

Information Needs of Fish Farmers in Osun-State, Nigeria

Enioluwa Jonathan Ijatuyi^{1*}, Oluremi Adenike Abiolu² and Olumuyiwa Akin Olaniyi³

^{*1, 2, 3} *Department of Agricultural Economics and Extension, School of Agricultural Sciences, Faculty of Agriculture, Science and Technology, North-West University, Mafikeng Campus, Mmabatho, South Africa*

²*University Library, Federal University of Technology, Akure, Nigeria*

³*Department of Agricultural Extension and Economics, Ladoke Akintola University of Technology, Ogbomosho, Nigeria*

E-mail: ¹<ijatuyienioluwa@yahoo.com>, ²<ijatuyioa@yahoo.com>, ³<oaolaniyi@lautech.edu.ng>

³<oaolaniyi@lautech.edu.ng>

KEYWORDS Catfish. Credibility. Producer. Tilapia. Usefulness. Information Sources

ABSTRACT This study investigated information needs among fish farmers in Ife Central Local Government area of Osun State, South West Nigeria. A simple random sampling technique was used to select 80 of the 160 fish farmers registered by the Zonal Office of Osun State Agriculture Development Project. A self-developed questionnaire segmented into sections was used to elicit information covering respondents' background, information sources, their credibility and usefulness as well as information needs. The findings revealed that sixty-five percent were males while thirty-five percent were females. The majority (65%) was married and fell within active years (30 years) and had primary education. Catfish was mostly farmed (40%) followed by Tilapia (23%) and Heterobranchus (20%). Monoculture was predominant (42.5%) and locally formulated feed was used by the majority (34%). Homestead concrete (30%) and earthen pond (30%) were commonly used among respondents. The majority of respondents (76.3%) were new entrants. Information needs of respondents covered both technical and economic areas. The greatest information needs of fish farmers was on the construction of the modern pond at 73.8 percent, feed formulation techniques at 71.3 percent, feeding operation at 66.3 percent, method of improving fingerling breeds and stocking operation at 62.5 percent and 61.3 percent respectively. It can be concluded that the most useful information means and sources are through mobile phones, radio, professional colleagues, religious organizations and the internet. The study recommends that Agricultural extension should identify information needs of fish farmers as well as prominent sources of information so that they can be targeted properly for extension activities.

INTRODUCTION

Throughout history, agriculture has been known to be one of the oldest industries among human beings and it also remains one of the main pivots on which human health stands. Protein is available from many sources and is invaluable to human health. One of the sources of protein in the human diet is animal protein commonly obtained from meat. Studies have reported an increasing shortage of animal protein, especially meat due to factors beyond consumers' affordability (Ijatuyi 2010; Adefalu et al. 2013). Zilberman et al. (2012) stated that among other things in recent past, increased population has

encouraged the drastic changes in livestock consumption and production patterns, therefore paving the way for what can be referred to as "food revolution". This implies that other sources of protein intake have to be sought for, of which fish is a common one.

Olaoye et al. (2016) discussed that fishery continues to maintain its crucial position through its contribution to agriculture's share of Gross Domestic Product in Nigeria. The study further believes that aquaculture has the ability to contribute significantly to the local fish production in the country if improved aquaculture technologies were introduced and adopted by fish farmers. Oginni (2004) observes that fish supplies up to forty percent of protein intake for not less than two-thirds of human population across the globe. Oginni's study further reiterates that the status of fish has improved from being a poor man's food to that of rich men due to dietary factors such as low level of cholesterol and saturated fats making it a choice as animal protein for those suffering from diabetes, obesity, and

Address for correspondence:

Enioluwa Ijatuyi
Department of Agricultural Economics and Extension
North West University,
Private Bag x 2046,
Mmabatho, 2735 South Africa
Telephone: +27790476718,
E-mail: ijatuyienioluwa@yahoo.com

hypertension. Torrens (2016) highlights that fish is also popular for food because it is richer in animal protein. Other factors that give prominence to fish being a good source of protein includes its ease of digestibility. It is known to make a vital contribution to the food and nutritional security of about 200 million African people. Moreover, it provides income for more than 10 million people who are mainly small-scale fish farmers and entrepreneurs of fish production (World Fish Center 2005). As important as fish is to household and national food security, it has been observed that a wide gap exists between its supply and demand (Oginni 2004). Commenting on this dismal condition, Adefalu et al. (2013) state that to cater for this deficit in fish supply, the government of Nigeria imports fish worth N97 billion annually.

