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ASSESSMENT OF THE BENEFITS DERIVED BY FISH FARMERS FROM EXTENSION SERVICES IN IBADAN, OYO STATE, NIGERIA

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Abstract
This study examined the benefits that are derived from extension workers by fish farmers in Ibadan, Oyo State, Nigeria. Multi-stage sampling technique was used to select a total of 185 catfish farmers from five (5) Local Government Areas in Ibadan metropolis, Oyo State. Data were collected with well-structured questionnaire and analysed using descriptive statistics and multiple regression models. The results revealed that Oyo State Agricultural Development Programmes (OYSADEP) is the dominant source (52.4%) of extension services to fish farmers in the study area. Also, the fish farmers have good knowledge about aquaculture production technologies and were adopting aquaculture production innovation. The Multiple regression estimates revealed that the model has a good fit (R^2 0.783) and age (-0.049), gender (0.087), educational qualification (0.452) and farming experience (1.032) were significant socio-economic characteristics affecting the benefits they were deriving from extension workers in the study area. The preservation and processing facilities, non-availability/high cost of fish seed, poaching/predators, high cost of fish feed and water shortage during dry season were the constraints facing catfish farmers in Ibadan, Oyo State. Policy interventions for agricultural development should focus on the small-scale fish farmers because they constitute the majority of agricultural production practitioners in the country.

Keywords: Perception, Innovations, Extension services, Awareness and Adoption.

Introduction

Over the years, different governments in Nigeria have recognized the relevance of the fisheries sub-sectors, which are composed of the marine, brackish and freshwater. Several attempts were made by federal and state governments to boost their productivity through institutional reforms and various fiscal and economic measures. Some of these measures involved tax exemption and input subsidy schemes for distribution to fishermen to stimulate increased production. Despite this, the fisheries sector still showed a deficit in the supply and demand of fish to the populace (Ashley-Dejo, 2012).

Nigeria is blessed with a vast expanse of inland freshwaters, marine and brackish ecosystem, which are very rich in aquatic life. Artisanal fishery, aquaculture and industrial fishery are the main subsectors contributing to the local fish production (FDF, 2008) at 68.8%, 25.7% and 5.5% respectively (FDF, 2013). However, the production from these subsectors are insufficient to meet the fish demand of Nigerians because of the ever increasing population of the country as well as the use of non-sophisticated fishing gears which characterized the artisanal fishery (Ashley-Dejo *et al*., 2017a).

Modern day agriculture is characterized by lots of innovation and improved practices. The practices were mostly generated from Agricultural Research Institutions (ARI) and are disseminated through the Agricultural Extension Institutions. However, most of the agricultural practices used by most farmers remain largely primitive and underdeveloped. This indicates a situation of information gap between the generators and the prospective users of these innovations.

Extension service constitutes the process whereby the extension worker tries to motivate the clientele to give him the capability to solve his problems. It can also be seen as a process of finding ways of making the encounter between the extension workers and the farmers meaningful such that they will be capable of creating solutions by their own efforts (Bolliger *et al.*, 1994). The relationship between the extension workers and the clienteles that is necessary to achieve this goal should be reciprocal. The extension workers must be committed to the welfare of the clienteles and the clienteles must, in turn, appreciate the situation of the extension agents. Extension service for the fisheries sector is basically an informal education process; an action-oriented programme targeted

towards promoting the farmers and overall agricultural development in the country. The process focuses on the identification of individual, group and community needs and the development and implementation of education programmes that can meet these needs. This includes the act of teaching farmers how to adopt more effective farming methods and technologies so as to improve production.

According to Jenny *et al.* (2003), a successful extension programme will involve the farmers and will depend on;

- a practical approach to manipulating the farming system, manage cost of feeding on a cost effective and sustainable basis;
- willingness and ability on the part of both farmers and supporting systems (extension, research, others) to experiment, modify and innovate and
- participatory training approaches in aquaculture extension services and promotion of cost-effective in fisheries management.

Interaction with the clienteles will let the extension personnel know how to help them in deciding which solution will be preferred by the farmers to a particular problem. This will also provide opportunity to pass across information to the farmers about government policies and decisions and the roles they are expected to play. Dissemination of extension information may be affected by some issues such as; the size of the audience, the nature of the message to be disseminated, literacy level among other circumstantial factors of the audience. These factors will determine the communication methods that could be adopted by the Extension Agents. The nature of the audience will determine the extent to which a receiver is involved in the communication activities and in essence, who controls the pace of communication and the effectiveness of the message passed across. The communication method used will inform the extent to which the farmers will be influenced by the message(s).

