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Adoption Levels of Improved Fisheries Technologies and Impacts of Extension Services on Fisher-Folks in Two Maritime States in Nigeria

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Abstract: A study to determine the awareness and adoption levels of disseminated fisheries technologies and the impacts of extension activities among the rural fisher-folks was carried out in two Nigerian maritime states of Lagos and Rivers. Structured questionnaire was used through interviewed schedules to obtain information from respondents in two fishing villages in a local government area in each state. The fisherfolks were randomly selected and consisted of fishermen, fish processors and fish farmers. The Agricultural Development Projects (ADPs) in the states assisted in the selection of the study sites. Data collected were analyzed by simple descriptive statistics of frequencies percentages and means. Results obtained showed that about 57.5% of the fisher-folks were in the economically active age group of 31-50 years, with mean age at 38 years in Lagos and 30 years in Rivers. Female fisher-folks constituted 30.0% of the respondents. The modal house hold size for both states was 6-10 constituting 51.3% of the respondents. About 50.0% of the fisher-folks had at least secondary school education with some of them (51.3%) relatively young in the business (1-10years experience). In spite of the fact that about 60% of the respondents were members of cooperative societies, most of them (81.0%) finance their businesses with personal funds. Fisher-folks in Lagos had higher levels of awareness (76.5-85.3%) and adoption (70.6-79.4%) of aquaculture technologies than Rivers state, with awareness and adoption levels of 7.5-22.5 and 5.0-20.0%, respectively. The awareness and adoption levels of disseminated technologies in post harvest handling in capture fisheries were lower in Lagos (26.5-47.1 and 17.6-47.1%, respectively) than in Rivers state (45.0-72.5 and 25.0-50.0%, respectively). On the average, more impact was recorded in both states on better income from fishing, fish processing and quality of diet. The most constraining factors to adoption among the respondents were high cost of adoption inputs, insufficient creation of awareness, scarcity of adoption inputs and lack of technical support in adoption practices, among others. Recommended measures to promote awareness and adoption levels in the two states vis-à-vis Nigeria as a whole, include proper testing and validation of recommendations at the fisher-folks' end before pushing the technologies for mass adoption, improvement of various strategies used in disseminating improved technologies and proper funding of fisheries extension activities to promote adoption and overall fisheries development.

Key words: Adoption studies, fisheries technology, fisher-folks, fisheries extension, Nigerian maritime

INTRODUCTION

Lagos and Rivers states are two maritime states in Nigeria with abundant fisheries resources in the ocean, creeks, lagoons and the inflowing rivers. The predominant economic activities of the indigenous populations are largely fisheries related-fishing, processing and marketing of fish products. The two states have benefited tremendously from fisheries development related interventions from Nigerian Government and International Organizations. Such interventions had the primary goals of improving the efficiency of operation of the fisher-folks, improving their living standard and ensuring environmental sustainability of fisheries resources. Among development programmes targeted at the fisher-folks in the two coastal states were coastal artisanal fisheries canoe mechanization scheme in 1962; improved smoking of Bonga project in 1963, National Accelerated Fish Production Project in 1973 and more recently, coastal artisanal fisheries development project by the UNDP between 1995 to 2000 (Bolorunduro, 2001). The fulcrum of these interventions was improved technologies that were packaged and disseminated to the fisher-folks.

Adoption does not necessarily depend on the development of a new technology or recommendation. The packaging of a technology, the extent of awareness

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creation by extension agencies using various extension delivery strategies, the friendliness in adaptation and perceived benefit(s) all play significant roles in the adoption of such technology. Research institutions in Nigeria, realizing the significant nutritional roles fish products, developed improved technologies with the hope of transforming the artisanal fisheries sub-sector. Such technologies have been documented (NAERLS, 2001).

Adoption of fisheries technologies has been relatively low when compared with other agricultural technologies in Nigeria (NAERLS, 1999). The reasons for this development have been documented. This includes among others high cost of inputs, difficult technical features of some technologies and insufficient awareness creation (Vabi and Williams, 1991; Bolorunduro and Falaye, 2003; Bolorunduro *et al*., 2005).