Literature has shown that protein intake in developing countries is below the required standard per person per day (FAO 2005). In the light of this scenario, it is not surprising therefore that fish farming is gaining prominence not only in dietary purposes, but also in providing employment and income for farmers. Fisheries thus occupy a unique stance in the agricultural sector of Nigerian economy.

Fish has 20,000 identified species which is more than any vertebrate (FAO 1997 in Adefalu et al. 2013). According to Cho (2016), the “American Heart Association recommends that we eat fish at least twice a week since fish are high in protein, low in saturated fats and rich in omega-3 fatty acids. Global per capita fish consumption has almost doubled from the 1960’s to 2012. And today, about half of all the seafood destined for human consumption is produced through fish farming, also called “aquaculture”. Fish farming is a form of aquaculture and is about raising fish of any species commercially in tanks or some form of enclosure or another for human consumption. According to Ogboma (2010), though fish farming is predominant among different types of agricultural practices along coastal areas of Nigeria, it is no longer limited to the wild. Fish farms or fish farming is the practice of raising fish for commercial purposes in tanks or enclosures which can be of different types such as “cage system, irrigation, or pond systems, composite fish culture irrigated recycling systems and classic fry farming otherwise referred to as flow through system” (Fish Farms 2015). If fish production in Nigeria as a developing country

has to be increased, it seems quite necessary that the information needs of the people who farm the fish has to be investigated.

Literature Review

Studies on Information Needs of Fish Farmers

Information is said to be germane to increasing production, improvement of marketing and distribution strategies in fish farming processes (Richard et al. 2014). In all spheres, information is vital to all sectors of a nation’s economy. Agricultural information, whether it is for technical, economic, socio-cultural or legal aspects, is of utmost importance to fish farming activities. However, studies have shown that as important as information is to agricultural productions in fish farming, gaps still exist in fish farmers information needs. In their study of information needs of fish farmers in Ilorin metropolis, Adefalu et al. (2013) identified the inadequate provision of information and training to fish farmers and scarcity of guidelines for fish farmers with no previous knowledge as one of the factors inhibitory to an adequate meeting of fish demand by Nigerian populace. Ogboma (2010), while studying fish farmers’ access to agricultural information found that in order to cope with the pressure made on the protein demand occasioned by increasing population in Nigeria, it becomes compelling that information on fish farming and for fish farmers be provided since information is the driving and sustaining force for any development strategy and a necessary ingredient for success in all human endeavors. The study observed that such information cover a variety of areas such as fish spawning, fish processing, storage, marketing, and financing among others. The study found further that respondents need information mostly on feed, new technologies, disease and pest control/treatment, and credit facilities among others, in order to improve and consequently increase their yield. Ogboma (2010) concludes that formatting and packaging of fish farming information to suit end users are paramount while maintaining consistency and continuity in the delivery and diffusion of information.

Adewumi (2003) identifies six categories of agricultural information users, namely policy makers and planners, researchers, extension educators and students, agro-based industries,

service staff, and farmers. The need for supplying each category with relevant and current information is premised on the fact that they contribute directly to the improvement of agriculture in Africa. Adeniji (2007) states that everybody needs information to reach their potential, adding that a system becomes more reliable with greater chances of survival in a situation of increased availability of information. What then is information? Information is different things to different people having been given many terminologies in the information and technology-driven age.