Given the foregoing, the aim of this study is to examine the benefits derived by fish farmers from extension services in Ibadan, Oyo State, Nigeria.

Methodology

The Study Area

This study was carried out in the metropolitan city of Ibadan which is the capital city of Oyo state, Nigeria as shown in Figure 1. It is located on latitude 7°23'47"N and longitude 3°55'0"E. It is the third largest metropolitan area, by population, in Nigeria after Lagos and Kano with a population of about 2,338,659 according to the 2006 Census. Ibadan is located in south western Nigeria in the south eastern part of Oyo state (Alawode and Jinad 2014). Administratively, Ibadan municipality is divided into 11 Local Government Areas (LGA). The overall population density of the town is 586 persons per km^2.

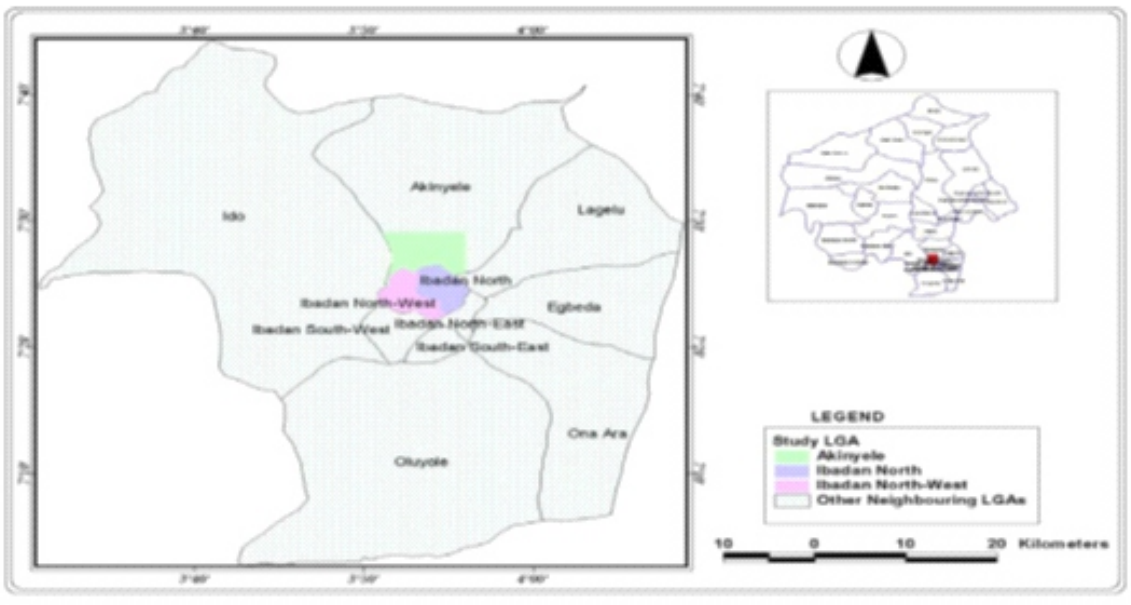

Figure 1: Map of Ibadan zone showing eleven Local Government Areas according to OYSADEP

Sampling Techniques and Sample Size

Multistage random sampling procedure was used to select respondents for this study. Five (5) Local Government Areas (LGAs) were randomly selected from the existing eleven (11) LGAs in the town. In each of the selected LGA, five (5) communities were randomly selected. A proportional sample of 70% of the fish farmers (which was obtained from fish farmers association and Oyo State Agricultural Development Programme OYSADEP) were selected using simple

random sampling techniques from each of the selected LGAs earlier to give a total of 185 fish farmers. Structured interview schedule was used to collect data from these selected farmers.

Data Analysis

The data collected with the interview schedule were analysed using descriptive statistics which include frequency, percentage, mean, etc. Cobb-Douglas function equation was also used to analysis the influence of some socio-economic characteristics such as age, gender, educational qualification, marital status and farming of the fish farmers on benefit derived from extension workers.

