ICTs and online resources used for meeting information needs by agricultural researchers and extension workers in Edo State, Nigeria

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Article Info

ABSTRACT

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The study ascertained ICTs and online resources used for meeting information needs by agricultural researchers and extension workers in Edo State, Nigeria. Survey design was used in the study. ICTs /online resources used by respondents to meet their information needs were: computers (95.1%), internet (90.2%), mobile/cell phones (86.3%), dictionaries (79.4%), electronic books (e-books) (78.4%), and electronic journals (e-journals) (77.5%). The majority (82.4%) indicated their purpose of using ICTs/online resources was for research purposes. Researchers acquired their e-resources majorly from the internet (83.9%) and extension workers acquired their e-resources through subscriptions made through the consortium for university and research libraries (87.5%). The study recommends that Edo State ministry of agriculture and agricultural research institutes in the state, should subscribe for online resources for the benefit of respondents who desire to use relevant online resources but are hindered by cost and technical issues.

INTRODUCTION

Agriculture plays an important role in the economies of many developing countries, contributing significantly to their gross domestic product (GDP), labour force, exports, and urban population (Stamoulis, 2001; Olajide et al. 2012). Agriculture accounts for about 24.18% of Nigeria's GDP and 70% of informal sector jobs created in the economy are related to rural agriculture (Enejeta, 2016). It is a source of government revenue, foreign exchange through exports and raw materials for the manufacturing and processing industries. This implies that agriculture is a key sector that stands to affect majority of Nigerians positively (Oji-Okoro 2011) because of its important role in slashing poverty and transforming the economy. Considering the overall positive effect of agriculture on a nation's economy and the livelihood of her citizenry, it is important that agricultural knowledge/information be properly developed, then transferred to end users.

Speedy access to current, accurate, and relevant technical information can provide invaluable support to researchers and extension workers. On the contrary, unavailability of information can result in waste of financial, material, and human resources or duplication of research effort (Majid et al. 2000). Thus, information is considered as an important resource that contributes towards the development of a research institute, extension organization and the nation at large. It provides the core for the development of knowledge, the basis for innovations, the resources for informed citizenry, and as a result, becomes a key commodity for the progress of a society (Thanuskodi 2012).

For researchers and extension workers to meet their information need, they must seek it from various sources. Information seeking behaviour involves a set of actions that an individual takes to express information needs, seek information, evaluate and select information, and finally use these information to satisfy his/her information needs (Thanuskodi 2012). It deals with behaviour and actions exhibited by human beings in their search for information to satisfy diverse information needs (Abubakar 2010). Information seeking behaviour therefore is the purposive

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seeking for information by individuals as a consequence of a need to satisfy goals (Kakai *et al.* 2004; Wilson 2008; Mustaffa *et al.* 2012). In the course of seeking, the individual may interact with manual information systems such as a journal or a library, or with computer-based systems such as the World Wide Web (Kari, 2004). The information searching and acquisition process has several components such as passive attention, passive search, active search and ongoing search (Sarkel *et al.* 2012). Information seeking behaviour of researchers as well as their information needs *i.e.*, the information which is being sought may vary according to personality, emotional, educational and demographic variables of the person who seeks information (Sarkhel *et al.* 2012).

Successful satisfaction of information needs is influenced by ICTs and online resources available in the research institutes cum extension organizations. Unfortunately, poor infrastructure and inadequate investment is the bane of information and communications technology development in Nigeria (Ubabukoh 2017). While developed countries of the world are coming up with new technologies that will drive the digital age, Nigeria and other developing countries are trying to play catch-up owing to lack of adequate ICT infrastructure (Okonji 2016). This infrastructure deficit is preventing many Nigerians (especially agricultural researchers and extension workers) from gaining affordable and reliable access to ICT services.

Considering the aforementioned, this study was conducted in Edo State, Nigeria to ascertain ICTs/online resources available and used by agricultural researchers and extension workers to meet their information needs.