Cartmell et al. (2004) assert that we live in an information and technology-laden world. Information is deemed to have assumed the term language refers to as “language game” in which its meaning depends on the context in which it is used as opposed to the generally accepted meaning or definition (Bawden 2001). Information is regarded as data (Wilson 2000) wealth and is relatively scarce, transferable, and external. It is also a good or commodity or service with utility (Narayana 2010). Information provides messages (Ferguson and Ferguson 2000). Bellinger et al. (2004) quoting Ackoff (1989), stated that information supply answers to “who”, “what”, “where”, and “when” questions. Authors have noted that knowledge and information are important assets that need to be managed strategically for competitive advantage and business outcomes. They are often referred to as intangible assets – assets that are not physical or touchable; knowledge and information concern content rather than technology (Bryson 2006). Adewumi (2003) identifies information as ideas, facts, and imaginative works of the mind and data of value to decision-making, problem-solving, and improved products. With the status attained by information, it is not out of place to investigate the need for this asset among fish farmers who appear to be contributing in no small measure to the improvement of the nutritive health of the Nigerian populace.

Information Needs

There is no agreed definition of information need as a phrase among information professionals (Nicholas and Herman 2009). However, these authors provide a working definition or understanding that an information need is information that enhances a research or improves a job;

when an anomaly is seen, people want this corrected. Simply put by Nicholas and Herman (2009), an information need is the “need for information that individuals ought to have in order for them to perform their job effectively”. It is often believed that information need may exist when there is a gap between the state of the present knowledge possessed by somebody and that which they need to deal with some particular issues or solve some problems or handle a present situation. These information needs are various, multi-dimensional, dynamic and not subject to generalization.

Concluding a study of change agents and information provision in rural communities, Okeh (2002) points out that if information needs have to be met, they must be carefully identified by change agents who have to rely on accurate, accessible and useful sources or channels. Efforts have been made in investigating the information needs of fish farmers in different communities. These include those of Ogunlade (2007), Ogboma (2010) and Adefalu et al. (2013). These studies have identified many information needs among the fish farmers such as training in marketing, fish processing and preservation, water quality management (Adefalu et al. 2013), new trends, disease control and treatment, credit facilities (Ogboma 2010), fish feed, maintenance of water quality and harvesting methods (Ogunlade 2007) as the thorniest areas of information needs. In their own study, Barguma and Ndaghu (2014) found that over eighty percent of their study respondents had diverse information needs in their fish farming endeavor. Others found information needs like capital or credit facilities (Olaoye et al. 2013), lack of feed, finance, skills and fingerlings, market, storage and transport facilities, diseases and predators (Omasaki et al. 2014) as the greatest information needs faced by fish farmers including training for new entrants.

Knowing the information that is desired by various fish farmers, for what purposes, and through what channels can go a long way in guiding the various agricultural information user population and information providers themselves in better access, use of information and consequently increased yields. Because information needs are always changing, it has become necessary that studies on fish farmers’ information needs be surveyed from time to time in addition to the need for increased and im-

proved fish production in Nigeria in order to meet the demands. In addition, to adequately provide fish in such quantities that can meet the purchasing power of the masses in Nigeria, there is a need for adequate information on fish and fish culture.

Objectives of the Study

The main objective of the study was to identify the information needs of fish farmers in Ife central local government area in Osun-State.

The specific objectives of the study are to:

- Identify the type of fish farmed by study respondents
- Examine the type of pond that respondents used for fish farming
- Identify the type of fish feed that respondents use
- Determine respondents' information needs
- Identify the sources by which they obtain information

METHODOLOGY

Study Area

Osun State is one of the 36 states in Nigeria. Ife Central Local Government Area is located in Osun-East senatorial district of the State. The State enjoys a tropical climate characterized by two seasons of rainy (March to October) and dry (November to March) seasons. The Local Government Area is predominantly inhabited by core Yoruba people with its headquarters in Ile-Ife occupying an area of 111 km² and a population of 167,254 (Federal Republic of Nigeria 2006). The Local Government Area is composed of agrarian communities having its agricultural products as oil palm, palm wine, fish production, among others.