A 5-point Likert type scale was also used to analyse the data on perception of fish farmers toward the use of fisheries innovation. The scores were weighed and the weighted average was computed.

$X_{fi} = \Sigma X/n$

X_{fi} of each was computed by multiply the frequency of each response pattern with its appropriate nominal value and dividing the sum with the number of respondents to the items. This can be summarized with the equation below

$X_{fi} = \Sigma fn/nr$

Where;

X_{fi} = mean score

Σ = summation

f = frequency

n = likert nominal value

nr = number of respondents

$$X_c = \frac{1+2+3+4}{4} = \frac{10}{4} = 2.5$$

The scores were weighed and the weighted average was estimated also. The critical mean of 2.5 was used to accept or reject an item as a constraint on catfish farm production in the study area. The constraints that score equal to or more than critical means of 2.5 was accepted as constraint to catfish farming in the study area or otherwise rejected (Ashley-Dejo *et al*., 2017a)

The Cobb-Douglas function adopted is specified as:

$\ln Y = \ln\beta_0 + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_4 \ln X_4 + \beta_5 \ln X_5 + e$

Where:

Y = Benefit derived from extension workers

X_1 = age of the farmers (years)

X_2 = gender (male = 1, female = 0)

X_3 = educational qualification (year spent in school)

X_4 = marital status (married = 1 and otherwise = 0)

X_5 = farming experience (years)

B_0 = intercept, B_1- B_5 = regression parameters to be estimated and e = error terms. Statistics such as the explanatory power of the model (R^2), the significance of the estimated coefficient, the magnitude of the estimated coefficient were used to describe result of the regression model.

Results and Discussion

Socio-economic Characteristics of Fish Farmers in The Study Area

The results in Table 1 revealed that the majority (50.8%) of the fish farmers were in the age of 41 – 50 years. This implies that young and energetic youths in the study area are fully involved in fish farming and they are in their prime age and hence, economically active. This result agrees with the findings of Aihonsu and Olatingiri, (2012) and Fregene *et al.,* (2011). Furthermore, Akinola and Adeyemo (2008) stressed that fish farmers within this age bracket could take risks that might increase output as well as income. It was also affirmed that the majority (74.1%) of the fish farmers were males. This implies that men were capable of handling fisheries activities than their female counterpart. Ashley – Dejo *et al.* (2016), Fregene *et al.* (2011) and Ezike and Adedeji (2010) also reported the dominance of men in fish farming in Oyo and Ondo states. Also, the majority (89.2%) were married showing that married people are more involved in fish farming and this could be as a result of more responsibilities they are saddled with as married individuals. Adewuyi *et al*. (2010) also reported similar finding from a study carried out in Ogun State, Nigeria. The majority (52.4%) had tertiary education indicating that most of the fish farmers had formal education and are likely to have a positive attitude toward seeking recent innovations. Also, this may be because of the technicality of fish farming which involves the intricacies of fish culture. This is in line with the findings of Adeleke (2006). Fregene *et al.* (2011) and Fregene and Digun-Aweto (2008) also reported the high levels of education among fish farmers in Southwest Nigeria. The study revealed that 52.4% of the farmers had between 11 – 15 years of fish farming experience, 30.0% had between 5 – 10 years of experience. The mean years of fish farming experience was 8.2 years which suggested that respondents in the study area had considerable good years of fish farming experience. Ashley – Dejo *et al.* (2017b) reported that fish farming experience is an important factor determining profit level and farm output, the more they are able to understand the business, conditions, trends and prices, the better their output which will invariable had positive influence on farmers' revenue. The majority (52.4%) of the fish farmers had fish training from Oyo State Agricultural Development Programme (OYSADP). This implies that the OYSADP reached out most effectively to fish farmers compared to other extension agents that are in the study area. This could be due to the interests of the State Governments in fish farming. This finding is supported by the works of Arokoyo (2003) that the Nation's Agricultural Research and Extension System (NARES) is the most important single determinant of the level of its agricultural development and hence the yard-stick of the quality of life of its people.

