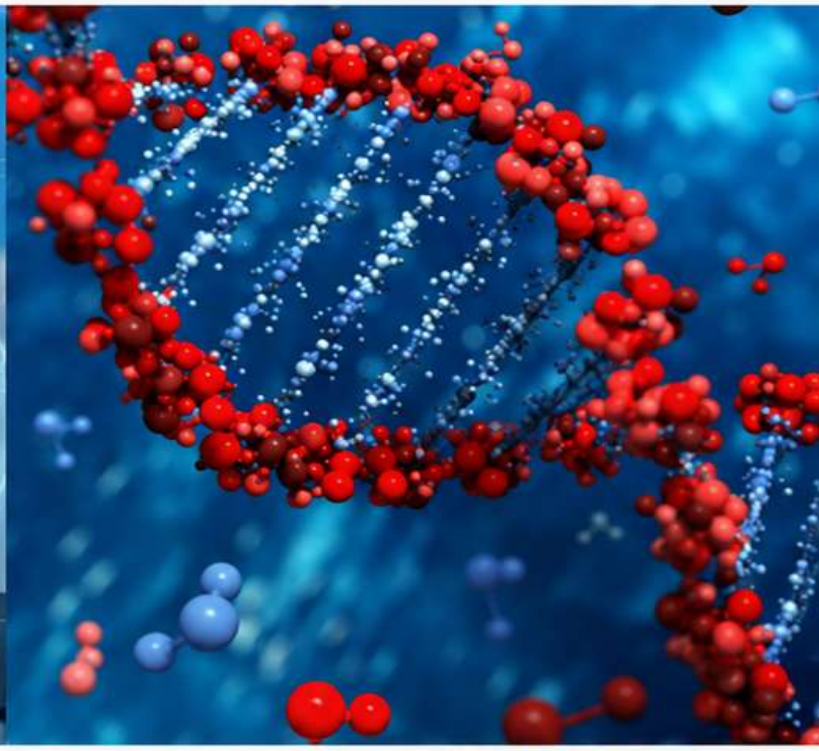
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NOUN Journal of Physical and Life Sciences





Volume 1 Issue 1 | June 2017

ISSN: 2645-2480

A Joint Publication of the
Faculties of Agricultural Sciences, Health Sciences and Sciences
National Open University of Nigeria

NOUN JOURNAL OF PHYSICAL AND LIFE SCIENCES

A JOINT PUBLICATION OF THE FACULTIES OF AGRICULTURAL SCIENCES, HEALTH SCIENCES AND SCIENCES

National Open University of Nigeria
Volume 1 No. 1, June 2017

NOUN JOURNAL OF PHYSICAL AND LIFE SCIENCES (NJPLS)

NOUN Journal of Physical and Life Sciences (NJPLS) is a joint publication of the Faculties of Agricultural Sciences, Health Sciences, and Sciences of the National Open University of Nigeria (NOUN). It accepts and publishes (in English language) high-quality articles, original research papers, review articles and short communications in all disciplines of Agricultural Science, Health, and Behavioural Sciences, Physical, Computational, Biological and Environmental Sciences. It also accepts and publishes articles in cross-disciplinary fields, interfacing with science-based disciplines.

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NOUN Journal of Physical and Life Sciences
Volume 1, 2017
ISSN: 2645-2480
www.njpls.nou.edu.ng; njpls@noun.edu.ng

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www.njpls.nou.edu.ng; njpls@noun.edu.ng