The Agricultural Development Projects (ADPs) in Lagos and Rivers States are the grass root extension agencies that promote technology adoption through their interactions with farmers and fishermen. Since the two coastal states contribute significantly to the fish products consumed in Nigeria (Bolorunduro and Falaye, 2003), it is necessary to study the awareness and adoption levels of improved fisheries technologies available and the impacts of adoption of such on the livelihood of the fisher-folks. The specific objectives were:

- To determine the socio-economics characteristics of the respondents.
- To assess the awareness and adoption levels of improved fisheries technologies.
- Identify constraints and problems encountered by fisher-folks in adoption.
- To determine the impacts of fisheries extension services on the fisher-folks.

MATERIALS AND METHODS

Lagos and Rivers states were purposively selected for the study. The total sample size was eighty fisher-folks, i.e., forty per state. Selection of these states was based on their significance in fisheries production. The Agricultural Development Projects (ADP) in each of the selected states was surveyed to know the improved fisheries technologies available in their domain and the approaches used in their dissemination. The ADPs assisted in location survey of selected fisher-folks in each state to establish the adoption levels and impacts of extension activities. Forty questionnaires were administered to fisher-folks in two fishing villages in a Local Government Area in each state. The underlying factor for the choice of L.G.A. was the popularity of practice of fisheries production activities. Secondary data on available technologies were collected from research and extension agencies in the two states. Data was analyzed using descriptive statistics such as frequencies, percentages and means.

RESULTS AND DISCUSSION

Socio-economic characteristics of respondents: The socio-economic characteristics of fisher-folks in the two states are presented in (Table 1). The economically active age groups consist of 31-50 years with 57.5% in Lagos and 57.5% in Rivers, with the mean age been 38.0 and 30.0, respectively in the two states. Studies have shown that middle age farmers are more inclined to adoption of innovations (Fedder *et al*., 1985; Bolorunduro *et al*., 2005). Even though males significantly dominated the fisher-folks population in both states (Lagos and Rivers) with a proportion of 70%, fishing and fish farming activities are not exclusively a male occupation.

Dominant household sizes were 6-10 members per household with 55.0% of respondents in Lagos and 47.5% in Rivers. Most of the fisher-folks were literate with primary, secondary or tertiary educational attainment. The implication of this is that adoption of modern

Table 1: Socio-economic characteristics of the respondents

	States		
Characteristics	Lagos (%)	Rivers (%)	Average (%)
Age			
20-30	10.0	27.5	18.6
31-40	20.0	25.0	22.5
41-50	37.5	32.5	35.0
51-60	17.5	10.0	13.8
> 60	15.0	5.0	10.0
Mean, Lagos = 38.0 Rivers = 30.0			
Sex			
Male	70.0	70.0	70.0
Female	30.0	30.0	30.0
Household size			
1-5	35.0	40.0	37.5
6-10	55.0	47.5	51.3
11-15	5.0	7.5	6.3
> 15	5.0	5.0	5.0
Highest education			
Non formal	15.0	10.0	12.5
Primary	25.0	47.5	36.3
Secondary	37.5	27.5	32.5
Tertiary	22.5	15.0	18.8
Years of experience			
1-10	67.5	35.0	51.3
11-20	12.5	30.0	21.3
21-30	12.5	20.0	16.3
31-40	5.0	12.5	8.8
> 40	2.5	2.5	2.5

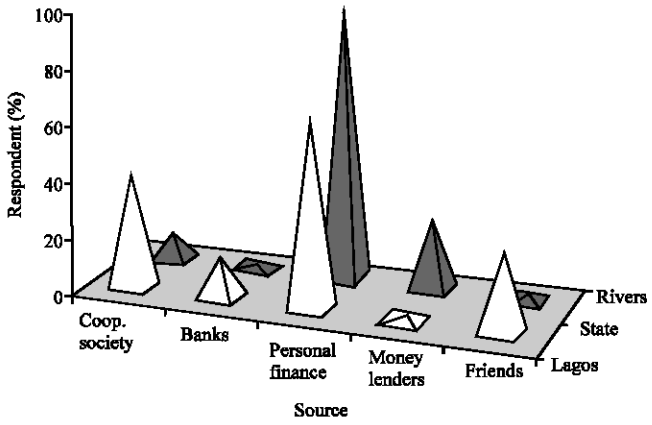

Fig. 1: Sources of credit for business

technologies can be accelerated, since level of education is known to be influential in the adoption decision of farmers (CMMYT, 1993). About 67.5% of the fisher-folks in Lagos have between 1-10 years business experience, with only 35% of respondents in Rivers having same. On the average, 51.3% of respondents in both states had between 1-10 years business experience. In (Table 2), it can be seen that 57.5% of fisher-folks in Lagos and 62.5% of those in Rivers belong to cooperative societies with an average of 60% in both states. The major source of business finance among the fisher-folks in the states was savings (internally generated fund), with an average of 81.3% of respondents in this category (Fig. 1). The implication is that without adequate credit sources fisher-folks would continue to operate at mere subsistence level.

