TOWARDS SUSTAINABLE RURAL ENTERPRISES: ADOPTION STUDY OF INTEGRATED AQUACULTURAL TECHNOLOGIES AMONG FISH FARMERS IN OSUN STATE, NIGERIA

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ABSTRACT

The study was designed to assess Adoption of Integrated Aquacultural Technologies (AIAT) among Fish Farmers in Osun State, Nigeria. Specifically, the personal attributes of respondents were described, level of awareness of integrated aquacultural technologies was determined, the sources of information on integrated aquacultural technologies available to fish farmers in the study area and constraints inhibiting adoption were also identified. A purposeful sampling procedure was used to select 150 farmers that registered with Osun State Agricultural Development Programme (ADP). Validated and structured interview schedule was used to elicit requisite information from the respondents. Simple descriptive statistical techniques were used to summarize the data, while Pearson Moment Correlation was used to make inferential deductions. The results showed that respondents had a mean age of 42.5 ± 8.12 years and majority of them (84.30%) were males. It was also revealed that higher percentage of the respondents were aware (60.0%) of the technologies. Also, majority (56%) of the respondents adopted 7-9 integrated aquacultural technologies out of 15 integrated aquacultural technologies introduced to them. Extension agents were the information providers for the respondents. In addition, there were positive and significant relationships between AIAT and educational level (r=0.316) and numbers of ponds owned (r= 0.325) at P≤ 0.05 significance level. It was therefore concluded that regular training and capacity building of the fish farmers would enhance sustainable fish farming in the study area and Nigeria in particular.

Keywords: *Fish farmers, integrated aquacultural technologies, adoption, sustainable fish farming*.

INTRODUCTION

The contribution of fish to the existence of man cannot be overemphasized, being a good source of animal protein, it plays vital roles in the nutritional diet of man, and serving as sources of employment and income (CTA, 2001). For many centuries, open water fisheries have been important as major fish food sources and for trade

in most countries of sub-Sahara Africa. In contrast aquaculture (farming of aquatic organisms) has been introduced in the last fifty years (Olakunle, 2000). Fish farming, a branch of aquaculture is defined as the raising of fish for personal use or profit (FAO, 1988). In Africa, fish production increased at an annual rate of 12.1 percent between 1984 and 1995 (FAO, 2012). The increment might have been connected to favourable attitude of farmers in many African countries who enthusiastically adopted fish farming as major economic enterprise. Also, government initiatives over time, including the Federal government's collaboration with host states and private sector to rehabilitate selected fish farms and hatcheries for the production of fish seeds in the National Special Programme for Food Security (NSPFS).

In any part of the country, the type and level of integration depends on the prevalent environmental conditions, social norms, cultural valves and religious factors. For example in northern part of the country, fish cum pig integration is not advisable because of religious factor or belief. The agricultural enterprise to be combined and their level of intensity determined the type of integration. Fish culture can be extensive, semi-intensive or intensive. The semi-intensive earthen pond fish culture is the most suitable integrated aquaculture system because of the natural eco-system that can conveniently accommodate both crop and livestock production (Ayinde, 2003). Common species of fish cultures in the state government farms include Clarias, Tilapia, Heterotis and *cynprinus carpo* (common carp). In Osun State like in other states of the federation, aquaculture is practiced on extensive and semi-intensive level, characterized with low-density culture with minimum input and low production per unit area (Fagade and Ugwumba, 1992). Fish farming in Osun state ranges from homestead fish pond to fish production hatcheries, ponds and tanks. Of these, pond fish culture is the most prevalent (Ita *et al.,* 1995).