This study is part of a research work that investigated information supporting fish farming activities of respondents in Ife-Central Local Government area in Osun State using a survey research design. The study used a multi-stage sampling technique. Simple random sampling technique was employed to select a sample size of 80 out of 160 fish farmers that were registered by the zonal office of Osun State Agriculture Development Project at fifty percent sample size. A self-developed questionnaire was used to elicit information from respondents

through interviews. The instrument was segmented into areas such as respondents' personal characteristics, sources of information available to respondents, information needs of respondents, sources of information used to meet such needs, the degree of usefulness of sources of information used by respondents and the degree credibility of information sources as perceived by respondents. Data were analyzed using descriptive statistics, simple frequency counts, and percentage.

RESULTS AND DISCUSSION

Sixty-five percent of the respondents were males while thirty-five percent were females. This agrees with the findings of Uzezi (2015) that males participate more in fish farming. The married respondents constituted the highest (65%), the rest were divorced (7.5%), widowed (1.2%) or unmarried (26.3%). The age distribution of the respondents spread between 20 and above 50 years. Those between 20 and 40 years were the majority (65%) with the mean age at 40 years, while those above 40 years fell to thirty five percent. This finding corroborated with the findings of Olasunkanmi (2012) and Olaoye et al. (2016) that the mean age of fish farmers was 40 and 45 years. The educational background of these fish farmers showed that they spent diverse numbers of years in their educational endeavors. While many (60%) had primary education, spending not more than six years in school, others (5%) spent between 7 and 9 years in school undergoing their junior secondary school education, others (13.7%) spent between 10 and 12 years for their senior secondary education, while about 17.5 percent had tertiary education. This contradicts the findings of Ronald et al. (2015). However, a small percentage (3.8%) did not have any formal education. Looking at the respondents' membership of the social organization, the results show that sixty five percent did not have any social affiliation while the rest belonged to one social organization or another. The educational pattern of respondents is similar to that of Ogboma (2010) whose respondents were also majorly educated.

Type of Fish Farmed

Different types of fish were farmed by the fish farmers. Catfish was farmed by most of the

respondents (40%), followed by Tilapia (23%) and *Heterobranchus* species (20%). However, some of the respondents (17%) did not respond to this question. This finding shows that fish farmers in the area under study follow the trend reported in Mississippi Agricultural and Forestry Experiment Station (2015) about catfish farming leading aquaculture industry in United States of America and has reached a scale of \$660 million sales in recent decades therefore becoming one of the most important agricultural activities. Most farmers deal with catfish as was explained by Ogunlade (2007) and Ijatuyi (2010) that such fish have more resistance and are easy to farm in warm climates like the Nigerian tropical type. This finding was also supported by Ogunleye et al. (2015).

Fish Culture Practiced

Questions were asked on the type of fish culture practiced by the respondents. Their answers showed that monoculture (42.5%) was predominant among them followed by polyculture (28.8%), and integrated culture (25%). This finding is similar to the study by Ibemere and Ezeano (2014) and Olaoye et al. (2014) that monoculture was the major fish culture practiced.

Type of Feed Used in Fish Farming

Different types of feeds were used in respondents’ respective fish farming activities. These include locally formulated feed (34.0%), animal waste (31.3%) and improved feed (30%). This contradicts the findings of Ogunleye et al. (2015) which shows most of the fish farmers use imported feed for fish farming.

Type of Fish Ponds Used in Fish Farming

There was a need to ask for the type of pond used for farming purposes. Findings reveal that thirty percent used Homestead Concrete and Earthen pond, twenty percent used plastic pond but only fourteen percent used tarpaulin as a pond. This result shows that fish farming is no longer limited to the naturally created waters only, but it now extends to artificially created environments of raising fish which is supported by Ogboma (2010). Furthermore, Olaoye et al. (2014) highlighted that fish farmers practiced more through an earthen pond in a similar study.