Dissemination of improved fisheries technologies: In research and extension systems, the development of improved technologies must be backed up with efficient dissemination. The approaches/strategies used, will determine to a great extent the awareness creation and eventually the level of adoption. River state located in the South-South geo-political zone of Nigeria is a maritime state just like Lagos that is situated in the Southwest zone. Both states are located within the mandate area of the Nigerian Institute for Oceanography and Marine Research (NIOMR). While Lagos hosts the NIOMR headquarters, Rivers state host an outstation of NIOMR and the African Regional Aquaculture Center (ARAC). This obviously makes the states advantageous in directly benefiting from improved technologies developed by the Institute and other Institutions (especially the Universities around the zones). The levels of awareness and adoption of improved aquaculture and capture fisheries technologies disseminated in the two states are shown in (Fig. 2 and 3).

Table 2: Membership of cooperative societies and sources of credit for business

	States				
	Lagos		Rivers		
	Freq.	(%)	Freq.	(%)	Average (%)
Membership of coop.					
Yes	23	57.5	25	62.5	60.0
No	17	42.5	15	37.5	40.0
Sources of credit*					
Coop. Society	16	40.0	4	10.0	25.0
Banks	6	15.0	1	2.5	8.8
Personal finance	26	65.0	39	97.5	81.3
Money lenders	1	2.5	10	5.0	13.8
Friends	11	27.5	1	2.5	15.0

* Multiple responses

In (Table 3), it can be seen that fisher-folks have high range of awareness levels (76.5-85.3%) and correspondingly high adoption levels (70.6-79.4%) of aquaculture technologies in Lagos state, while the range of awareness (7.5-22.5%) and adoption levels (5.0-20.0%) were dismally low in Rivers state. Adoption time was however earlier in Lagos than in Rivers State. Such aquaculture technologies include criteria for site selection, safe methods for fingerlings transportation, pond fertilization techniques, feeding practices and pond disease control.

Table 4 shows that in capture fisheries, awareness levels ranged from 26.5-47.1% for various disseminated technologies in Lagos state with corresponding comparable adoption levels of between 17.6-47.1% (Fig. 4). In Rivers state however, awareness levels of disseminated capture fisheries technologies was slightly higher as shown on (Fig. 5), varying from 45.0-72.5% with adoption levels ranging from 25.0-50.0%. Earliest adoption time of capture fisheries technologies was 1990 in Rivers as against 1986 in Lagos state. The period of 1986-1990 marked the intensification of awareness creation by the

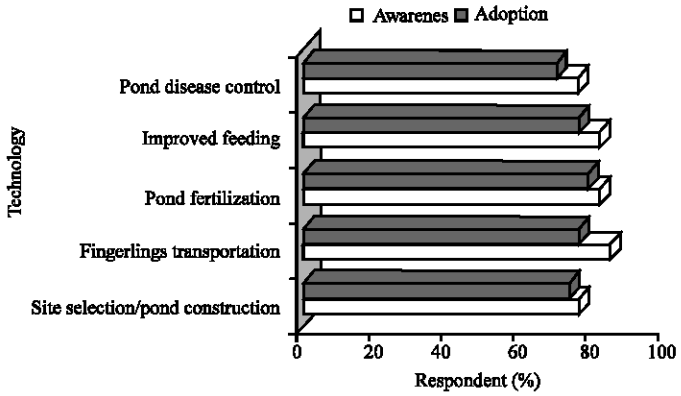

Fig. 2: Awareness/Adoption level of disseminated aquaculture technologies in lagos