Adoption of innovation by farmers is an important process through which systematic social change takes place in rural areas. Adoption usually passes through many stages. Ekong (2013) identified five stages of adoption. This is in line with the stages identified by North Central Rural Sociology Committee. Alao 1980 These are: awareness, interest, evaluation, trial and adoption, passing from one stage to another in a chronological order. Alao (1980) also identified these stages but he claimed that these could be fused into three, which are easily noticeable. These are: awareness, trial and adoption. However, no matter the number of stages involved, innovations like improved management practices that is seen to be of great benefit to the farmers would be followed to the last stage, which is complete adoption. Innovativeness often occurs among the adopters. This is the degree to which the individual farmers are relatively earlier in adopting new idea than others.

In 1972, some capture fisheries were practiced in some rivers and streams like Osun and Opa rivers in Obafemi Awolowo University which has served as experimental reservoir for the Department of Zoology. With the breakthrough in this research, the result leads to interest and adoption of fish farming technologies

in few towns in the State. However, about 54% of the fish consumed in the country is still being imported from other countries. Based on output from fish farming as against artisanal farming, fish farming needs to be encouraged more among Nigerians to boost the output of fishes. Raji (2003) reported that farmers are not aware of some management practices or technologies; improved feeding, fertilization, stocking using polyculture, liming and water quality management are alien to fish farmers in Osun State due to inadequate dissemination of technological information. Hence, most fish farmers in Osun State depend on trial and error method, which often resulted into low output. One is therefore enthused to investigate the extent of adoption of aquacultural technologies among the fish farmers in Osun State, Nigeria.

The main objective of the study was to investigate the extent of adoption of integrated aquacultural technologies among Fish Farmers in Osun State. The specific objectives are to:

i. describe the personal characteristics of fish farmers in the study area;

ii. identify the integrated aquacultural technologies disseminated to fish farmers in the study area and determine the extent to which integrated technologies disseminated by extension agents are adopted.

iii. identify the sources of information on integrated aquacultural technologies available to fish farmers in the study area.

v. identify the constraints associated with the adoption of integrated aquacultural technologies.

METHODOLOGY

The study was carried out in Osun State. A multistage sampling technique was used to select the respondents for the study for the sampling 10 which was Nigeria's coastal capital city for over a century (Olupona, 2011). A purposeful sampling procedure was used to select 150 farmers that registered with Osun State ADP. Interview schedule was administered to collect relevant quantitative data from the respondents. Questions were asked basically on personal characteristics of the respondents, sources of information and constraints associated with adoption of integrated aquacultural technologies among the fish farmers in the study area.

The data were analysed using SPSS software while simple descriptive statistical techniques such as frequency counts, percentages, means and standard deviation were used to summarize the data collected. Chi-square and Pearson product moment correlation PPMC were used to make inferential deductions.

RESULTS AND DISCUSSION

Personal Characteristics of the Respondents

Results in table 1 show that high percentages (47.06%) of the respondents were within age group of 41-50 years with the mean age of 42.5 ± 8.12 years. Age is usually regarded as one of the parameters generally used for measuring level of biological and intellectual maturity and experience. It also depicts that the farmers are still in their active age and have strength for aquacultural practices. Majority

(84.3%) of the respondents were male. The result indicates that majority of the fish farmers have more physical strength to meet the rigorous tasks of fish farming activities. This also contributes to the fact that male are known to fish in the area and female are processing it. Deji (2011) further opined that women are usually the vulnerables in many issues regarding them in Africa. Majority (74.5%) were married implying that they were people with responsibilities and marriage is often considered as a respected institution and married people are regarded as mature and responsible. Also, the family member could serve as additional farm labour.

Results in table 1 also show that majority (39%) of the fish farmers had no contact with extension agents. This clearly revealed that majority had no regular contact with extension agents and this can slow the rate of adoption. Very low (35.3%) of the fish farmers income is between N200,000.00 and 400,000.00. This shows that fish farming is a lucrative business. Majority (66.6%) had between 1 to 5 years' experience. This cleasrly reveals that integrated aquaculture technologies is still new in the study area and this could affect the adoption. Majority (62.7%) of the respondents did not obtain loans. This implies that they started the business with their personal money. Also, majority (72.5%) of the fish farmers crop/harvest twice a year.