Respondents’ Fish Farming Experience

Respondents were asked to state the number of years for which they have engaged in fish farming. The finding in (Table 1) showed that many (76.3%) of the respondents had just five years fish farming experience and could thus be regarded as new entrants. This is in support of the study by Olaoye et al. (2014). The study does not support the findings of Ogunleye et al. (2015) which showed that the majority of the fish farmers in a similar study were having between two to four years of fishing experience. Contrarily, the majority of fish farmers in the study by Olaoye et al. (2016) supported the finding of this study which showed the majority having five years of fish farming experience. Those who had more than five years of fish farming experience were about 18.6 percent while about 5.1 percent had more than a decade experience in the fish farming business. The result showing that the majority were new entrants is sustained by Ogboma (2010) where it was found that fish farming is diffusing fast thus contradicting earlier studies that observed slow diffusion of fish farming. However encouraging as it may seem that new entrants are increasing in the endeavor, Adefalu et al. (2013) noted that more years of farming experience are needed to facilitate the acquisition of farming skills in farming production.

Table 1: Respondents’ fish farming experience

<i>Fish farming experience (Years)</i>	<i>Frequency</i>	<i>Percentage</i>
1-5	61	76.3
6-10	15	18.6
11-15	3	3.8
16-20	1	1.3
Total	80	100

Information Needs of Fish Farmers

The fish farmers have expressed their need for information in their farming activities. Their greatest need focused on the construction of the modern pond. This information need was highly needed by 32.6 percent and somewhat needed by 21.3 percent whereas it is just needed by 22.5 percent. Following this, is the information need on feed formulation technique form which is highly needed by 31.3 percent fish farmers, somewhat needed by 25 percent of the farm-

ers and just needed by 13.8 percent. The need for feeding operation was equally important though it falls to the third area. This technical skill was highly essential with 23.8 percent, but somewhat essential with 17.5 percent while only 25 percent expressed that they just needed it. Another area of information need for farmers was the improvement of fingerling breed. The information needs rated low by respondents included stocking operation, improving the breed of fingerling, spawning operation. Ranked least under information needs were marketing information and preservation method. The low rating of these information needs seemingly contradicts Adefalu et al. (2013) who found them to be of greater ranking among their respondents. The respondents in this study lack information on technical skills while those in Adefalu et al. (2013) lack information on economic issues of fish farming. In both cases, fish production was affected by a lack of information on those areas. Fish farmers were asked to identify their information needs from an array of areas provided. The distribution of the needs of the fish farmers is

shown in (Table 2). These indicate that respondents have diverse information needs. Information is paramount to any group of people in the society, to entrepreneurs more especially; information is essential and needed to carry on with life and its activities.

Information Sources Used by Fish Farmers

In trying to meet their information needs, respondents use a number of sources/means to obtain information in their fishing entrepreneurial endeavors. As shown in (Table 3) the study, respondents found the information sources useful to varying degrees. Mobile phones was the most popular medium of obtaining information as 26.3 percent found it most useful. To 32.5 percent of respondents, it was useful while 27.5 percent found it fairly useful. The next source was the radio with 15 percent finding it most useful, 45 percent found it useful and was fairly useful to 31.3 percent. Respondents agree that professional colleagues were also valuable in obtaining information through personal con-

Table 2: Information needs of fish farmer

<i>Information need</i>	<i>Yes (percentage)</i>	<i>No (percentage)</i>	<i>Needed (percentage)</i>	<i>Somewhat needed (percentage)</i>	<i>Highly needed (percentage)</i>
Construction of modern pond	59 (73.8)	21 (26.3)	18 (22.5)	17 (21.3)	26 (32.6)
Stocking operation	49 (61.3)	31 (38.8)	10 (12.5)	25 (31.3)	14 (17.5)
Improvement of fingerling breed	50 (62.5)	30 (37.5)	18 (22.5)	13 (16.3)	18 (22.5)
Feed formulation technique	57 (71.3)	23 (28.8)	11 (13.8)	20 (25.0)	25 (31.3)
Feeding operation	53 (66.3)	27 (33.8)	20 (25.0)	14 (17.5)	19 (23.8)
Marketing information	45 (56.3)	35 (43.8)	13 (16.3)	16 (20.0)	9 (20.0)
Spawning operation	40 (50.0)	40 (50.0)	14 (17.5)	9 (11.3)	15 (18.8)
Preservation method	36 (45.0)	44 (55.0)	16 (20.0)	12 (15.0)	9 (11.3)