Table1: Socio-economic Characteristics of Fish Farmers in the Study Area

Characteristics	Frequency	Percentage
Age		
[illegible]	18	9.7
31 – 40	48	25.9
41 – 50	94	50.8
51 – 60	21	11.4
Above 60	4	2.2
Gender		
Male	137	74.1
Female	48	25.9
Educational Attainment		
No formal Education	12	6.5
Adult Education	0	0.0
Primary Education	24	13.0
Secondary Education	52	28.1
Tertiary Education	97	52.4
Marital Status		
Married	137	74.1
Single	39	21.1
Widowed	9	4.9
Fish Farming Experience (Years)		
Less than 5	11	5.6
5 – 10	56	30.0
11 – 15	97	52.4
Above 15	21	11.4
[illegible]		8.2±4.8
Extension Service Institution		
Agricultural Development Programme	97	52.4
Ministry of Agriculture	46	26.5
Research Institute	26	14.1
NGOs	13	7.0

Fish Farmers' perception toward aquaculture production innovations

Table 2 shows the perception of fish farmers toward aquaculture production innovations. Out of the twelve (12) perceptional statements examined in the course of this study, it was discovered that ten (10) perceptional statements were positive while two (2) were negative perceptional statements. This indicates that fish farmers in the study area have good knowledge and were adopting aquaculture production innovation appropriately.

Table 2: Fish Farmers' Perception Toward Aquaculture Production Innovations

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree	Weight score	Weight means
Using aquaculture innovation saves time.	97 (52.4)	59 (31.9)	0 (0.0)	17 (9.2)	12 (6.5)	767	4.15**
Using aquaculture innovation conserves farmers energy, material and finance	43 (23.2)	90 (48.6)	5 (2.7)	39 (21.1)	8 (4.2)	676	3.65**
Large family size dis -encourages fish farmer's use of aquaculture innovations	14 (7.6)	13 (7.0)	7 (3.8)	85 (45.9)	66 (35.7)	379	2.05*
Using aquaculture innovation lead to high product losses.	7 (3.8)	18 (9.7)	17 (9.2)	79 (42.7)	64 (34.6)	380	2.05*
Using aquaculture innovation increases profit/improved income via higher yield/harvest.	68 (36.8)	83 (44.9)	2 (1.1)	28 (15.1)	4 (2.2)	738	3.99**
The uses of aquaculture practice are not gender sensitive	77 (41.6)	83 (44.9)	5 (2.7)	14 (7.6)	6 (3.2)	766	4.14**
Using aquaculture innovation improves the quantity and quality of fish harvested.	79 (42.7)	50 (27.0)	23 (12.4)	26 (14.1)	7 (3.8)	723	3.91**
Aquaculture innovation practice are more easier to handle	43 (23.2)	70 (37.8)	27 (14.6)	16 (8.6)	29 (15.7)	637	3.44**
The use of aquaculture innovation requires training.	26 (14.1)	109 (58.9)	7 (3.8)	19 (10.3)	24 (13.0)	649	3.51**
Skills required for the use of aquaculture innovation can be easily acquired.	29 (15.7)	87 (47.0)	21 (11.4)	37 (20.0)	11 (5.9)	641	3.46**
Adoption of aquaculture innovation gives a sense of satisfaction.	68 (36.8)	77 (41.6)	13 (7.0)	11 (5.9)	16 (8.6)	725	3.92**
Aquaculture innovations aggress with the existing fisheries technology.	38 (20.5)	55 (29.7)	27 (14.6)	43 (23.2)	22 (11.9)	599	3.24**

Decision rule: Critical mean = 3.0, **mean accepted as positive attitude, * mean accepted as negative attitude

Awareness and Adoption of Aquaculture Innovations by Fish Farmers

Table 3 revealed the extent of awareness and adoption of aquaculture innovations by the fish farmers in the study area. All the fish farmers were aware of culture system, pond construction, fish pond netting to control pest, feeding methods and use of maggot to feed fishes while between 60.0 and 90.0% adopted pond construction, fish pond netting to control pest, feeding methods and use of maggot to feed fish. The majority (91.53%) of the fish farmers were aware of pond site selection while 75.0% adopted the practice, 78.39% were aware of pond installation while 87.59% adopted the practice, 91.89% were aware of stocking density while 86.47% adopted the practice, 71.89% were aware of culture of hybrid while 38.35% adopted the practice. Adoption as a mental process, involves learning about a new idea, nurturing the idea and trying to decide on what to do and then taking an action over a period of time. In adoption process, an individual may choose a new alternative or those previously in practice. Ekong (2003) attributed acceptance and rejection of innovation by the farmers to incompatible experiences, while Oladele (2005) established extension contacts as foremost factor leading to acceptance or rejection of a particular innovation.