ANALYSIS OF IMPACT OF EXTENSION SERVICES ON FISH FARMING IN LAGOS STATE, NIGERIA

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ABSTRACT

Agricultural extension services are pivotal in the development of fish farming for increased productivity, income and improved standard of living of people as well as increasing the national output on food to meet the needs of the rapidly increasing population. This study assessed the impact of fish farming extension services in Lagos State. The study examined the socio-economic characteristics of fish farmers, the respondent's access to extension services available to them relative to profitability. A three-stage sampling procedure was used to select respondents. Three Agricultural Development Programme (ADP) zones in Lagos State comprising of Western, Eastern and Far-eastern zones were selected. Ten fish farmers were randomly sampled from each of the three Local Government Areas selected from each zone using a structured questionnaire. Data collected were analysed using descriptive statistics and inferential statistics. Results indicated that majority of fish farmers were male (66.7%) with an average age range of 41 - 50 years and fishing experience of 5 - 10 years. 51.1% respondents had household size of 6-9 persons with 93.3% access to extension services. The study showed that there was a significant relationship between farmers' access to extension services and profitability of fish farming. Local government Area with higher access to extension services had higher profit in the study area. The study recommended that extension agents should extend their reach to fish farmers far away from extension stations to pass useful information to them in order to increase their profitability.

Keywords: Access, extension services, Profitability, Fish farming

Fish farming is the rearing of fish in tanks or enclosures under controlled or semi-controlled conditions usually for food (Agbarevo and Benjamin, 2013). It is the most cost-effective form of fish production especially in Nigeria with a national fish demand-supply gap of 0.22 million metric tons in 2012 (FOA, 2012). In 2016, Catfish Association of Nigeria (CAFAN) affirmed that Nigeria produced 370,000 metric tonnes of catfish at over N175 billion, adding that fish business contributed about 4.5 per cent to the nation's GDP. Fish and fish products are good sources of high quality, balanced and easily digestible protein, vitamins and polyunsaturated fatty acids, which possess immense antimicrobial peptide in defending against dreadful human pathogens (Ravichandran *et al.*, 2011).

Consumption of fish provides important nutrients to a large number of people in the world and makes a very significant contribution to nutrition. (Sandhya *et al.*, 2013). Fish contains essential amino acids, mostly lacking in plant sources, vitamins such as "A and D", minerals such as phosphorus, calcium and sulphur, and also contains low level of cholesterol (LSMAC, 2003). Fish is also the world's best source of omega-3 fatty acids and omega-6 fatty acids, which function in building body and development of brain (Ibironke *et al.*, 2018)

Agricultural extension services have undergone a significant transformation in order to effectively address issues of poverty and hunger through educational process in improving farming methods and techniques, increased production efficiency and income. It is expected that modern methods of extension will improve image and quality of extension services offered in low-income regions (Ramjattan *et al.*, 2017). This definition was based on the assumption that the researcher has all the answers, while the farmer is conservative and relies on unscientific and retrogressive methods. The concept has been challenged in recent years. Extension may now be more appropriately defined as the process of fruitful interaction among all stakeholders in agricultural development, which is expected to lead to improved performance through increased and sustained agricultural production. This definition recognizes farmers as contributors to information generation.

The rather poor and unimpressive performance of the agricultural sector has often been blamed on the "inefficient and ineffective" agricultural extension delivery

system rather than Agricultural Technology systems (ATS), which is made up of technology generation, technology transfer, technology utilization sub-sectors, which as a system is influenced by important external factors (policy environment, the politic-bureaucratic structures economic and marketing structural condition etc. Research findings no matter how relevant and appropriate to the needs of the beneficiaries will be useless unless effectively and efficiently disseminated. This clearly shows the importance of extension. Extension does not only ensure the effective and efficient dissemination of research results.

Extension services convey farmers' problem to research centers and find suitable solution for the farmers so that the extension agents serve as a link between farmers and the researchers. Extension services or agents contribute to food security by taking farmers through learning experience to overcome production problems, act on relevant information in order to attain a high level of satisfaction. In addition, the extension worker can help to provide fish farmers with new ideas, technology and skills that can lead to increase in productivity that would improve standard of living of people (Olaoye, 2010).