Table 3: Distribution of information sources according to their degree of usefulness to respondent

<i>Information sources</i>	<i>Not useful (percentage)</i>	<i>Fairly useful (percentage)</i>	<i>Useful (percentage)</i>	<i>Most useful (percentage)</i>
Radio	7 (8.8)	25 (31.3)	36 (45.0)	12 (15.0)
Mobile phones	11 (13.8)	22 (27.5)	26 (32.5)	21 (26.3)
Professional colleagues	19 (23.8)	18 (22.5)	29 (36.3)	14 (17.5)
Religious organization	25 (31.6)	17 (21.5)	23 (29.1)	14 (17.7)
Internet	25 (31.3)	17 (21.3)	21 (26.3)	17 (21.3)
Bulletin/Posters	22 (27.5)	18 (22.5)	27 (33.8)	13 (16.3)
Friends and relations	18 (22.5)	26 (32.5)	26 (32.5)	10 (12.5)
Commercial input dealers	21 (26.3)	17 (21.3)	24 (30.0)	18 (22.5)
Feed millers	21 (26.3)	15 (18.8)	23 (28.8)	21 (26.3)
Cooperative society	20 (25.0)	27 (33.8)	22 (35.0)	5 (6.3)
Television	25 (31.6)	30 (38.0)	16 (20.3)	8 (10.1)
Extension agent	28 (35.0)	31 (38.8)	16 (20.0)	5 (6.3)

tacts which is supported by the findings of Aphunu and Nwabeze (2012). This is apparent in that 17.5 percent of the respondents relied on it for getting fish farming information, 36.3 percent found it useful, 22.5 percent regarded it as fairly useful while it was of no use to 23.6 percent. This was further corroborated by Ibemere and Ezeano (2014). Findings from the study showed that respondents preferred informal information sources and channels over formal sources, as the use of informal sources save time and energy (Talja 2002). The use of the media such as radio and mobile phones by respondents sustains that the findings by Barguma and Ndaghu (2014) who confirmed in their study that mobile phones and radio are very important and easy means by which fish farmers obtain information. The world is in an information age whereby the radio in many cases is inbuilt to mobile handsets which can be easily operated even by the most illiterate person. Furthermore, with the introduction of farmer applications and chat groups a mobile phone can become a good means of sourcing information. Religious organizations and the internet were ranked fourth and fifth by respondents as sources of meeting their information needs. The Internet might not be so accessible to them unless they have internet connectivity either by subscribing or by going to cyber cafe. A discouraging factor in the use of the internet may be epileptic power supply and cost subscription. Other sources were accorded less importance. It is worthy to note here that the extension agents were ranked as the least useful source of information for the respondents, which is in contrary to the findings of Ogunremi et al. (2013) that had the highest source of information through the extension agents. Extension agents also were the highest source of information in the study by Olaoye et al. (2014). This calls for a re-awakening of the concerned agriculture officers, especially extension officers.

CONCLUSION

The study showed that married males with basic education were dominant in fish farming in the study area. Catfish was the most popular fish reared by respondents using mostly locally formulated feed and homestead concrete. More than three-quarters of the fish farmers had a maximum of five years of experience showing

that majority were new entrants and also in their active years since they were between 20 and 40 years of age. The study found that the information needs of respondents were diverse. These include construction of the modern pond, feed formulation technique, feeding operation, improving the breed of fingerlings, stocking operation, spawning operation, arranged in that order of importance among others. However, respondents in a bid to meet their information needs obtain information through a number of sources. The most useful means of sourcing information are mobile phones, radio, professional colleague, religious organization, the Internet, bulletins/posters, friends, and relations, in the descending order of importance. A gap in information dissemination is evident among the fish farmers and the agricultural extension agents in this study.

