Journal of Agricultural Extension
Vol. 26 (2) April, 2022
ISSN(e): 24086851; ISSN(Print); 1119944X
Website: https://journal.aesonnigeria.org; https://www.ajol.info/index.php/jae
Email: editorinchief@aesonnigeria.org;agricultural.extension.nigeria@gmail.com

Information Communication Technologies Utilization and Profitability of Catfish Farming in Ijebu-Ode Zone of the Agricultural Development Programme, Ogun State

https://dx.doi.org/10.4314/jae.v26i2.6
Received: 17th December, 2021
Revision: 20th February, 2022, 24th March, 2022, 2nd, 4th, 7th &9th April, 2022
Accepted: 10th April, 2022
Published: 13th April, 2022

Oke Folasade Olukemi
Department of Agricultural Economics and Farm Management,
Federal University of Agriculture, Abeokuta, Nigeria.
Email: okefo@funaab.edu.ng
Phone: +2347030625030
https://orcid.org/0000-0001-9814-7198

Arowolo Aisha Olushola
Department of Agricultural Economics and Farm Management,
Federal University of Agriculture, Abeokuta, Nigeria.
Email: arowoloao@funaab.edu.ng
Phone: +2347032454696
https://orcid.org/0000-0003-2184-108X

Olorunsogo Gaius Oluwafemi
Department of Agricultural Economics and Farm Management,
Federal University of Agriculture, Abeokuta, Nigeria.
Email: gaiusfemi19@gmail.com
Phone: +2348148355992

Akerele Dare
Department of Agricultural Economics and Farm Management,
Federal University of Agriculture, Abeokuta, Nigeria.
Email: akereledare@yahoo.co.uk
Phone: +2347037957280
https://orcid.org/0000-0003-4725-035X

Abstract

The effect of information communication technologies utilization on profitability was examined among 120 catfish farmers drawn through a multistage sampling procedure. Data were elicited with the aid of a structured questionnaire, analysed using percentages, budgetary technique and multiple regression model. Agricultural media information sources utilized by the farmers include mobile phone (79.2%), television (76.7%) and radio (68.3%). The result revealed that ₦592,448.90 was expended as cost per annum on fish production with ₦970,700.54 as revenue and a

gross margin of ₦438,880.28 among ICT users while for non-ICT users ₦652,067.47, ₦1,026,428.66 and ₦427,337.41 were obtained as total cost, revenue and gross margin respectively. A value of 0.64 realized on the investment among ICT users implies that for every ₦1 invested in catfish farming, ₦1.64 is gotten as returns, leaving a profit of ₦0.64 while a profit of ₦0.57 is realized among non-ICT users. The factors that determine the profitability of catfish farming include household size (10%), input cost (1%) and television usage (5%) as agricultural media information source. Catfish farmers who utilized ICT have a higher profit level than non-users. Efforts and policies that will promote the farmers' timely availability and accessibility of agricultural information, particularly through television is recommended.

Key words: Information communication technology, catfish profitability

Introduction

The fishery industry in Nigeria operates under three major divisions, which are aquaculture, industrial and artisanal. Nigeria is one of the top aquaculture fish producers in Africa, and the leading producer in Sub-Saharan Africa (SSA), accounting for 52% of the region's entire farmed fish production (Kaleem and Sabi, 2021). The aquaculture sub-sector in Nigeria is believed to have several prospects for large-scale production and is considered a very viable alternative to satisfying the country's need for self-sufficiency in fish production (Kaleem and Sabi, 2021). However, the sector is still very much underutilized. Furthermore, despite the massive contributory roles of Nigeria's livestock and poultry industries to meet animal protein requirements in the human diet, deficiencies still abound. Jangampalli (2019) reported that these deficiencies are possibly and largely attributed to the incapability of the fishery sector to produce the needed quantity of fish that would be sufficient to combat animal protein deficiency in human nutrition.

Government and non-governmental organizations have put in place programs to provide information ranging from establishing a fish farm, pond management, fish processing, storage, and marketing to increase production potentials and reduce the amount spent annually on fish importation by the Nigerian government. Also, training and workshops are frequently organized to communicate current research findings for necessary actions and adjustments among farmers. Information and Communication Technologies (ICTs) are also not left out in these processes, so that fish farmers can be armed with new management techniques to increase output.

According to Kondra (2020), ICTs include all modern communication tools/devices like mobile phones, radio, television, computer and the networking systems that allows interconnectivity among people and organizations in the digital world. Such gadgets include traditional technologies such as landlines, radio, and television transmissions, which are still widely used today, and new technologies such as smartphones, robotics, and artificial intelligence, among others. Oke, Olorunsogo and Akerele (2021) in their previous work found that utilization of agricultural information, particularly through television broadcast, improved fish farmers' technical efficiency. Thus, ICT remains an effective medium to communicate the latest research findings and information that enhances agricultural production and technologies in agriculture to rural farmers.