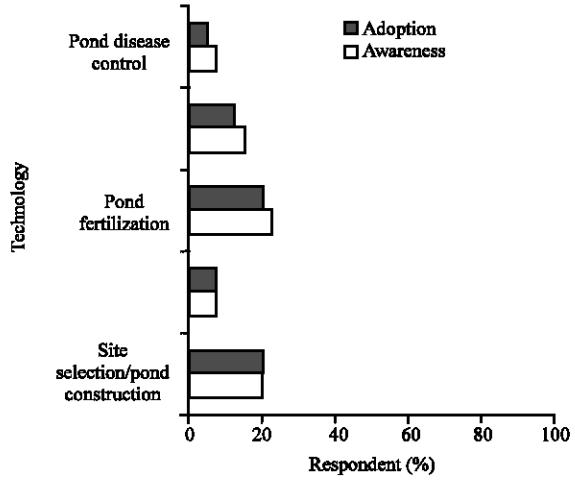

Fig. 3: Awareness/Adoption level of disseminated aquaculture technologies in rivers

States' Agricultural Development Projects (ADPs) under the unified agricultural extension system under the T and V extension approach. The capture fisheries technologies disseminated in both states include fishing gears maintenance practices, use of appropriate fishing net mesh sizes, hygienic fish products' handling, use of improved smoking kiln and efficient packaging of products. Results in (Table 3 and 4) showed that fisher-folks were more inclined toward the adoption of capture fisheries technologies in Rivers than in Lagos where the adoption of aquaculture technologies was higher.

Constraints to adoption of improved technologies: The adoption of any improved agricultural technology is dependent on socio-economic and institutional factors and the attributes of such a technology. The under listed factors in (Table 5) were considered significant in influencing the adoption or non-adoption of technologies.

Table 3: Awareness/Adoption levels of disseminated aquaculture technologies*

Technologies	% Awareness	% Adoption	Year adopted
Lagos			
Site selection/pond construction	76.5	73.5	1987
Fingerlings transportation	85.3	76.5	1987
Pond fertilization	82.4	79.4	1987
Improved feeding	82.4	76.5	1987
Pond disease control	76.5	70.6	1987
Rivers			
Site selection/pond construction	20.0	20.0	1995
Fingerlings transportation	7.5	7.5	1997
Pond fertilization	22.5	20.0	1995
Improved feeding	15.0	12.5	1995
Pond disease control	7.5	5.0	1995

* Multiple responses

Table 4: Awareness/Adoption of disseminated technologies in capture Fisheries/post harvest handling*

Technologies	% Awareness	% Adoption	Year adopted
Lagos			
Maintenance of fishing gears	47.1	44.1	1986
Hygienic handling of fresh fish	41.2	29.4	1986
Appropriate fishing mesh size	47.1	47.1	1986
Preventing fishing gear losses	32.4	29.4	1986
Hygienic processing site	26.5	26.5	1986
Controlling insect menace	29.4	26.5	1986
Improved smoking kiln	29.4	20.6	1986
Packaging dried fish	26.5	17.6	1986
Quality retention in fresh fish	29.5	26.5	1986
Rivers			
Maintenance of fishing gears	45.0	32.5	1990
Hygienic handling of fresh fish	60.0	50.0	1990
Appropriate fishing mesh size	62.5	42.5	1990
Preventing fishing gear losses	65.0	50.0	1990
Hygienic processing site	55.0	30.0	1990
Controlling insect menace	45.0	35.0	1990
Improved smoking kiln	72.5	50.0	1990
Packaging dried fish	65.0	25.0	1990
Quality retention in fresh fish	55.0	25.0	1990

* Multiple responses

From the study the most constraining factors to adoption among the respondents were high cost of adoption inputs (56.3%), insufficient awareness creation

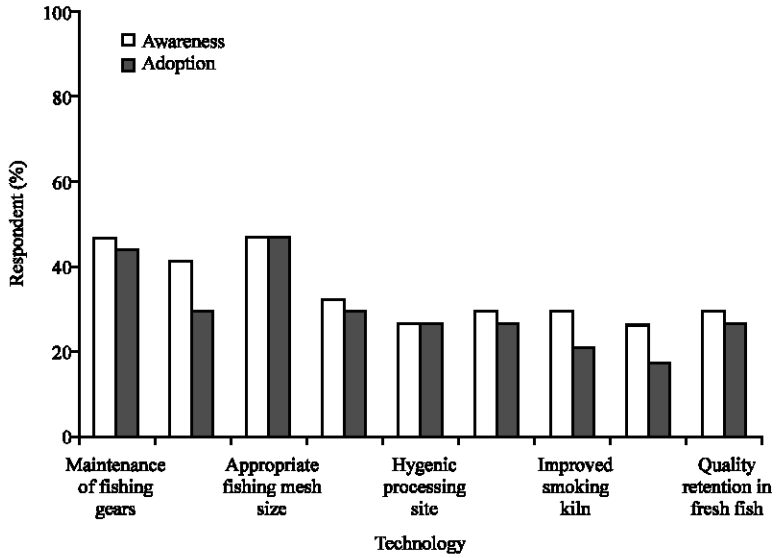

Fig. 4: Awareness/Adoption level of disseminated technologies in capture fisheries/post-harvest handling in lagos