RECOMMENDATIONS

Information is important to every sector of a nation's economy. Therefore, the study recommends:

- Provision of adequate, timely and relevant information to fish farmers. This should be vigorously pursued.
- Active involvement of agriculture specialists particularly the extension in providing fish farmers with the needed agricultural information covering technical and economic areas in order to propel their enterprise and increase fish production so as to boost the health of Nigerian populace through the fish intake.
- Usage of appropriate means of information dissemination by extension agents to pass information to fish farmers, especially informal means (no particular path, interpersonal relationships, slangs, and grapevine).
- Provision of the necessary infrastructure that can boost fish farming in the government of Osun State to encourage fish farming.

REFERENCES

- Ackoff RL 1989. From data to wisdom. *Journal of Applies Systems Analysis*, 16: 3-9
- Adefalu LL, Aderinoye-Abdulwahab SA, Bello OG, Olorunfemi OD, Oba SA 2013. Information needs of fish farmers in Ilorin metropolis, Kwara State, Nigeria. *Journal of Agriculture, Food and Environment*, 9(2): 1-5
- Adeniji MA 2007. Information needs and seeking habits of academic staff in Ibobgun campus of Olabisi

- Onabanjo University, Ogun State. *Gateway Library Journal*, 10(2): 127-135
- Adewumi COB 2003. Information-seeking habits and needs of agricultural research scientists in Ibadan metropolis Nigeria. *Gateway Library Journal*, 6(1): 34-43.
- Aphunu A, Nwabeze GO 2012. Fish farmer's perception of climate change impact on fish production in Delta State, Nigeria. *Journal of Agricultural Extension*, 16(2): 7-8.
- Bellinger G, Castro D, Mills A 2004. Data, Information, Knowledge, and Wisdom. From <<http://www.systems-thinking.org/dikw/dikw.htm>> (Retrieved on 8 August 2016).
- Barguma KA, Ndaghu AA 2014. Information accessibility among fish farmers in Girei, Yola-North and Yola-South local government areas, Adamawa State, Nigeria ARPN. *Journal of Science and Technology*, 4(8): 503-507.
- Bryson J 2006. *Managing Information Services: A Transformational Approach*. Surrey, England: Ashgate.
- Cartmell DD, Orr CL, Keleman DB 2004. Methods of Information Dissemination to Limited-Scale Land Owners. From <<http://agnews-tamu.edu/saas/2004/infodissemination.pdf>> (Retrieved on 15 June 2011).
- Cho R 2016. Making Fish Farming More Sustainable. Sustainability. From <<http://blogs.ei.columbia.edu/2016/04/13/>> (Retrieved on 8 August 2016).
- FAO 1997. Nigeria Integrated Rural Fisheries Development. Project Findings and Recommendations UNDP, IFAO, FIDP/NIR/87/010, *Terminal Report*. Rome: FAO, P. 26.
- FAO 2005. *Report of the FAO World Fish Center Workshop on Small-Scale Aquaculture in Sub-Saharan Africa Revisiting the Aquaculture Largest Group Paradigm*. Rome: FAO.
- Federal Republic of Nigeria 2006. Population Census. From <<https://web.archive.org/web/20120305101910/http://www.nigerianstat.gov.ng/nbsapps/connections/Pop2006.pdf>> (Retrieved on 8 August 2016).
- Ferguson PR, Ferguson GJ 2000. *Organizations: A Strategic Perspective*. London: Macmillan.
- Fish Farms 2015. Fish Farming Information and Resources. From <www.farms.com> (Retrieved on 18 September 2015).
- Ibemere IF, Ezeano CI 2014. Status of fish farming in rivers State Nigeria. *Journal of Fisheries and Aquatic Science*, 9: 321-329.
- Ijatuyi EJ 2010. *Analysis of Information Sources Used by Fish Farmers in Ife Central Local Government Area of Osun State*. BSc Project. Ogbomoso, Nigeria: Ladoke Akintola University of Technology
- Mississippi Agricultural and Forestry Experiment Station 2015. Commercial Catfish Production. Mississippi State University Extension Service. From <<http://msucares.com/aquaculture/catfish/index.html>> (Retrieved on 22 September 2015).
