Adoption of Aquaculture Technology by Fish Farmers in Lagos State, Nigeria

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Abstract: This paper focused on the extent of adoption of aquaculture technology introduced to fish farmers in Lagos State, Nigeria. Researchers have developed technology packages and disseminated it to the fish farmers through extension agents so as to improve aquaculture in Nigeria. The package included nine practices that fish farmers were expected to adopt. Data were collected from fish farmers through structured interview scheduled. Frequency counts and percentages were used as descriptive method of analyzing the data. Results showed that fish farmers adopted mainly three aquaculture technologies introduced by extension agents. These include pond fertilization (89.8%), water quality management (81.9%) and weed control (81.9%). Reasons for non-adoption of technologies include fund (99.1%), effect of the technology (60.0%), skill/manpower (59.0%). To increase the level of adoption of aquaculture technologies in Nigeria, it is necessary to provide fish farmers with credit facilities. Also, extension agents should be provided with motorcycles to enable them visit fish farmers more frequently to provide skill and encourage them to adopt technologies introduced to them.
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1. Introduction

The rapid increase in world population has resulted in a huge increase in the need for animal protein and other nutritional requirements. This is particularly crucial in developing countries like Nigeria where there is widening gap between supply and demand of fish leading to the large scale fish importation. Fish provides roughly 40% of the protein intake for nearly 2/3 of the world's human population (Oyetoro and Akinboye 2010). The use of fish as source of protein to aid growth and development of both human and livestock cannot be over emphasized. Fish complements meat since the cost of the later is beyond what most Nigerians can afford. (Adeokun et al 2006). Aquaculture is the farming of fish in confined waters (Omitoyin 2006). It also includes the husbandry, management, and multiplication or breeding of all useful aquatic organisms in manmade ponds, cages or other enclosures in lakes and coastal waters' (Ogunremi 2010). Green facts (2004) showed that aquaculture is the fastest growing animal based food production sector particularly in the developing countries mainly China and other Asian countries. In Africa, the governments of the continent under the aegis of the African Union, have identified the great potential of aquaculture and are determined to encourage private sector investment (NEPAD, 2005).

Nwachukwu and Onuegbu (2007) reported that the development of aquaculture can only be enhanced by the introduction of modern technologies. While there have been instances of successful introduction of technologies to boost production in Ghana (World fish centre 2005), the major problem has been the lack of appropriate technology. The adoption of new technology is described as innovation decision process through which an individual passes through the time of first knowledge of the innovation to a decision stage of either adoption or rejection and confirm the decision (Ekong 2002). The decision to adopt innovations involves risk on the part of the farmer. The farmer therefore has to be convinced of the superiority of recommended technology over the existing one. (Adeokun et al 2007). The main objective of the study was to identify the level of adoption of aquaculture technology by fish farmers in Lagos State, Nigeria. The specific objectives were to: describe the personal characteristics of fish farmers in the area of study; identify various types of technologies disseminated to the fish farmers via extension service and various levels of adoption and determine reasons for non-adoption of technologies.

2. Materials and Methods

The research was carried out in Lagos State of Nigeria. List of farmers were obtained from Lagos State Agricultural Development programme (LSADP). Eighty-eight fish farmers were randomly selected to constitute 60 percent of the total fish farmers. Structured interview schedule was used to collect information from the respondents. The fish farmers were asked to list technologies disseminated

to them by extension agents, technologies adopted and reasons for adoption of innovation. The data collected were analyzed using such statistical tools as frequency counts and percentages.

3. Results

Table 1 presents the personal characteristics of the respondents, while Table 2 shows the adoption of aquaculture technologies by farmers and figure 1 indicates the reasons for non- adoption of aquaculture technologies.

Table 1. Distribution of Fish Farmers by Demographic Characteristics

	Variable	**Frequency**	**Percentage**
Gender	Male	87	98.9
	Female	1	1.1
	Total	88	100
Age (years)	20-30	10	11.4
	31-40	20	22.7
	41-50	37	42.0
	> 50	21	13.8
	Total	88	100
Marital status	Single	7	8.0
	Married	74	84.1
	Divorced	6	5.7
	No response	1	2.2
	Total	88	100
Dependents	None	16	18.2
	1-5	51	58.0
	> 5	21	23.8
	Total	88	100
Educational	Non formal	2	2.3
	Adult Literacy	4	4.5
	Primary	11	12.5
	Secondary	31	35.2
	Tertiary	29	33.0
	No response	11	12.5
	Total	88	100

Table 2. Technologies introduced to Fish Farmers

Technologies	Adoption of technologies	Percentages
Fingerlings Production technique	53	25.9
Pond fertilization method	12	5.9
Stocking method	195	95.1
Water quality management technique	124	60.5
Fish feeding technique	195	94.6
Weed control method	9	4.4
Pond draining method	130	63.4
Fish seed Transportation method	50	24.4