Table 3: Awareness and adoption of innovations by farmers in the study area

Innovations	Awareness Freq. (%)	Adoption Freq. (%)	Not adopted Freq. (%)
Culture system	185 (100)	185 (100)	
Pond site selection	169 (91.35)	147 (75.0)	
Pond selection	185 (100)	172 (92.97)	
Pond installation	145 (78.39)	127 (87.59)	
Fish pond netting to control pest	185 (100)	179 (96.76)	
Application of lime	119 (64.32)	93 (78.15)	
Fertilizer application	157 (84.86)	131 (83.44)	
Stocking density/rate	170 (91.89)	147 (86.47)	
Feeding method	185 (100)	171 (92.43)	
Fish feed formulation (compounded feed)	185 (100)	125 (67.57)	
Use of maggot to feed fish	185 (100)	114 (61.62)	
Water quality management	154 (83.24)	135 (87.66)	
Artificial propagation of fry/fingerlings	179 (96.76)	99 (55.31)	
Culture of hybrid fish	133 (71.89)	51 (38.35)	
Live fish transportation	161 (87.03)	79 (49.07)	
Stock Management (Fish Sorting)	133 (71.89)	119 (89.47)	
Test Cropping	149 (80.54)	103 (69.13)	
Harvesting Techniques	176 (95.14)	99 (56.25)	
Total	**3330 (88.73)**	**2276 (77.02)**	**679 (22.98)**

Regression Parameters on Benefit Derived from Extension Workers in the Study Area

Table 4 presents the results of Ordinary Least Square (OLS) regression model of benefit derived from extension workers in Ibadan, Oyo State, Nigeria. The R^2 (0.783) was highly significant at 1.00% level of probability indicating goodness of fit. For a cross sectional analysis, the result indicates that the equation has a reasonable good estimate of the underlying socio-economic characteristics that affect

benefit derived from extension workers (R^2 = 78.3). This infers that the increase in age, gender, educational qualification, and arming experience will lead to increase in benefit derived from extension workers towards fish farmer's income.

The results revealed that the coefficient for age (-0.049) was negative signed and significant at 5.00% level of probability. This result was against a prior expectation, implying that any increase in age will lead to a corresponding decrease in benefit derived from extension workers. This result was in support of the work of Nwaru (2004) who found out that the ability of a farmer to bear risk and be innovative decreases with age and disagree with the findings of Lanyyintuo and Mekura (2005) and Okoronkwo and Ume (2013) who reported that aged farmers have higher accumulated capital, better preferred by credit institutions and large family size, all of which may make them to derive more/better benefit from extension workers.

The coefficient for gender (0.087) was positively signed and significant as 5.00% level of probability. This implies that any increase in involvement of both genders will lead to increase in benefit derived from extension workers.

The coefficient for education qualification (0.452) was positively signed as expected and highly significant at 1.00% level of probability. Generally, education is thought to create a favourable mental attitude for the acceptance of improved technologies, especially information on improved practices (Onyenweaku *et al*, 2010). This could be related to the fact that educated famers respond positively to farming trend (Ewuzieem *et al.,* 2010). This finding is in agreement with the finding of Tunde *et al*. (2015) who noted that educational qualification increases productivity and enhances the farmers' ability to understand, evaluate and effectively utilize farming techniques that could boost their income. This implies that any increase in the level of education of the farmer will lead to an increase in the benefit derived from extension workers.

The coefficient for farming experience (1.032) was positively signed and highly significant at 5.00% level of probability. The implication of this result is that as fishing experience increased, output would increase, hence will lead to increase profitability (Ezeh and Onuoha, 2009). This implies that any increase in farming experience will lead to an increase in the benefit derived from extension workers.

Table 6: Estimates of Regression Parameters on the Benefit Derived from Extension Workers in the Study Area

Variables	Parameters	Coefficient	Standard error	t-ratio
Constant	β_0	16.436	13.893	-3.265***
Age (X_1)	β_1	0.049	2.651	-2.421**
Gender (X_2)	β_2	0.087	6.582	6.432**
Educational qualification (X_3)	β_3	0.452	1.542	1.896***
Marital status (X_4)	β_4	0.065	0.872	0.752
Farming experience (X_5)	β_5	1.032	1.382	0.542**
R^2				0.783
F – Ratio				4.86***

Values in parenthesis are t-values.
*** Significant at 1% level, ** significant at 5% level
+ = lead equation.