In spite of the numerous benefits of ICT as a medium of communicating agricultural information to rural farmers, erratic power supply, and unaffordability of newspaper due to its expensive nature alongside other factors among farmers have been documented to hinder its effective use as a medium of information communication. Furthermore, the editors and programme producers could be more interested in anchoring programmes that appear to command higher financial returns at the expense of agriculture-related activities, thus making the farmers to have no choice other than resorting to third parties. Therefore, most farmers are forced to depend on third parties for up-to-date agricultural information and advances, which are frequently partisan in their viewpoint. Also, since access to timely information is sine qua non to improving fish output in order to bridge supply-demand gap and subsequently reduce yearly importation costs, there is the need to make the relevant information available to farmers in the most easily accessible form by embracing ICT. In line with the above, this study analysed ICT usage among farmers and profitability of fish farming. It specifically, identified the ICT utilization and different types of information sourced, estimated the profitability of fish farming and its determinants. Findings elicited would assist policy makers on how to promote and facilitate wider accessibility to timely information among farmers.

Methodology

The study was carried out in Ijebu-Ode Agricultural Development Programme (ADP) Zone in Ogun State. The study area lies between latitude 6^{o}49'47.95''N and longitude 3^{o}54'59.25''E. It has a land area of about 72 km^{2}.

A multistage sampling procedure was employed in selecting catfish farmers in the study area. Random selection of 3 blocks from the 6 blocks in the ADP zone was done in stage one. Random selection of 2 cells from each of the chosen blocks was done in stage two, giving rise to 6 cells sampled in the study. Proportionate sampling to size across the 6 cells was done in stage three to obtain 120 fish farmers.

Data on the farmers' socio-demographics, inputs use and cost, output realized from catfish farming and price sold per kilogram, ICT tools employed, and types of information sourced were obtained with the aid of a structured questionnaire. Data were analysed using percentages, mean, budgetary technique (cost and returns) and multiple regression.

ICT usage among farmers was examined using a 'yes' or 'no' response from the list of ICT tools provided, while usage frequency was assessed using a three-point measurement scale, like 'frequently/regularly, sometimes and seldom'. Frequent ICT usage as adopted in this study implies five times per week (5 times/week), sometimes implies three times per week (3 times/week) and seldom implies two times per week (2 times/week).

To determine the profit level, costs incurred and returns from fish farming were estimated separately for both ICT users and non-users of ICT, including the cost of all inputs used (fixed and variable), the quantity of output (fish) produced in kilogramme and the price per kilogramme.

Profitability ratios like Net Farm Income (NFI), Gross Margin (GM) and Benefit-Cost Ratio (BCR) were calculated from the cost and return analysis.

Multiple regression analysis, explicitly stated below, was employed.

$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \cdots \ldots\ldots\ldots\ldots\ldots\ldots\ldots + \beta_9 X_9 + \varepsilon_{it} \quad (v)$$

Where:

Y_i = Profit from catfish farming (₦ /annum)

X_1 = Sex of farmers (male =1; 0 otherwise)

X_2 = Age of famers (years)

X_3 = Educational level of farmers (years)

X_4 = Household size (number)

X_5 = Cost of inputs (₦)

X_6 = Farming experience (years)

X_7 = Television usage as a source of agricultural information (Yes =1; 0 otherwise)

X_8 = Radio usage as a source of agricultural information (Yes =1; 0 otherwise)

X_9 = Mobile phone usage as a source of agricultural information (Yes =1; 0 otherwise)

A priori expectations were for X_1, X_2, X_3, X_5, X_6, X_7, X_8 and X_9 to have a positive relationship with profit level (Y), while X_4 could either have a positive or negative relationship depending on whether the household contributes to production activities or otherwise.

Results and Discussion

Frequency of Information Communication Technology Utilization among Catfish Farmers

The ICT utilization among catfish farmers to improve profit level shown in Table 1 reveals that mobile phone (79.2%) was the most regularly used ICTs. Other ICTs employed include television (76.7%), radio (68.3%), extension agent (65.8%) and newspaper (55.0%). The least employed ICT is the billboard (25.8%). This suggests that mobile phone is the most frequently employed ICT as it is easily accessible, cheap and also encourage timely response to information, since the farmer can make a call easily to fellow farmers to seek for clarifications and other information. It also saves time and cost of transportation.

This finding is also in agreement with that of Omotesho, Akinrinde, Adenike and Awoyemi (2019) that due to convenience and expansive coverage, fish farmers mostly employ mobile phones in seeking for information. Television and radio were also widely employed among fish farmers as ICT tools and this is in line with the findings of Omotesho, Akinrinde, Adenike and Awoyemi (2019) that radio is a highly productive and reliable channel through which agricultural innovations can be transmitted to farmers particularly in rural areas.

