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FACTORS RELATED WITH ADOPTION OF FISH FARMING TECHNOLOGIES IN SELECTED COMMUNITIES IN NIGER STATE, NIGERIA

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ABSTRACT

This study investigates the factors, which inhibit or facilitate adoption of fish farming technologies by individual fish farmers in Niger State. There was significant relationship between six of the ten variables investigated and these have contributed significantly ($p < 0.05$) towards predicting the adoption scores of the fish farmers. It is believed that proper assessment of these factors by researchers could be used by policy makers and executioners to improve adoption of fish farming innovations. Significant factors include farmers' age, education, pond size, access to credit, sources of information and income level. Recommendations were made involving change agents and policy markers for future fisheries and aquaculture development in Nigeria.

Keywords: Study, Factors, Adoption, Technologies, Fish farming, Communities, Nigeria

INTRODUCTION

Certain factors influence adoption of fisheries/aquaculture technologies in fish farming. The development of fisheries sub-sector of agriculture demands that

these factors be oriented in a manner that will foster, encourage, and support change in the desired direction. However optimum economic and political conditions for development may not lead to development if socio-economic condition of individual farmers do not permit acceptance of new ideas, practices, and products (Atala, 1984)

In an effort to achieve the status of self-sufficiency in fish production in Nigeria, the Federal Government has played an increasing role in fisheries development. This includes establishment of fisheries research institutes charged with the responsibility of conducting research and generating proven fisheries and aquaculture technologies on one hand, and the availability of the extension agencies charged with the responsibility of facilitating the transfer of such technologies to the end-users (fish farmers) for adoption. In order to achieve a suitable turn around in fish production therefore, the right and sufficient support in the form of appropriate technologies and their transfer to fish farmers are essential. National Institute For Freshwater Fisheries Research, New Bussa, has over time continued to popularize fisheries and fish farming technologies through various communication channels such as extension guides, radio and television media and organizing short courses in aquaculture for interested fish farmers in addition to the diploma programmes in aquaculture and fisheries management for students of aquaculture and would be-fish-farmers through its colleges. Similarly, fish feed millers and related companies have introduced some important fish farming

technologies to fish farmers while to some extent the Agricultural Development Projects (ADP) have also been channeling their effort towards creating awareness on certain recommended aquaculture practices, and persuading the farmers to adopt new fish farming inputs and practices in order to increase fish farm operators' productivity and fish farm income. Technologies under investigation in this study includes: good site selection; techniques of pond construction; pond liming and fertilization; pond and water management techniques; fish seed packaging/transportation; fish species combination; stocking density, fish feed formulation and production; fish feeding practices; natural food / zooplankton production; fish diseases/parasites identification and control; sex determination in fish; induced fish breeding and identification of culturable fish species. The need for systematic studies of the adoption of recommended fish farm practices by the fish farmers in terms of the socio-economic and institutional characteristics of the fish farmers might be considered long over due. David (1993) reported that the science of aquaculture is at the stage where it is probably technically feasible to produce fish almost every where and those constraints limiting achievement of this feat are more likely to be related to socio-economic, cultural and institutional issues.

METHODOLOGY

The study was carried out in Niger State. Study sites include the major towns which were selected in accordance with the prevalence of fish farmers in the Agricultural Development Project (ADP) zones 1, 2 and 3. Zone 1 (Bida, Agai and Lapai); Zone 2 (Minna); Zone 3 (Kotangora and New Bussa).

A preliminary survey was conducted to obtain the frame list of fish farmers from either their associations or the Zonal ADP offices. Thus the survey technique was purposive and cross-sectional. 15 fish

farmers from zone 1, 36 fish farmers in zone 2 and 30 in zone 3 making a total of 81 fish farmers. Data was collected from both Primary and Secondary sources. The Primary data was collected by the use of well-structured questionnaire, which was administered to the respondents through trained and monitored enumerators. The secondary data was collected from relevant publications such as annual reports, Journal papers, Bulletins, Extension guides and Textbooks. Descriptive statistics was used in the analysis of the data.