Edo State is home to two research institutes headquarters (Nigeria Institute for Oil Palm Research and Rubber Research Institute of Nigeria), and a sub-station of Cocoa Research Institute which has its headquarters in Ibadan, Oyo State of Nigeria.

Nigeria Institute for Oil Palm Research (NIFOR), is an agricultural research institute located in Edo State, Southern Nigeria in the heart of the oil palm belt region. It is on latitude 06°33'N and longitude 05°37'E and on altitude 149.4m (Okpamen *et al.* 2012). The formal mandate of the Institute is to conduct research into the production and products of oil palm and other palms (coconut, raphia palm, date palm and Shea butter) of economic importance and transfer its research findings to farmers.

Rubber Research Institute of Nigeria (RRIN) was established in 1961 at Iyanomo, Benin City, Edo State. RRIN is the only government agency in the country mandated to conduct research in the

production and development of Natural Rubber (NR), Gum Arabic (GA) and other latex-producing plants of economic importance.

Cocoa Research Institute of Nigeria (CRIN) was established in Ibadan, Oyo State on 1st December, 1964 as a successor autonomous research organization to the Nigerian substation of the defunct West African Cocoa Research Institute (WACRI) (Nigeria Statute, Act No. 6 of 1950). CRIN today has mandate to conduct research on five crops, namely, Cocoa, Kola, Coffee, Cashew and Tea throughout the country. The Institute has established and sustains substations in six locations in which the mandate crops of the Institute can be economically cultivated. Uhonmora sub-station (Edo-State) caters for cocoa in marginal forest areas.

Furthermore, Edo State is divided into three agricultural zones as follows: Edo Central, Edo North and Edo South. Edo Central Zone is divided into five extension blocks as follows: Esan Central, Esan West, Esan North-East, Esan South-East and Igueben. Edo North Zone comprises 6 extension blocks, namely: Owan West, Akoko-Edo, Etsako West, Etsako East, Owan East and Etsako Central. Edo South Zone consists of seven (7) extension blocks namely, Oredo, Ovia South West, Ovia North East, Ikpoba-Okha, Egor, Uhumwode and Orhionwon. In all there are a total of 18 extension blocks in the study area (Omogegbe and Ajayi, 2009).

MATERIALS AND METHODS

Study area

This study was carried out in Edo State, Nigeria. Edo State lies between longitude 06°04'E and 06°43'E, latitude 05°44'N and 07°34'N. It is bounded in the south by Delta State, in the west by Ondo State, in the north by Kogi State and in the east by Kogi and Anambra States. It occupies a land area of about 17,802 square kilometres (National Boundary Commission (NBC), 2007) with 180,000 farm families (Omogegbe and Ajayi, 2009). It has a population of about 3,218,332 (National Population Commission (NPC), 2006).

Population and sampling procedure

The population for the study was all research officers in research institutes in Edo State and all extension workers with Edo State agricultural development programme (ESADP). Proportionate sampling technique was used to select respondents. Thirty percent of the total number of research officers and extension workers were sampled with exception to CRIN-Uhonmora Sub-station where 100% was used. Thus, the total sample size for the study was one hundred and six (106) respondents (see Table 1).

Table 1. Sampling frame

S/N	Institute or organization	Number of research officers or extension workers**	Sample (30% of staff)
1.	Nigerian Institute for Oil Palm Research (NIFOR)	134	41
2.	Rubber Research Institute of Nigeria (RRIN)	79	24
3.	Cocoa Research Institute of Nigeria (CRIN) - Uhonmora Sub-station	1	*1
4.	Extension workers with ESADP (in the three agricultural zones)	132	40
Total		346	106

*100%

** Number of research officers and extension workers as at July, 2017.

Instrument for data collection

Data was collected using structured questionnaire. The questionnaire was used to elicit response from respondents in line with the study objectives. A total of 106 questionnaires were administered and 106 were retrieved achieving a return rate of 100%. However, errors were identified in four of the questionnaires and they were discarded.