According to Syngenta Foundation of Sustainable Agriculture (2018), agricultural extension is the function of providing need- and demand-based knowledge in agronomic techniques and skills to rural communities in a systematic, participatory manner, with the objective of improving their production, income, and (by implication) quality of life. Agricultural extension plays an important role in development by assuring adequate and timely access by farmers to relevant advice, with appropriate incentives to adopt new technologies if it suits their socio-economic and agroecological circumstances (Maiangwa *et al.*, 2010). Hence, from a development policy perspective, investments in extension services is considered as potentially important tools for improving agricultural productivity and increasing farmers' income. The immense significance of agricultural extension services on fish farming has drawn government attention to develop many policies and programmes to address its needs. Studies (Ladele *et al.*, 2011; Ajah, 2012) showed paucity of information on extension services among fish farmers especially with respect to impact of extension services and profitability of fish farmers in Nigeria, Therefore, for Nigeria to have a meaningful fish farming

developmental policy information is required on impact of extension services on fish farming. This study was designed to assess the impact of access to extension services and profitability of fish farming in relation to access to extension services in Lagos State, Nigeria.

MATERIAL AND METHOD

Sample and Sampling Techniques

This study was carried out in Lagos State located at 6°34′60″N, 3°19′59″E within the south western region of Nigeria and is bounded in the north and east by Ogun State, south by the Atlantic Ocean, west by Cotonou in Benin Republic. Located on a total landed area of 3,345 km^2 (1,292 sq mi) on four principal islands and adjacent parts of the Nigerian mainland, the islands are connected to each other and to the mainland by bridges.

The study was based on primary data obtained in a survey that involved 90 fishers selected using a multistage random sampling procedure in three (3) Agricultural Development Programme (ADP) zones in Lagos State between June and August, 2017. The first stage involved purposive selection of three (3) Agricultural Development Programme (ADP) zones in Lagos State comprising of Western, Eastern and Far-eastern zones. The second stage also involved purposive selection of three Local Government Areas (LGAs), namely Alimosho, Ojo and Mainland (Western Zone); Epe, Eti-Osa and Eredo (Far-eastern zone) and Ikorodu, Igbogbo and Kosofe LGA (Eastern zone) where fishing activities were prominent in the five main agricultural zones in the State. Simple random technique was used at the third stage to select three respondents (fish farmers) from each LGA. A well-structured questionnaire was used to collect data from the fish farmers.

Source of Data and Analytical Technique

Data were mainly obtained from primary source collected on fish farmer's socio-economic characteristics, access to extension services, information on fish farming and profitability of fish farming. Secondary information was obtained from journals, research reports among others. The analytical tools employed in the study were descriptive statistics, which included percentage and frequency distribution and gross margin analysis (inferential statistics).

NOUN Journal of Physical and Life Sciences
Volume 1, PP.6-20, 2017
ISSN: 2645-2480
www.njpls.nou.edu.ng; njpls@noun.edu.ng

Gross Margin Analysis (GM) was used to estimate the profitability of fish farmers that has access to extension services and was compared with those farmers that do not have access to extension services in the study area. The GM is the difference between the Total Revenue (TR) and the Total Variable Cost (TVC). Total Variable Cost is operating expenses. The GM was thus operationalized as the profit residual after payment for the variable costs of production.

Total Revenue = yield (kg/ha) X market price: (GM = TR – TVC).

The greater the GM, higher the profitability

RESULTS AND DISCUSSION

Table 1: Distribution of socio-economic characteristics of fish farmers (n=90)

Socio-Economic Characteristics	Frequency	Percentage
Age (years)		
Below 20	0	0
21 – 30	5	5.6
31 – 40	9	10
41 – 50	44	48.8
Above 50	32	35.6
Level of Education		
Primary Education	19	21.1
Secondary Education	28	31.1
Tertiary Education	34	37.8
No formal Education	9	10
Gender		
Male	60	66.7
Female	30	33.3
Marital Status		
Single	9	10