Correlation matrix and multiple regressions were used to predict the relationship and effects of the socio-economic factors on adoption of recommended practices in fish farming. Multiple regression model was applied using the formular: $Y_a = a + b_1x_1 + b_2x_2 + b_3x_3 + \dots + b_nx_n + U$, Where a = constant, Y_a = number of fish farming practices which the farmers continuously put into use in farming operations. X_1 = Age (in years); X_2 = Level of education (years); X_3 =Pond size (m^2); X_4 = Household size (no of people); X_5 = Fish farming experience (years); X_6 = Access to credit (number of credit sources in use); X_7 = Extension contact (Frequency of extension visit); X_8 =Sources of information (number of information source available); X_9 =Membership of social organization (no of relevant social organization); X_{10} = Income level (naira); U = error term.

RESULTS AND DISCUSSION

Males were accounted for 88% of total respondents in all the three zones (Table 1). The observed male dominance have implication for the current growing desire to integrate women into the national economies especially in terms of access to land and other farm resources. Age group of 46-55 years was in the majority (40%) in zone I while the age group of 26-45 years accounted for about 68% of the respondents in zone 2. Similarly, the group of 26-35 years of age dominates the respondents (36-7%) in zone 3. A mean

age of 42 years showed that the respondents were relatively young at the middle age and are consequently supposed to be more physically able to carry out both fish farming operations and adoption of improved practices since younger people are more mentally alert and have greater flexibility in accepting new ideas in dealing with risks (Akinola, 1987; Polson and Spencer 1992; Sanni, 2009). Over 70% had tertiary education in all the zones. This high literacy level shows a high prospect for aquaculture in the study area because fish farming is a high risk and management intensive industry requiring application of skills by the fish farmers.

Civil servants form the majority among the respondents in all the zones, with 9.8% having fish farming as their main occupation (Table 2). This means that fish farming is an important means of diversifying livelihood activities in Niger state. The average annual income from all sources of the respondents was found to be ₦ 240,414.00 while 19.8% of them had annual income of over ₦301,000.00. Similarly, the mean years of experience was 7 while about half the population of the respondents had 1-5 years of fish farming experience with a very few (2.5%) of them having been into fish production for about 16 -20 years.

A mean number of visits of 13times/year by fish farmers to other fish farms were found to be the practice in the study area (Table 3). Visits to other fish farms foster interaction and diffusion process among fish farmers on the important technologies in fish farming. Data on pond size shows that over 60% of the respondents had relatively small pond size of 200 squared meters and below. Mean pond size of 129 squared meters was recorded in the study. This was probably due to the scale of operations and the financial resources at the disposal of the fish farmers as Panayotou *et al.* (1982) reported that pond size and the number of ponds per farm

have economic and management implications for the fish farm operators.

About 38% of the respondents (Table 4) depend on print and electric media for information, 43% depend on the combination of National Institute For Freshwater Fisheries Research and University, while only 18.5% laid claim to have benefited from ADPs for information on fish farming. A closer look at extension contact in table 4 shows that information from extension agent comes to fish farmers on irregular basis with 81.5% totally cut out from extension information. Thus there is inadequate extension service delivery for the fish farmers in the study area. Majority (55.5%) depends on personal savings while 22% claimed to obtain fund from thrift and credit societies for financing their farms. However only 8.65% had benefited from formal bank loans indicating inadequate financial support for the fish farmers from formal financial institutions. Some (13.6%) however had support from all available sources for funding. Only 34.4% of the total respondents were members of fisheries related associations who utilized their professional knowledge to access fisheries information from other colleagues as well as obtain financial support for fish farm financing from their associations.

Table 5 showed that six of the ten variables examined have significant effect on adoption of fish farming technologies. These include age (0.0012); access to credit (0.0009); sources of information (0.013) and income level (0.0004) respectively. These are in line with the findings of Rogers (1991), Ifejika *et al.* (2007) and Sanni (2009) who found these variables significant in their studies. The significant result on the level of education shows as people become more educated they are more curious and enthusiastic in adopting new technologies. Similarly, as the size of farm (pond size) increases more resources in terms of input would be required, hence the need to adopt more

technologies. Also, with more access to credit more opportunities are opened to procure and use more technological inputs in fish farming. In sources of information and improved income level, a fish farmer would be availed with better chances of

adopting proven technologies on a larger and continuous scale for fish production (Sanni, 2009). The weak relationship between extension contact and adoption is probably due to non-regular extension service in the study area.