Measurement of variables

To ascertain ICTs/online resources used to meet their information needs, respondents were required to tick from available options the ICTs/online resources they have access to e.g. computers, projector, cloud storage, the internet among others, for what purpose they use the ICTs/online resources, how they rate the ICT

infrastructure in their offices likewise competence in their usage. They were further asked how important the various sources of information they consulted in meeting their information needs were on a five-point Likert scale of, very important (4), important (3), moderately important (2), of little importance (1) and not important (0). The values were summed up to get 10, which was divided by 5 to obtain a mean score of 2. Variables with mean ≥ 2 were accepted as important information sources while those with a mean < 2 were rejected thus.

Similarly, respondents were asked how often they used information sources on a five-point Likert scale of, always (4), often (3), sometimes (2), rarely (1) and never (0). The values were added up to get 10 which was later divided by 5 to get 2 (mean). Variables with mean ≥ 2 were regarded as information sources used by respondents while variables with mean values < 2 were reported on the contrary. Furthermore, respondents were asked

Table 2. ICTs/online resources used to meet information needs

ICTs/online resources used	Agric. Researchers	Extension workers	Total (%)
Computer	91.9	100.0	95.1
Internet	91.9	87.5	90.2
Mobile/Cell phone	90.3	80.0	86.3
Printers	80.6	90.0	84.3
Telephone	83.9	85.0	84.3
Dictionaries	83.9	72.5	79.4
Electronic books (e-books)	72.6	87.5	78.4
Electronic journals (e-journals) e.g. African Journals Online (AJOL)	87.1	62.5	77.5
Email/Discussion forums	85.5	55.0	73.5
Search engines e.g. Google	82.3	50.0	69.6
Projector	54.8	90.0	68.6
Television	75.8	55.0	67.6
Web online databases (Web OPAC) e.g. AGORA, OARE and HINARI	72.6	59.0	66.7
Radio	69.4	57.5	64.7
Video/Picture/Image/Graphics files e.g. YouTube	74.2		63.7
Encyclopaedia e.g. Encyclopaedia Britannica, Wikipedia	69.4	47.5	59.8
Video recorder	45.2	52.5	48.0
Audio files	43.5	40.0	42.2
Cloud Storage e.g. Dropbox, Google Drive	50.0	30.0	42.2
CD-ROM e.g. E-Granary	33.9	43.6	37.3
Video player	40.3	30.0	36.3
Fax	9.7	67.5	32.4

*multiple responses

to indicate how they get access to e-resources, how they rate their competence in their use of the internet, if they've had training on online resources search techniques and the type of training if on the affirmative.

Data for the study was analyzed using percentage, mean score, and standard deviation. The Statistical Package for the Social Sciences (SPSS) software package was used for analysis.

RESULTS AND DISCUSSION

ICTs/online resources used to meet information needs

Entries in Table 2 show that respondents used various ICTs/online resources to meet their information needs. They include: computers (95.1%), internet (90.2%), mobile/cell phones (86.3%), printers (84.3%), telephone (84.3%), dictionaries (79.4%) among others. The least ICTs/online resources used to attend to information needs were; CD-ROM, video player and fax which accounted for 37.3%, 36.3% and 32.4% respectively.

The results indicated that agricultural researchers and extension workers used ICTs/online resources to meet their information needs. This depicts that respondents had insufficient knowledge at certain points in the discharge of their responsibilities and sought information to fill a void in some area of knowledge. In order for these needs to be satisfied, respondents consulted various ICTs retrieving information that matches/addresses their needs. The computer and internet ranked highest among ICTs used, it shows that respondents have embraced computer literacy and internet services. This is promising for the overall development of agricultural research and extension service delivery in Nigeria. According to Rivera et al. (2005), computers and their related technologies have become indispensable in administration and collaboration in organizations and institutions, and in the gathering, analysis and dissemination of information. However, it is important to note that respondents mostly used their personal computers and provided internet access for themselves using modems. This is so because, the research institutes and extension organizations offices visited had to office-wide internet connection. Respondents did not use certain ICTs or online resources including cloud storage, CD-ROM and fax possibly because of non-purchase (as in the case of CD-ROMs) and lack of subscription (as in the case of cloud storage) by their institutions. More so, with recent trends in ICT development fax seem to be obsolete in attending to respondents' information needs.