Fig. 1:Reasons for non – adoption of Technologies
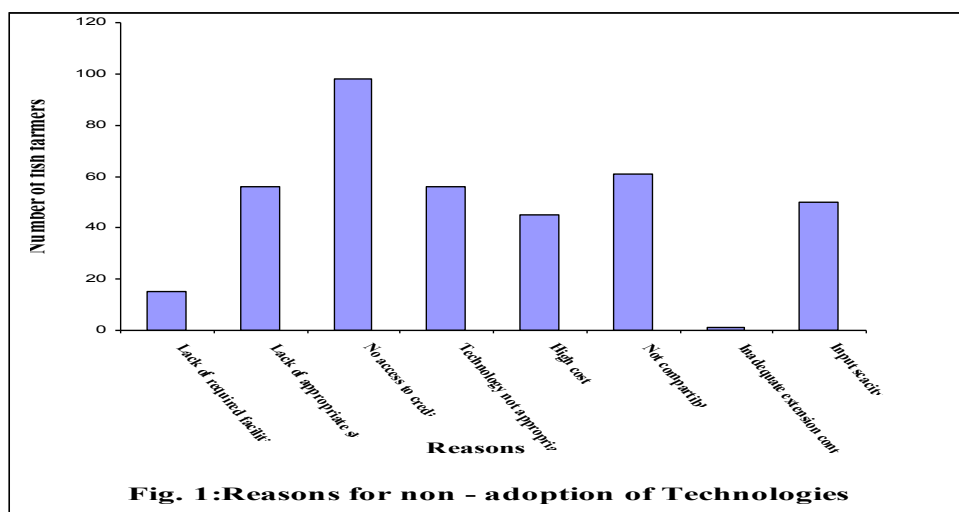
Fig. 1. Reasons for non-adoption of Technologies

Discussions

From table 1, almost all the respondents were male 98.9%, more males are involved in fish faring than females, most of the farmers are between the age of 30 - 50years (674.7%). Age is very important in adoption decision-making because it requires maturity, mental and psychological alertness. Age can affect perception, attitude and adoption of innovation (Adesiji 2004). Thus, there is need to encourage younger people to go engage in fish farming. It can be observed on the table that the highest percentage accounted for married respondents was (84.1%), only (8.0% were single (Oyetoro and Akinboye 2010, Nwachuwu and Onuegbu 2007) reported higher percentages of married among fish farmers. It can be inferred that the married have extra hands to work with on their farms hence can embark on more farming activities. Also, 85.0% have between 1 and 5 dependents, while 23.8% have more.

On the educational level of the respondents, 12.5% had minimum education of primary school, 35.2% attended secondary schools while 33.0% attended tertiary institutions. The implication of this is that, information dissemination by extension agents through leaf lets, extension guides, and other print media might make impact in improving fishing activities in the area of study since most of the fishermen could read and write it could also be seen that majority of the fish farmers in the study area (84.1%) engage in fish farming as their primary

occupation while the remaining (15.9%) engage in fish farming as their secondary occupation.

Results from Table 2 shows higher adoption level for stocking (95.1%), fish feeding (94.6%), pond draining (63.0%) and water quality management (60.5%). Pond fertilization (5.9%), weed control (4.4%) and fish breeding (25.9%) recorded low adoption. High adoption rate of fish feeding was reported by (Tejiri and Fregene 2011). The reason for the high adoption level of stocking, fish feeding and pond draining were paramount because it invariably determines the yield. Stocking signifies the number of fish to put in water, for feeding the quality and quantity of nutrients needed by fish and the timing of feed application is important. Good water quality management will prevent retarded growth and outbreak of diseases, if a pond is not well drained when harvesting, it will affect fish stocked later as those remaining will cannibalize on them thus the farmer will incur loss. Omitoyin (2002) reported that feed is a major input in aquaculture. The adoption of new technology and production practices is often the key to maintaining a profitable agricultural operation (Ogunremi 2010). Figure 1 shows reasons for non- adoption of technologies introduced to fish farmers in the study area. Technologies were generated for farmers without their input in most cases. Inputs for developed ones are either not available or avoidable; consequently, most of the technologies generated are not suitable to the farmers needs and have relatively limited acceptability (Akinbile, 2002). It has been noted that people do not just adopt a technology because it is available to them. Even when the technology is available and appropriate, some personal and socio-cultural factors bear on the decision of clienteles to adopt or not (Adesehinwa and Bolorunduro 2007). Most of the fish farmers (98%) asserted that credit was a major reason for non- adoption of technologies. As regards cost implication, Abadi *et al*; (2003) agreed that if it is perceived that an innovation is more subject to price variability. Adu (2007) submitted that farmers' needs and objectives are the primary stimuli for adoption of technology. Angba (2000) however, discovered that adoption takes place only when the constraints due to a new technology are overcome such that farmers are able to take adoption decisions. Male were mostly into fish farming in Lagos State. The factors influencing adoption of technologies in the study area were mostly fund, skill or manpower, how applicable the technology could be. When fish farmers do not see a technology as generating in come immediately, the motivation to commit resources to the venture will not be there. It is therefore recommended that:

1) Enough find should be made available to fish farmers for expansion of their farming activities.
2) The government through the extension agents should enlighten fish farmers on various ways of raising fund. (Nigerian Agricultural Cooperative and Rural Development Bank (NACRDB, loan Scheme).
3) Extension agents should also come up with programmes that will encourage fish farmers.
4) Extension agents should visit fish farmers timely so as to provide the needed skill, guide and draw up programmes that will encourage fish farmers on adoption of technologies to boost fish production in the country.
5) Fish farmers should properly organize themselves in to cooperatives so that government can channel various aids, and loan.

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