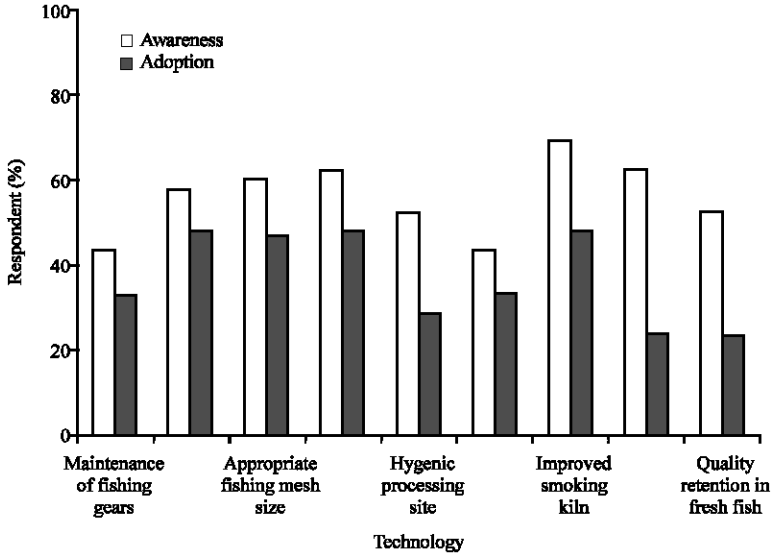

Fig. 5: Awareness/Adoption level of disseminated technologies in capture fisheries/post-harvest handling in rivers state

(36.3%), scarcity of adoption inputs (35.0%) and lack of technical support in adoption practices (33.8%) among others (Fig. 6).

In packaging a technology, it is the responsibility of research and extension agencies to introduce features in that innovation that will be friendly to farmers. Friendliness is a question of affordability, simplicity, availability and ease of operation and maintenance.

Impacts of extension activities: The Village Extension Agents (VEAs) play crucial roles in grass root extension development. They occupy unique position as agents of change, bridging the gap between the development of technologies and the eventual adoption or rejection. Under the T and V extension approach practiced in Nigeria, the VEAs operate at cell level, introducing new innovations that have been tested and validated by research, initially to the contact farmers for trials and eventually to the larger population of farmers. The frequency of extension visit by the VEAs, the actual contacts made and the good will of the contact farmers to the other farmers would account largely for the success of extension programme in promoting eventual adoption. When clienteles consider the usefulness of extension contacts, then willingness could be predicted on possible positive response to adoption.

Table 5: Constraints to adoption of improved fisheries technologies*

	States				
	Lagos		Rivers		
Reasons	Freq.	(%)	Freq.	(%)	Average (%)
High cost	20	50.0	25	62.5	56.3
Handling difficulty	4	10.0	7	17.5	13.8
Lack of technical support	15	37.5	12	30.0	33.8
Non-availability of input	18	45.0	10	25.0	35.0
Recommendations not compatible	5	12.5	6	15.0	13.8
No clear relative advantage	5	12.5	4	10.0	11.3
Insufficient awareness	10	25.0	19	47.5	36.3