Purpose of using ICTs/online resources

The results presented on Table 3 reveal that agricultural researchers used ICTs/online resources at their disposal mainly for research purposes (98.4%) and for communication with fellow researchers (87.1%) while extension workers used theirs to communicate with farmers (90%), friends (72.5%) and to disseminate agricultural information (72.5%).

The diversity in the use of ICTs/online resources by respondents means they had broad spectrum of information needs. A further deduction from the result presented in Table 3 is that useful information and suggestions may have been circulated among researchers, extension workers and farmers. This has a positive multiplier effect on respondents, their clientele, and sets the right pace for the overall development of the agricultural sector of a country like Nigeria. These findings are in tandem with a study conducted by Singh et al. (2012) in India in which the results showed that agriculturists used e-resources for research work, teaching and for updating themselves with current information. Furthermore, Renwick (2005) posits that people use ICTs/online resources for communication; professional development and professional related tasks; supporting teaching and administrative tasks; personal use; research activities and recreation.

Important sources of information for keeping up-to-date with scientific developments

Data in Table 4 indicated that the internet (3.32 ± 1.14), telephone (3.23 ± 1.16), search engines (3.23 ± 3.29), mobile/cell phones (3.21 ± 1.10), journal articles (3.10 ± 1.22), professional meeting/workshops (3.07 ± 1.18) and web online databases (web OPAC) (3.07 ± 1.33) were important sources of information, for keeping up-to-date with scientific developments. Nonetheless, fax (1.89 ± 1.42) was not seen as important in keeping up-to-date with scientific developments.

Adequate ICTs in agriculture have the potential to facilitate greater access to information that drive or support knowledge sharing. With standard ICTs – radios, cell phones, computers, the Internet, digital cameras, and geographic information systems (GIS) infrastructure in place; there can be reduction in transaction costs, increased access to markets, improved productivity, better access to more frequent critical market information, and improved communication throughout a value chain. Using ICT can enhance results and help projects become sustainable and scalable beyond a typical project's reach (FACET 2010; Mbang 2015).

Regularity of using sources of information in keeping up-to-date with scientific developments

Table 3. Purpose of using ICTs/online resources

Purpose of using ICTs/online resources	Agric. Researchers	Extension workers	Total (%)
To communicate with agricultural researchers	87.1	80.0	84.3
Research purposes	98.4	57.5	82.4
Professional communication with colleagues	80.3	72.5	76.5
To communicate with farmers	58.1	90.0	70.6
Educational purposes	90.3	40.0	70.6
Personal communication with friends	59.7	82.5	68.6
Dissemination of agricultural information	67.7	72.5	69.6
To communicate with publishers	71.0	22.5	52.0
To communicate with agricultural extension workers	46.8	47.5	47.1

*multiple responses

ICTs/online resources regularly used by respondents to stay abreast with scientific developments were mobile/cell phones (3.42 ± 1.03), internet (3.15 ± 1.25), journal articles (2.96 ± 1.36), books (2.94 ± 1.30), e-journals (2.89 ± 1.33), review articles (2.85 ± 1.32) and face-to-face conversation/discussion with colleagues (2.76 ± 1.34). Audio files (1.98 ± 1.34) and fax (1.42 ± 1.36) was not regularly used to stay abreast with scientific developments (see Table 5).

Findings in this study further reveal, mobile/cell phones were found to be frequently

used by respondents for seeking information to meet their needs. The diffusion of mobile phones in Nigeria has enhanced communication between farmers, extension agents, agricultural research institutes, input dealers and transporters (Ebriku 2012). Google search engine, e-journals and e-mail were also used extensively. This is in consonance with studies conducted by Madhusudhan (2010) and Agber (2013).