Table 1. Distribution of respondents by their selected personal and socio-economic characteristics (n=150)

Personal Characteristics	Frequency	Percentage	Mean	Std. Deviation
Age				
<21-30	5	9.9		
31-40	13	25.53	42.5	8.12
41-50	24	47.06		
50>	9	17.65		
Sex				
Male	43	84.3		
Female	8	15.7		
Marital Status				
Single	9	17.6		
Married	38	74.5		
Divorced	2	3.9		
Widowed	2	3.9		
Household size				
<4	19	32.7		
4-8	32	62.8		
Contact with Extension Agents				
0	20	39		
1	8	15.69		

2	7	13.73
3	6	11.76
>3	10	19.61
Income (Naira)		
<200,000	9	17.6
200,000-400,000	18	35.3
400,000-600,000	10	19.5
600,000-800,000	12	23.5
800,000 and above	2	3.9
Fish farming experience		
1-2 years	34	66.7
3 yrs or above	17	33.3
Source of loan		
Friends and relatives	2	3.9
Agricultural credit scheme	4	7.8
Cooperative society	10	19.6
Commercial bank	3	5.9
Personal savings	32	62.7
No of cropping per year		
1	3	5.9
2	37	72.5
3	5	9.8
4	6	11.8

Source: Field Survey, 2018

Extent of Adoption of Integrated Aquacultural Technologies
The results in table 2 show that 56.9% of the respondents adopted 6-8 IAT, (19.6%) adopted between 9-11 IAT while (15.7%) adopted 3-5 IAT and very low (7.8%) adopted 0-2 IAT. The analysis revealed that IAT are new technologies and high percentage of fish farmers adopted the innovation. This result supports the work of Jibowo (2001) that adoption is significant to the level of education and extent of orientation of the farmers.

Table 2. Distribution of respondents by the extent of adoption of Integrated Aqua cultural Technologies (n=150)

Adoption score	Frequency	Percentage
0-2	4	7.8
3-5	8	15.7
6-8	29	56.9
9-11	10	19.6
Total	150	100

Source: Field Survey, 2018

Source of information available to fish farmers

Results in table 3 show that majority (86.3%) of the respondents' source information on IAT from radio. About 62.7% source information from commercial fish dealers' while 33.3% source information from television. Only 21.6% source their information from newspaper whereas 19.8% and 9.8% claimed that they source information from feed mill and internet. These are in tandem with Ladele and Edgal (2005) that radio is the cheapest source of information and quickest and the most used source of information in developing countries.

Table 3. Distribution of respondents by available information sources (n=150)

Source of information	Frequency	Percentage
Television	17	33.3
Newspaper	11	21.6
Radio	44	86.3
Internet	5	9.8
Feed mill	10	19.6
Commercial input dealers	32	62.7

Source: Field Survey, 2018

Awareness of Integrated aquacultural technologies by the respondents

The results in table 4 show that majority (80.30%) of the respondents were aware of IAT like construction of fish ponds while 51.00%, 63.00% and 78.00% were aware of liming, stocking of improved fish seed and use of imported feed, respectively. Also, 25.00%, 22.00% and 16.00% were inclusion of maggot to feed fish, use of animal waste to feed fish and practicing of integrated fish farming such as fish cum/rice or fish/cum poultry respectively. In addition, 20.00% were aware of fish breeding, 59.00% of water quality management while 96.00% of harvesting and 14.00% of processing and packaging. This implies that farmers are aware of the technologies introduced to them.