Table1: Distribution of the respondents based on sex, age, marital status, household size and level of education

Socio-economic characteristics	Zone 1		Zone 2		Zone 3		Total No. = 81.	
	Freq	%	Freq	%	Freq	%	Freq	%
Sex								
Male	15	100	29	81	27	90	71	88.0
Female	-	-	7	19	3	10	10	12.0
Age (years)								
15 - 25	-	-	1	2.7	1	3.0	2	2.5
26 - 35	2	13	10	27.7	11	36.7	23	28.0
36 - 45	4	27	15	41.6	6	20	25	31
46 - 55	6	40	6	17	6	20	18	22
Greater than 55	3	13	4	11	6	20	13	16
Non - formal education								
Primary school	1	8	1	27	3	10	5	6
Secondary school	2	13	7	19	5	17	14	17
Diploma /N.C.E	5	33	7	19	10	28	3	10
HND	5	33	10	28	3	10	18	22
University degree	2	13	11	31	9	30	22	27

Table 2: Distribution of the respondents according to Main occupation, Annual income and Farming experience

Socio-economic characteristics	Zone 1		Zone 2		Zone 3		Total	
	Freq	%	Freq	%	Freq	%	Freq	%
Main occupation								
Fish farming	2	13	4	11	2	7	8	10
Crop/Livestock farming	2	13	2	6	-	-	4	5
Civil servant	11	74	19	53	24	80	54	67
Military	-	-	5	14	4	13	9	11
Trading/Business	-	-	6	16	-	-	6	7
Politics	-	-	-	-	-	-	-	-
Annual Income (₦) 50,000 - 100,000								
101,000 - 150,000	-	-	-	-	-	-	-	-
151,000 - 200,000	4	27	6	17	2	7.0	12	15
201,000 - 250,000	2	13	10	27.7	9	30	21	26
251,000 - 300,000	3	20	10	27.7	9	30	21	26
301,000	6	40	10	27.7	10	33	26	32
Experience								
1-5 years	9	60	11	31	21	70	41	50
6 - 10 years	3	20	13	36	6	20	22	27
11- 15 years	2	13	12	33	2	7	16	20
16- 20 years	1	7	-	-	1	3	2	2.5

Table 3: Distribution of the respondent based on the frequency of visits to their farms, pond size and profit level

Socio-economic characteristics	Zone 1		Zone 2		Zone 3		Zone 4	
	Freq	%	Freq	%	Freq	%	Freq	%
Freq. of visits to other fish farms								
Less than 5 times a year.	8	53	-	-	15	50	23	28
5-10 times a year	4	22	-	-	8	27	12	15
11-15 times a year.	1	7	-	-	5	20	6	7
16-20 times a year.	2	13	20	56	2	7	24	30
Greater than 20 times a year.	2	13	16	44	-	-	16	20
Pond size								
Less than 50 sqm	2	13	4	13	14	47	16	20
50-100 sqm.	4	27	6	14	10	33	19	24
101-200 sqm	3	20	6	17	6	20	20	25
> 200 sqm	6	40	20	56	-	-	26	32

Table 5: Regression of socio economic and institutional factors affecting adoption of fish farming technologies

Independent Variables	Correlation Coefficient (r)	Regression coefficient	Standard Error	T- ratio	P-value
Age	-0.506*	-0.0024	0.0011	2.080	0.004*
Level of education	0.611*	0.5000	0.031	6.444	<0.0001*
Household size	0.3103	0.0070	0.084	0.1193	0.860
Pond size	0.4810*	0.3084	0.116	3.383	0.0012*
Farming experience	0.2111	0.1086	0.0973	1.115	0.2680
Access to credit	0.606*	1.468E-05	5.55E-06	2.640	0.00099*
Extension contact	0.204	0.0217	0.03164	0.0684	0.4958
Sources of information	0.721*	0.1246	0.2003	3.367	0.0013*
Social participation	0.2000	0.6135	0.2112	2.905	0.480
Income level	0.710*	1.32E-07	6.996E-07	3.809	0.0004*

$R^2 = 0.55$; Degree of freedom=70; R (*) = Correlation coefficient significant at 5% level of possibility;

(r)*=Regression coefficient significant at 5% level of probability.