*Multiple responses

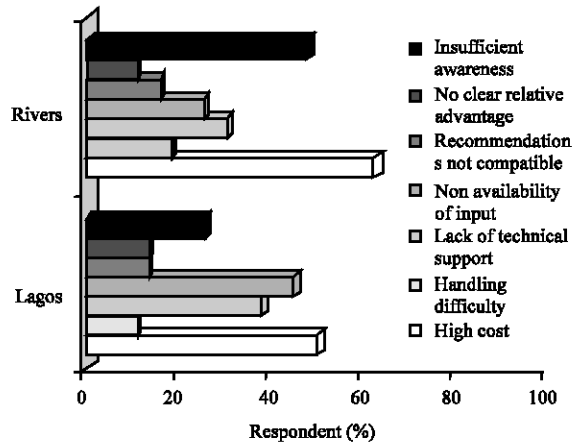

Fig. 6: Constraints to adoption of improved fisheries technology

Table 6: Impact of extension activities on fishers folks*

	States				
	Lagos		Rivers		
Impact indicators	Freq.	(%)	Freq.	(%)	Average (%)
Change in cropping pattern	8	20.0	7	17.5	18.8
Better yield from aquaculture	16	40.0	6	15.0	27.5
Better income from fishing	22	55.0	23	57.0	65.0
Changes in quality of diet	12	30.0	17	42.5	36.3
Enhanced income from processing	5	12.5	25	62.5	37.5
More adoption of technologies	14	35.0	10	25.0	30.0
No impact	-	-	1	2.5	1.3

* Multiple responses

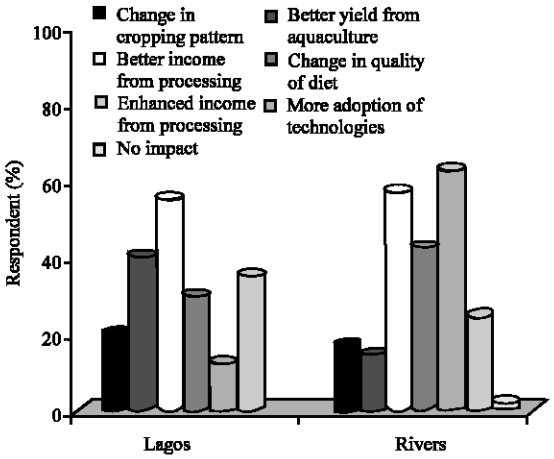

Fig. 7: Impact of extension activities on fishers folks

Extension activities have definite goals and objectives. To a large extent, major goals include increase in farmers' level of income and productivity, enhancement of farmers' skill and efficient use of resources in a profitable and sustainable manner. Achievement of these goals makes extension impact measurable.

Attempt was made in this study to determine the level of impact of extension activities on fisher-folks using some impact indicators as shown on (Table 6). In Rivers state, the major impacts of extension activities according to respondents were enhanced income from fish processing (62.5%), increased income from fishing (57.0%); and changes in the quality of diet (42.5%). Whereas in Lagos, the major impacts were increased income from fishing (55.0%), better yield from aquaculture and to some extent, more adoption of technologies (35.0%) (Fig. 7). On the average, as shown on (Table 6), more impacts were recorded in both states on better income from fishing (65.0%), fish processing (37.5%) and improved quality of diet (36.3%). A major goal of extension is positive contribution to rural livelihood. Significant impacts in both states are indicative of the adoption of some recommendations in capture fisheries and aquaculture. Adoption of agricultural technologies has been reported to show positive impacts on the levels of production, income and general standard of living (CIMMYT, 1993).

CONCLUSION

The study has shown that awareness and adoption levels of improved fisheries technologies are still relatively low in coastal aquaculture and to some extent, capture fisheries in the Nigerian maritime states of Lagos and Rivers. This is in spite of various developmental intervention programmes in coastal fisheries development. However prevailing constraints towards adoption include high cost and scarcity of adoption inputs, lack of technical support and insufficient awareness creation. These constraints must be tackled if adoption of fisheries technologies is to be promoted. When adoption is promoted, better impacts would be seen of the fisher-folks and more fish protein will be made available to the larger populace.

Based on the findings in this study the following are recommended measures that could improve the awareness and adoption levels of fisheries technologies:

- Research institutions should ensure that improved technologies and recommendations are well tested and proven at the fisher-folks' end before being pushed for mass adoption The benefit of this is that such friendly attributes like simplicity, ease of handling and maintenance and low acquisition cost can readily be incorporated into technologies meant for adoption
- Extension agencies in the two states and in Nigeria as a whole need to improve on various strategies used in disseminating improved technologies. Strategies for fisheries technology transfer should be specially packaged because of the uniqueness of fisheries. Suitable intervention points would demand the modification of such strategies as Small Plot Adoption Techniques (SPAT), Management Training Plot (MTP) and field days that are unique to fisheries
- In most cases the funding of field extension work has been problematic in Nigeria. Extension contacts with farmers are often irregular due to mobility problems as a result of inadequate funding. Extension campaigns are costly in nature. Hence, it is the responsibility of government to properly fund such, since most extension agencies in Nigeria are government institutions.

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