Married	76	84.4
Divorced	2	2.2
Widowed	3	3.3
Fish Farming Experience (years)		
< 5	5	5.6
5 – 10	51	56.7
11 – 15	32	35.6
Above 15	2	2.2
House hold size		
1 – 3	11	12.2
4 – 6	33	36.7
6 – 9	46	51.1
Membership of Social Group		
Co-operative Society	63	70
Fish Farmers Association	27	30
Contribution Methods		
Monthly Contribution	68	75.6
Daily Contribution	15	16.7
None	7	7.8

The result (Table 1) of the socio-economic characteristics showed that the fish farmers whose age fall between 41 – 50 years constituted 48.8% of the respondents. On the whole, 64.4% fall into the economically active group of 21 – 50 years. This implies that farmers in their active age were active and expected to supply the labour requirement. This result is inconformity with the result on age group and fishing activities by FAO (1997) indicated the age range as the active group in fishing activities. This age distribution seems to cut across all fisheries sectors for instance Maina *et al*. (2014) in their study of the influence of social-economic factors, gender and the fish farming enterprise and productivity project on fish farming practices in Kenya noted that majority of fish farmers were below 50 years of age are

innovative and motivated individuals who can cope with challenges that may emanate from fishing activities and adoption of new technologies.

The results also showed that majority (68.9%) of the respondents had tertiary education (37.8%) and secondary education (31.1%). Fish farming requires a lot of technical and scientific knowledge. Information on the innovations of fish farming is somehow complex and this requires some high level of education to practice and the more educated an individual is, the easier it will be for him / her to decode and process information. The results suggest that fish farmers in the study area would likely have good capacity for assimilation, awareness and receptivity to innovation of fish farming practices. This result agreed with Agbebi's,(2012) study of impact of access to extension services on fish farming in Ekiti State where 83.3% of fish farmers had tertiary education.

The study also revealed that male fish farmers constituted 66.7% as compared to the females that represent 33.3%. This indicates the dominance of men in fish production in the study area. The male dominancy implies the laborious nature of fish farming operation right from pond construction to management, which their female counterparts cannot easily undertake.

The evaluation of the marital status showed that a majority (84.4%) of the fish farmers was married. This indicates that most of the fish farmers in the study area were married, implying that fish production could be viewed in the light of income diversification derived for married individuals apparently due to additional household responsibilities that could require extra money to finance (Ohen *et al.*, 2009). The results also suggest that marriage institution was still cherished and is an indication of economic responsibilities of fisher folks that care for their dependents.

Majority (56.7%) of the respondents had fish farming experience of 5-10 years while, only 35.6% had 11-15years of experience of fish farming. This implies that the respondents had reasonable years of fish farming experience and that fishing experience and better performances in fishing activities comes with years in fish harvesting. Analysis of household size revealed that 51.1% respondents had household size of 6-9 persons.

Fish farmers engaged in monthly contribution (Esusu) constituted

the majority (75.6%) of the respondents in the study area, while daily contribution constitutes 16.7% of the respondents. Majority of the fish farmers (70%) subscribed to co-operative society compared 30% of fish farmers that held Fish Farmer's association. Higher percentage of members of farmers' cooperative societies implies that they would have access to agricultural information, better access to knowledge, inputs and credit from government than non-member

Table 2: Distribution of information disseminated by extension agents among fish farmers

Information	Frequency (F)	Percentage (%)
Pond Construction	9	10.1
Stocking	7	8.3
Pond Management	11	12.7
Fish Breeding	5	5.1
Fish Harvesting	9	9.3
Feed Formulation	7	7.6
Group Formation	9	10.2
Marketing	8	10.4
Record Keeping/Credit	14	15.2
Fish Preservation	10	11.1

Table 2 shows that Majority of those that had access to extension services had information on record keeping/ credit (15.2%), pond management (12.7%), fish preservation (11.1%) marketing (10.4%) and pond construction, 10.1%. This is because these are the most common and critical fish farming operations that are done routinely by the farmers. Record keeping had the highest with 15.2%, this implies that the farmers in the study areas were eager information on record keeping as a prerequisite to credit facility hence, reason why they had adequate information on their farming operation. In the same vein information on pond management, group formation and marketing was also critical for the fish farmers as this will help to get credit facilities and improve on their farming operation which will lead to high profitability (Agbebi, 2012). Fish farmers had less information on fish harvesting (9.3%), Stocking (8.3%), feed formulation (7.6%) and fish breeding (5.1%) because most of these operations were carried out by outside consultants; hence, farmers pay

little attention to these aspects of extension services.