Table 1: Frequency of ICT utilization among catfish farmers

ICT Sources	Regularly (%)	Sometimes (%)	Seldom (%)
Television	6.7	38.3	31.7
Radio	8.3	35.0	25.0
Newspaper	8.3	15.0	31.7
Billboard	-	5.0	20.8
Contact group	50.8	20.8	6.7
Extension Agent	3.3	17.5	45.0
Mobile phone	36.7	30.0	12.5

Source: Field Survey, 2019

Information Types and Sources among Catfish Farmers

Sources and information types as shown in Table 2 reveal that 20.0% of the respondents sought for information on feeding trough the television and not too many (1.7%) considered information using mobile phone. In terms of fish pond management, mobile phone (6.7%) is frequently used in seeking for information. Marketing information are regularly sourced from television and radio and least sourced (1.7%) from extension agent and newspaper. This is similar to the findings of Benard, Dulle and Lamtane (2018) that information sourced from television are key and credible to profitable fish farming.

Table 2: Types and sources of information among catfish farmers

ICT Sources	Information Types		
	Feeding (%)	Pond management (%)	Marketing (%)
Television	20.0	1.7	15.0
Radio	5.0	3.3	15.0
Newspaper	6.7	1.7	1.7
Billboard	-	-	3.3
Contact group	5.0	5.0	13.3
Extension agent	3.3	-	1.7
Mobile phone	1.7	6.7	3.3

Source: Field Survey, 2019

Cost and Return Analysis

Profit realized from catfish farming as computed from the budgetary technique in the study area is displayed on Table 3. Findings revealed that feed cost took the highest share (46.3% and 47.5%) of the total cost expended on fish production among ICT users and non-ICT users respectively. Fingerlings, liming and labour cost accounted for 22.4%, 0.3% and 13.1% of the total cost respectively among ICT users while for non-ICT users, they accounted for 21.8%, 0.1% and 10.1% respectively. This vividly revealed that a huge amount of money is expended on feed and fingerlings procurement in catfish farming. Fixed production cost among ICT users includes cost of fixed items like pumping machine (2.0%), land rent (2.4%), pond construction (3.4%) and other inputs which include cutlass (0.4%), sprayers, hoes and bowls accounted for 0.1% each respectively. Fixed production cost among the non-ICT users includes pumping machine (1.8%), land rent (3.2%), pond construction (1.5%) and other inputs like cutlass (0.5%), hoes, sprayers and bowls which accounted for 0.1% each of the total cost of production. Further findings showed that an annual total cost of ₦592,448.90 was incurred and a gross revenue of ₦ 970,700.54 realized. ₦ 438,880.28 and ₦ 378,251.64 were obtained as gross margin and profit

respectively among ICT users while for non-ICT users ₦652,067.47 and N1,026,028.66 were obtained as total cost and revenue respectively. Also, ₦427,337.41 and ₦373,961.19 were obtained as gross margin and profit respectively. Returns to investment in catfish farming value of 0.64 among ICT users means that on every one naira invested, a return of ₦1.64 with a profit of ₦0.64 were obtained while for non-ICT users, a profit of ₦0.57 is realized on every one naira invested. These ratios implied that catfish farming is a profitable enterprise in the study area, although, ICT users realize more profit than non-ICT users possibly due improved management technique as a result of information sought. This result corroborates Benard, Dulle and Lamtane (2018) that ICT usage enhances higher profitability in fish farming.

Table 3: Cost and return analysis

Items	ICT USERS Mean Amount Naira)	% TC	NON-ICT USERS Mean Amount (Naira)	% TC
Revenue				
Quantity of fish (kg)	1,279.19		1,402.79	
Price Per kg (naira)	758.84		731.42	
Total Revenue (TR)	970,700.54		1,026,028.66	
Variable cost				
Fish Seeds (Fingerlings)	132,488.00	22.4	141,948.00	21.8
Fish Feed	274,251.00	46.3	309,502.00	47.5
Hired Labour	77,709.00	13.1	66,801.00	10.1
Labour Pond Clearing	19,561.46	3.3	35,079.52	5.4
Liming materials	1,960.00	0.3	911.00	0.1
Fertilizer	1,945.00	0.3	1,523.53	0.2
Medication cost	3,822.00	0.6	7,630.00	1.2
Pond Maintenance	1,825.80	0.3	3,274.20	0.5
Security Cost	4,564.50	0.8	8,185.50	1.3
Other Cost	13,693.50	2.3	24,556.50	3.8
Total variable cost (TVC)	**531,820.26**		**598,691.25**	
Gross margin (GM) = (TR – TVC)	**438,880.28**		**427,337.41**	
Fixed cost (Depreciated)				
Land Rent	13,963.18	2.4	21,116.88	3.2
Cost of Cutlass	2,327.20	0.4	3,519.48	0.5
Cost of Hoe	388.00	0.1	587.00	0.1
Cost of Sprayer	367.40	0.1	649.84	0.1
Cost of Pond Construction	20,509.99	3.4	9,884.84	1.5
Cost of Net and Other Fishing Equipment	3,765.00	0.6	1,382.58	0.2
Cost of Bowls	754.00	0.1	700.00	0.1
Cost of Pumping Machine	11,772.87	2.0	11,803.68	1.8
Cost of Other Inputs	6,781.00	1.1	3,727.92	0.6
Total fixed cost (TFC)	**60,628.64**		**53,376.22**	
Total cost (TC) = TFC + TVC	**592,448.90**		**652,067.47**	
Profit/Net farm income (NFI) = GM – TFC	**378,251.64**		**373,961.19**	
Rate of return on investment (RORI) = NFI/TC	**0.64**		**0.57**	
Benefit-Cost Ratio (BCR) = TR/TC	**1.64**		**1.57**	

