However, policy makers needs to review the policy establishing NIFFR, formulate new policy(s) that will encourage commercialization, provide fund for technology commercialization drive and initiative, increase public-private partnership which will in turn increase technology penetration, employment, income generation and fish farming sustainability.

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