Table 3: Distribution of accessibility of extension services among fish farmers

Distribution	Frequency	Percentage
Access to Extension Services	84	93.3
No Access to Extension Services	6	6.7

The distribution of individual farmers based on their access to extension services as shown in Table 3 revealed that 93.3 % of the respondents had access to extension services and 6.7% of the respondents had access to extension services in the study area. The result implies that extension agents' impact has been really felt in the study area and this is because of the renewed healthy attitudes of the governments toward financing the extension services, which leads to their better performances. High performance of the extension agents in these areas leads to increased productivity and profitability in the study area. This result of this study is supported by Läpple *et al.* (2013) that explain that extension services as a programme help to improve farm performance and introduce new technologies to connect emerging research to on farm practices.

Table 4: Distribution of farmers' perception of services delivery performance of extension agents

Perception	Frequency	Percentage
Punctuality	12	13.3
Energetic	9	10.3
Patience	10	11.0
Approachability	14	15.5
Cordiality	8	9.4
Cheerfulness	10	10.6
Accepts no offer in cash/kind	8	8.3
Ability to Carry People Along	8	8.4
Ability to Demonstrate	6	6.6
Ability to proffer solution to problems	6	6.6

NOUN Journal of Physical and Life Sciences
Volume 1, PP.6-20, 2017
ISSN: 2645-2480
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Farmers perception score of the Extension Agents as shown in Table 4 revealed that farmers reported that the Extension Agents were approachable (15.5%), punctual (13.3%), patient (11.0%), cheerful (10.6%), energetic (10.3%), ability to demonstrate (6.6%) and ability to proffer solution to problems (6.6%). About 8.4% and 8.3% of the farmers revealed that extension agents do not accept offer of cash or kind and had ability to carry people along, respectively. This implies that farmers had very good perception of extension agents in the study area. This result is in conformity with the finding of Chukwu, A.O. (2013) on farmers' perception of the effectiveness of extension principle in extension delivery in Owerri Agricultural zone, Imo State. He noted that farmers perceived that extension agents are vast in subject matter, had beneficial new technologies and they integrated lectures well with practical. However, respondents were not impressed with extension agents' listening ability to respondents' problems, acting as if they know all, imposing their ideas on them and not being explanatory enough. Despite these shortcomings, farmers still highly adopted transferred technologies.

Table 5: Distribution of annual profit of farmers in each Local Government Area (LGA) and Local Council Development Area (LCDA)

LGA	Total Variable Cost (₦)	Total Revenue (₦)	Gross Margin/Annual (₦)
Alimosho LGA	14,256,293	150,313,500	136,057,207
Ojo LGA	30,317,189	49,450,000	19,132,811
Mainland LGA	1,998,500	4,949,000	2,950,500
Epe LGA	3,236,000	4,709,000	1,473,000
Eti-Osa LGA	4,022,200	2,049,000	-1,973,200
Eredo LCDA	2,476,200	3,754,000	1,277,800
Ikorodu LGA	9,239,000	15,807,500	6,568,500
Igbogbo LCDA	5,790,700	16,650,000	10,859,300
Kosofe LGA	17,519,925	13,650,000	-3,869,925

Gross margin represents as a percentage how much a company gains from total sales revenue after the production costs associated with producing the product. According to Hirst (2013), gross margin has a meaningful role in the profitability of a company. If the business cannot make a decent gross margin from products, it's going to be very difficult to make a net profit. The Gross margin was derived by removing the Total Variable Cost from the Total Revenue for each local government in the study area i.e. GM = TR – TVC. Table 7 reveals the profitability of farmers in each local government. This table revealed that local government Alimosho LGA, Ojo LGA, Igbogbo LCDA and Ikorodu LGA had high profit of N136, 057, 207, N19,132,811, N10,859,300 and N2702450, respectively, while Mainland LGA (N2,950,500), Epe LGA (N1,473,000) and Eredo LCDA (N1,277,800) had low profit. However, Kosefe LGA (-N3,869,925) and Eti-Osa LGA (-N1,973,200) had no profit.