Table 4: Distribution of the respondents based on the sources of information

Socio-economic characteristics	Zone 1		Zone 2		Zone 3		Total No = 81	
	Freq	%	Freq	%	Freq	%	Freq	%
Sources of information								
Print and electronic media.	11	73	11	31	9	30	31	38
Research institute universities	1	7	16	44	18	60	35	43
Extension agents	3	20	9	25	3	10	15	19
Sources of financing								
Personal savings	7	47	20	56	18	60	45	56
Cooperative associations	3	20	8	22	7	23	18	22
Bank loans	2	13	3	8	2	7	7	9
All sources	3	20	5	14	3	10	11	14
Extension contact								
Fortnightly								
Monthly	-	-	-	-	-	-	-	-
Quarterly	-	-	-	-	-	-	-	-
Not regular	3	20	9	25	3	10	15	18.5
None at all	12	80	27	75	27	90	60	81.5
Social participation								
Catfish farmers Association	2	13	6	17	3	10	11	14
Association of fish farm owners	-	-	4	11	-	-	4	5
Association of fingerlings producers	3	20	10	28	-	-	13	16
Fish marketers Association	-	-	-	-	-	-	-	-

CONCLUSIONS

The study revealed fish farming like other ventures is male dominated. Fish farming business in the study area was predominantly in the hands of civil servants with mean age of 42years. Also a mean pond size of 129 meters squared and mean income of ₦240,414 were obtained for the respondents. Over 70% of the respondents had tertiary education. The mean age of 42years and high literacy level have indicated high prospect for fish farming in the study area since the respondents were dominated by young and middle-aged group with appreciable educational level, traits that facilitate fast and prompted response to adoption-decision process coupled with skill application in resolving attendant problems in fish farming (Polson and Spencer, 1992). There was generally low level of institutional credit such as bank loans to fish farmers while extension contact was found to be irregular in some areas, thus contributing to scanty information on available fish farming technologies.

Age, education, pond size, access to credit, sources of information and income level were found to show significant relationship with adoption and thus significantly contributed to predicting the adoption behaviour of fish farmers.

RECOMMENDATIONS

- Government should step up effort in funding extension agents to actualize aquaculture extension in the study area so that proven technologies could be transferred to fish farmers for adoption.
- As a complement to local credit facilities available to individual fish farmers, micro finance institutions should be encouraged to target the small-scale fish farmers in their credit programmes. This will help in the procurement of inputs for fish production.
- The change agents and policy makers should take special cognizance of the six significant factors, identified to influence fish farmers' adoption decisions in their fisheries and aquaculture management plans. This is to forestall the possibility of the socio-economic factors hindering progress in future management plans

REFERENCES

- Akinola, A.A (1987). An application of project analysis to the adoption of tractor hiring service scheme in Nigeria. *Oxford Agrarian Studies* 16: 70-82
- Atala, T.K. (1984). The relationship of socio-economic factors in agricultural innovation and utilization of information sources in two Nigerian villages. *The Nig. J. of Agric. Exten.* 2(1&2):1-10.
- David, H.L.T. (1993). *Socio-economic and Cultural factors in Aquaculture*, No. 119: 329-343.
- Ifejika P.I, Ayanda, J.O and Sule, A.M. (2007). Socio-economic variables affecting aquaculture production practices in Borgu LGA in Niger State, Nigeria. *J. of Agric. and Soc. Res. (JASR)* 7(2):20-29
- Panayotou, T., Wattenutchariya, S., Isvilanoda, S. and Tokrisna, R (1985). *Catfish farming in Central Thailand*, Kasestart University Research and Development Institute, Bangkok, Thailand
- Poison, R.A and Spencer, D.S (1992). Adoption process in subsistence agriculture: The case of cassava in Southwestern Nigeria, *IITA* 5:12-16, Ibadan, Nigeria
- Rogers, E. M. (1982). *Diffusion of innovations*. 3rd Edtn. Colheir Macmillan Publishers, London, pp. 163-194
- Sanni A.O (2009). Analysis of socio-economic and institutional factors

affecting adoption of aquaculture technologies in two local Government areas of Kaduna State.
MSc Thesis, Ahmadu Bello University Samaru, Zaria.