Production Constraints Among Catfish Farmers in the Study Area

There are constraints that are confronting fish farming in Ibadan metropolis. These major constraints are presented in Table 7. They are preservation and processing facilities, non-availability/high cost of quality fingerlings, poaching/predators, high cost/lack of construction equipment, market price fluctuation, high cost of fish feed and water shortage during dry season. Some authors have also reported some of the constraints. Adeka *et al*. (2006) reported the unavailability of improved fingerlings as a major problem facing fish farmers in Imo State, Nigeria. Egwui (2000) reported the scarcity of fingerlings as a major constraint to fish farming too. This could be due to few numbers of fish breeders in the country as noted by Mohammed *et al*. (2014) in their study.

Table 7: Percentage Distribution of Production Constraints among Catfish Farmers in the Study Area

PROBLEMS	SEVERITY				Weight score	Weight means
	Very serious	Moderately serous	Serous	Not a problem		
Land accusation	12 (6.5)	52 (28.1)	119 (64.3)	2 (1.1)	310	1.68*
Insufficient labour	38 (20.5)	57 (30.8)	90 (48.6)	0 (0.0)	437	2.36*
Distance of the extension staff's office to the village/farm.	29 (15.6)	43 (23.2)	100 (54.1)	13 (7.0)	344	1.86*
Preservation and Processing Facilities	64 (34.6)	86 (46.5)	28 (15.1)	7 (3.8)	693	3.75**
Inadequate Motivation from extension officer	26 (14.1)	38 (20.5)	55 (29.7)	66 (35.7)	360	1.95*
Absence of strong co-operative society	0 (0.0)	33 (17.8)	141 (76.2)	11 (5.9)	176	0.95*
Lack of finance (capital and credit)	7 (3.7)	30 (16.2)	129 (69.7)	19 (10.3)	197	1.06*
Non-availability/High cost of quality fingerlings	120 (64.9)	41 (22.2)	24 (13.0)	0 (0.0)	685	3.70**
Poaching/predators	37 (20.0)	139 (75.1)	9 (4.9)	0 (0.0)	843	4.56**
High cost/lack of construction equipment	77 (41.6)	102 (55.1)	6 (3.2)	0 (0.0)	818	4.42**
Market price fluctuation	132 (71.4)	53 (28.6)	0 (0.0)	0 (0.0)	793	4.29**
High cost of fish feed	168 (90.8)	17 (9.2)	0 (0.0)	0 (0.0)	757	4.09**
Water shortage during dry season	27 (14.6)	144 (77.8)	0 (0.0)	14 (7.6)	842	4.55**
Disease and pest infestation	5 (2.7)	47 (25.4)	133 (71.9)	0 (0.0)	255	1.38*
Lack of technical know-how	35 (18.9)	41 (22.2)	109 (58.9)	0 (0.0)	245	1.86*
Mean total						42.46
Critical mean						2.5

Decision rule: Critical mean = 2.5, **mean accepted as a constraints, * mean not accepted as a constraints

Conclusion and Recommendations

Catfish farmers in the study area are young, active and well experienced. The enterprise is dominated by male fish farmers. Their high level of education affected their technology usage that had translated into improved income. Oyo State Agricultural Development Programme (ADP) reaches out most effectively to fish farmers in the study area. . It was also affirmed that fish farmers in the study area have good knowledge and adopt aquaculture production innovation better as a result of cordial relationship that exist between farmers and the State ADP. The study also identified constraints faced by the fish farmers which include preservation and processing facilities, non-availability/high cost of fish seed, poaching/predators, high cost/lack of construction equipment, market price fluctuation, high cost of fish feed and water shortage during dry season. It is therefore recommended that: Policy interventions for agricultural development should focus on the small-scale fish farmers because they constitute the majority of agricultural production practitioners in the country. Any programme that would be targeted at fish farming enterprise development can safely be implemented through the State's ADP, being the dominant source of extension service to the fish farmers

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