The implication of this result is that local governments Alimosho LGA, Ojo LGA, Igbogbo LCDA and Ikorodu LGA have higher profit than Mainland LGA, Epe LGA and Eredo LCDA because higher number of farmers had access to extension services in local government. The information received from these extension agents made the farmers to improve on their production method thereby increasing their profit The negative gross margin in Kosofe LGA and Eti-Osa LGA suggest that farmers had minimal access to extension services.

Table 6: Distribution of Interaction between Farmer's Accessibility to Extension Services and Profitability in Each Local Government Area (LGA) and Local Council Development Area (LCDA)

LGA	Access	No Access	Gross Margin/Profit (₦)
Alimosho LGA	18	2	136,057,207
Ojo LGA	17	3	19,132,811
Mainland LGA	11	9	2,950,500
Epe LGA	8	12	1,473,000
Eti-Osa LGA	6	14	-1,973,200
Eredo LCDA	4	16	1,277,800
Ikorodu LGA	14	6	6,568,500

Igbogbo LCDA	15	5	10,859,300
Kosofe LGA	3	17	-3,869,925

The results on Table 8 revealed that there is a relationship between access to extension services and profitability of fish farmers that is, the more the farmers had access to extension services on fish farming operations, the higher the farmers profit will be. The table shows that local government Alimosho LGA, Ojo LGA, Igbogbo LCDA and Ikorodu LGA have high profit of N136,057,207, N19,132,811, N10,859,300 and N6,568,500 because the number of respondents that had access to extension services in each of these local government were high i.e. 18, 17, 15 and 11 respondents. Eti-Osa LGA, Eredo LCDA and Kosofe LGA with low profit and negative gross margin and access level extension services of N1,473,000 (6), -N1,973,200 (4) and -N3,869,925 (3), respectively. This implies that those that had access to extension services had higher profit than those that had no access to extension services.

CONCLUSION AND RECOMMENDATIONS

Based on the results of this study, an understanding of the socioeconomic context of fish farmers in Lagos State that could serve as basis for re-directing the activities of extension agents towards efficient delivery of agricultural innovation for maximum impact has been highlighted in the study. The study also brought to light some facts about the impact of extension agents in disseminating information to fish farmers in the study area.

Finding in this study indicate that some local government were more impacted by extension agents than the others. This was attributed to lack adequate mobility to reach some of the farmers that were far from their locations. Nevertheless a high level (93.3%) access to extension services was observed in the entire study area. Conclusively, there is a relationship between farmers access to extension services and farmers profitability. That is, fish farmers with more access to extension services have higher profit. In view of the findings, effective coverage of fish farmers and quick dissemination of new technology by extension agents, which require adequate provision of mobility and capacity building to enhance their performance, is recommended. Finally, to ensure that fish farmers enjoin economies of scale in the purchase of inputs, labour availability, sale of output and

government provision of capital under poverty alleviation, fish farmers should be organized into formidable groups such as cooperative to programmes was observed in capacity building to enhance their performance, Conclusively, there is a relationship between farmers access to extension services and farmers profitability. That is, fish farmers with more access to extension services have higher profit.

In view of the findings, effective coverage of fish farmers and quick dissemination of new technology by extension agents, which require adequate provision of mobility and capacity building to enhance their performance is recommended. Finally, to ensure that fish farmers enjoin economies of scale in the purchase of inputs, labour availability, sale of output and government provision of capital under poverty alleviation, fish farmers should be organized into formidable groups such as cooperative to programmes.

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