Table 4. Distribution of fish farmers according to awareness of aquacultural technologies

Aquacultural technologies	Frequency	Percentage
Modern method of fish pond construction	41.0	80.3
Liming	26.0	51.0
Stocking of improved fish seed	32.0	63.0
Use of imported feed (floating feed)	40.0	78.00
Inclusion of maggot to feed fish	13.0	25.00
Use of animal waste to feed fish	11.0	22.00
Practicing of integrated fish farming such as fish cum rice/fish cum poultry	8.0	16.00
Fish breeding programme	10.0	20.00
Water quality management	30.0	59.00
Harvesting using modern methods	49.0	96.00
Processing and packaging	7.0	14.00

Source: Field Survey, 2018

Hypothesis of the study

Result shown in table 5 depicts that four sources of information were significant to the adoption of integrated aquacultural technologies by fish farmers in the study area. The variables are television, newspaper, extension agent, radio and internet. The result further indicate that the more the magnitude of variation in these variables, the higher the number of information sources that will be adopted by fish farmers.

Table 5. Correlation and Chi-square analysis showing relationship and association between adoption of integrated aquacultural technologies and sources of information.

Variables	Chi-square	p-value	DF	Decision
Television	30.35	0.10	8	S
News paper	23.13	0.03	8	S
Extension agent	19.04	0.15	8	S
Radio	30.49	0.10	8	S
Internet	29.80	0.10	8	S
Feedmill	5.90	6.58	8	NS
Commercial input dealers	4.20	8.38	8	NS

Source: Correlation Analysis
S: Significant; NS: Non-Significant

CONCLUSION AND RECOMMENDATIONS

This study concluded that majority of the fish farmers did not have extension contact for training in aquacultural technologies and source information from radio and commercial input dealers. They crop their fish farm twice a year. Also, personal savings and cooperative society remained major source of loan/credit to fish farmers. It is therefore recommended that Government should employ more extension agents to level the wide range of gap between extension agents and farmers. In addition, government and financial institutions should stick their loan interest into a single digit.

REFERENCES

Alao J.A. (1980). Understanding small farmers adoption behavior: The Nigeria Experience. University of Ife Inaugural Lecture series, pp. 7.

CTA (2001). Sustainable agro-pisciculture systems in Sub-Saharan Africa. Summary Report of a CTA study visit. Incomplete reference

Ekong, E.E (2013). Rural Sociology: An introduction and Analysis of Rural Nigeria. Dove Educational Publishers Uyo, Nigeria.

Fagade, S.O. and Ugwumba ? (1992). Introduction to Aquaculture Chapter 1. Training and Reference Manual for Aquaculture Extensionist. Cowxi J.G. (ed.), Published by the Commonwealth Secretariat, London. pp. 290-318.

FAO (2012). Statistical Yearbook. Food and Agricultural Organization of United Nation, Rome, Italy

Jibowo, A.A. (1992). Essentials of Rural Sociology. Gbemi Sodipo Press Limited, Abeokuta, Nigeria. p. 22.

Ita E.A., Sado, E.K., Balogun, J.K. and Abioye, B. (1985). Inventory survey of Nigeria inland waters and their fisheries resources. A preliminary check list of inland water bodies in Nigeria. Special reference to ponds lakes, reservoirs and major rivers. Kanji lake research Institute, Technical Report series, No 14 LKRT, New Bussa, p. 51.

Nnaji C.J., Okoye F.C and Ogunseye, J.O. (2003). Integrated fish farming with special references to combination rate production - An Economic Evaluation. In, Eyo ? and J.O Atanda (Eds.), conference proceedings of Fisheries Society of Nigeria, pp. 40-42.

Raji A.A. (2003). A survey of Aquaculture Management Practice in Fish Farm in Osun State. Unpublished Post Graduate Diploma Project. Department of Fisheries. Federal University of Technology, Akure.

Ladele, A.A. and Edgal M.E. (2005). Potentials of Agricultural Knowledge and Information System (AKIS) - Stakeholders in participatory Extension in Oyo State, Nigeria. Journal of Rural Sociology, 4 (1/2): 100-108.

Olakunle O. (2000). Home stead Fish Pond Farming for Poverty Alleviation. A paper Presented at Workshop on Woman's work Department, Institute of Church and Society, Samonda, Nigeria.