Source: Field Survey, 2019

Determinants of Profitability in Catfish Farming

Table 4 shows that three explanatory variables (household size, cost of inputs and television usage) were significant at different levels of probability.

The estimated coefficients conformed to the a priori expectation. The multiple determination coefficient, R^2 value of 0.79 indicated that 79% of the variation in the profitability of catfish is described by household size, inputs cost and television usage as an agricultural media information source. Also, 21% of the variation in the

profit level is explained by other factors not entertained in the model. The F-ratio was 45.69 and statistically significant at 1%.

The coefficient of farmer's household size (X_4) was negative and significant at 10%. This means that the larger the household size, the lower the catfish profit level among the farmers. Furthermore, a unit increase in household size will reduce the profit level by 35%. Cost of inputs coefficient (X_5) was positive and statistically significant at 1%. The positive sign of the variable also conforms to the a priori expectation. The implication of this result is that an increase in the level of input costs possibly due to expansion will increase catfish profit level in the study area by 88.4%.

Television usage as a source of agricultural media information (X_7) was significant at 5% and also had a positive relationship. This suggests that the more the use of this medium as an information source, the more the profit level. Specifically, this medium will increase profit level among farmers in the study area by 9.9%. This corroborates the earlier submission of Oke, Olorunsogo and Akerele (2021) of increased output in fish farming as a result of listening to radio and watching television for information related to fish farming.

Table 4: Determinants of profitability in catfish farming

Variables	Estimated β values	t- values
Sex	-0.069	1.072
Age	0.238	1.184
Level of education	0.104	1.268
Household size	-0.350	1.677
Cost of inputs	0.884**	19.710**
Farming experience	0.147	0.904
Television usage	0.099**	2.206
Radio usage	0.010	0.212
Mobile phone usage	0.010	0.223
Constant	-2969322.34	2.479
F-value (9,119)	45.69	
$R^2 = 0.79$		
P>F = 0.0000		

Source: Field Survey, 2019
** implies ≤0.05

Conclusion and Recommendations

The profit level was higher among farmers that use ICT compared to those that did not. Household size, cost of inputs and television usage significantly determine catfish profit level. Government at all levels should assist catfish farmers to subsidize fish feeds and also encourage the use of local materials in order to reduce cost of production and ultimately increase level of profit. The ICT tools employed by the farmers to source for information should be improved upon by focusing more on the dissemination of programmes that are agriculture related particularly fishery activities at appropriate time to increase farmers' profit level.

References

Benard, R., Dulle, F. and Lamtane, H. (2018). The influence of ICT usage in sharing information on fish farming productivity in the Southern Highlands of Tanzania. *The International Journal of Science & Technoledge* 6(2): 56-67.

Jangampalli, A. D. (2019). Aquaculture role in global food security with nutritional value: a review. *Transnational Animal Science* 3**:** 903-910.

Kaleem, O. and Sabi, A. F. B. S. (2021). Overview of aquaculture systems in Egypt and Nigeria, prospects, potentials, and constraints. *Aquaculture and Fisheries* 6**:** 535-547.

Kondra, I. (2020). “Use of IT in Higher Education”. *UGC Care Journal. India*: Studies in IndianPlace Names. 40: 280.

Oke, F. O., Olorunsogo, G. and Akerele, D. (2021). Impact of information communication technology (ICT) and mass media usage on technical efficiency of fish farming in Ogun State, Nigeria. *Journal of Agribusiness and Rural Development* 60**:** 143-150.

Omotesho, K. F., Akinrinde, F. A., Adenike, A. J. and Awoyemi, A. O. (2019). Analysis of the use of information communication technologies in fish farming in Kwara State, Nigeria. *Journal of Agribusiness and Rural Development* 54(4): 327–334.