- Narayana GJ 2010. *Knowledge and Information: Perspectives and Prospect*. New Delhi: Ess Publications
- Nicholas D, Herman E 2009. *Assessing Information Needs in the Digital Age of the Consumer*. 3rd Edition. London: Routledge.
- Ogboma MU 2010. Access to agricultural information by fish farmers in Niger-Delta Region of Nigeria. *Library Philosophy and Practice*, 424: 1522-0222.
- Oginni O 2004. *Fish Catch Assessment and Economic Viability of Iwo Reservoir Gillnet Fishery*. PhD Thesis. Akure, Nigeria: Federal University of Technology.
- Ogunlade J 2007. Backyard Fish Farmer's Information Needs in Osun State, Nigeria. *Paper presented during African Association of Agricultural Economists second International Conference*, Accra Ghana, 20-22 August 2007.
- Ogunleye KY, Ojo TY, Oyewo T 2015. Training needs for fish farmers in Ibadan-North local Government area of Oyo State, Nigeria. *World Applied Sciences Journal*, 33(12): 1923-1928.
- Ogunremi JB, Abraham P, Olatunji SO 2013. Gender and aquaculture information preferred sources among rural fish farmers in Ondo State, Nigeria. *Journal of Sustainable Development in Africa*, 15(7): 47.
- Okeh E 2002. Change agents and information provision in rural communities: The case of selected Nigerian rural communities. *Gateway Library Journal*, 5(1 and 2): 54-60.
- Olaoye OJ, Ashley-Dejo SS, Fakoya EO, Ikewinwe NB, Alegbeleye WO, Ashaolu FO, Adelaja OA. 2013. Assessment of socio-economic analysis of fish farming in Oyo State, Nigeria. *Global Journal of Science Frontier Research Agriculture and Veterinary* 13(9): 45-55.
- Olaoye J, Ashley-Dejo SS, Adekoya EO 2014. Small Holder Fish Farmer's Information and Training Needs in Ogun State of Nigeria. *Global Journal of Science Frontier Research*, 14(3): 1-10.
- Olaoye OJ, Ezeri GO, Akegbejo-Samsons Y, Awotunde JM, Ojebiyi WG 2016. Dynamics of the adoption of improved aquaculture technologies among fish farmers in Lagos State, Nigeria. *Croatian Journal of Fisheries*, 74(2): 56-70.
- Olasunkanmi JB 2012. *Economic Analysis of Fish Farming in Osun State, South-Western Nigeria*. Tanzania: IIFET Tanzania Proceedings.
- Omasaki SK, Charo-Karisa H, Kosgey IS 2013. Fish production practices of smallholder farmers in western Kenya. *Livestock Research for Rural Development*, 25(52).
- Richard W, Malcolm B, Randall B, Sarah C, Nuttapon C, Sadasivam K, Michael P 2014. *Improving Productivity and Environmental Performance of Aquaculture*. WorldFish, Worldbank, 60.
- Ronald B, Silayo GF, Abdalah KJ 2015. Preference sources of information used by Seaweeds farmers in Unguja Zanzibar. *International Journal of Academic Library and Information Science*, 3(4): 106-116
- Talja S 2002. Information sharing in academic communities: Types and levels of collaboration in information seeking and use. New review of information behavior. *Research*, 3: 143-160.
- Torrens K 2016. Best Sources of Protein. From <<http://www.bbcgoodfood.com/howto/guide/best-sources-protein>> (Retrieved on 5 August 2016).
- Uzezi OP 2015. Agricultural and information needs and utilization among migrant fishermen by gender: A study of Isoko Reverie Community, Delta State, Nigeria. *Journal of Emerging Trends in Computing and Information Sciences*, 6(5): 265.

Wilson TD 2000. Human information behavior. *Information Science Research*, 3(2): 49-55.

World Fish Center 2005. Crisis in African Fish Supplies Looms, Experts Warn African leaders. From <www.eurekalert.org/pub_release/2005> (Retrieved on 29 September 2015).

Zilberman D, Otte J, Roland-Holst D, Pfeiffer D (Eds.) 2011. *Health and Animal Agriculture in Developing Countries*. Springer Science & Business Media, P. 36.

Paper received for publication on April 2016
Paper accepted for publication on November 2016