Means of acquiring e-resources

Entries in Table 6 show the means through

Table 4. Important sources of information for keeping up-to-date with scientific developments

Information sources	Mean	SD
Internet	3.32*	1.14
Telephone	3.23*	1.16
Search engines e.g. Google	3.23*	3.29
Mobile/Cell phone	3.21*	1.10
Journal articles	3.10*	1.22
Professional meeting/workshops	3.07*	1.18
Web online databases (Web OPAC) e.g. AGORA, OARE and HINARI	3.07*	1.33
Conference abstract and proceedings	3.02*	1.26
Books	2.99*	1.33
Electronic books (e-books)	2.94*	1.41
Electronic journals (e-journals) e.g. African Journals Online (AJOL)	2.90*	1.26
Review articles	2.87*	1.30
Encyclopaedia e.g. Encyclopaedia Britannica, Wikipedia	2.73*	1.36
Face-to-face conversations/discussions with colleagues	2.71*	1.24
Technical reports	2.69*	1.29
Consult knowledgeable person in the field/supervisor	2.68*	1.39
Research reports/patents	2.67*	1.37
Radio	2.64*	1.36
Pamphlets/leaflets	2.64*	1.19
Theses and dissertations	2.59*	1.30
Email/Discussion forums	2.59*	1.37
Dictionaries	2.57*	1.36
Television	2.56*	1.35
Video/Picture/Image/Graphics files e.g. YouTube	2.52*	1.30
Newsletters	2.43*	1.38
Sources of contents (content pages)	2.36*	1.29
CD-ROM e.g. E-Granary	2.35*	1.39
Librarian/library staff	2.32*	1.27
Audio files	2.14*	1.39
Fax	1.89	1.42

* Important sources of information

Table 5. Regularity of using sources of information in keeping up-to-date with scientific developments

Information sources	Mean	SD
Mobile/Cell phone	3.42*	1.03
Internet	3.15*	1.25
Telephone	3.10*	1.26
Journal articles	2.96*	1.36
Books	2.94*	1.30
Electronic journals (e-journals) e.g. African Journals Online (AJOL)	2.89*	1.33
Review articles	2.85*	1.32
Face-to-face conversations/discussions with colleagues	2.76*	1.34
Search engines e.g. Google	2.75*	1.51
Professional meeting/workshops	2.74*	1.19
Conference abstract and proceedings	2.72*	1.37
Electronic books (e-books)	2.65*	1.33
Web online databases (Web OPAC) e.g. AGORA, OARE and HINARI	2.62*	1.32
Dictionaries	2.61*	1.39
Technical reports	2.59*	1.28
Theses and dissertations	2.59*	1.32
Consult knowledgeable person in the field/supervisor	2.57*	1.45
Encyclopaedia e.g. Encyclopaedia Britannica, Wikipedia	2.56*	1.19
Email/Discussion forums	2.47*	1.45
Research reports/patents	2.46*	1.26
Newsletters	2.34*	1.29
Television	2.33*	1.44
Radio	2.33*	1.42
Pamphlets/leaflets	2.28*	1.33
Sources of contents (content pages)	2.25*	1.30
Video/Picture/Image/Graphics files e.g. YouTube	2.24*	1.44
CD-ROM e.g. E-Granary	2.21*	1.44
Librarian/library staff	2.16*	1.38
Audio files	1.98	1.34
Fax	1.42	1.36

* Regularly used

which respondents acquired e-resources to meet their information needs. Researchers acquired their e-resources majorly from the internet (83.9%) and by subscription made by their respective institutions (41.9%). On the other hand, extension workers acquired their e-resources through subscriptions made through the consortium for university and research libraries (87.5%) and the internet (77.5%).

The study found that open sources accessed through the internet was the major means respondents acquired e-resources. This may not be unconnected with the fact that search engines such

as Google make free contents available for easy access and download online. Instances as this necessitates researchers and extension workers alike to depend on e-resources and especially those which are freely accessible on the internet, as the only choice to meet their information needs.

Rating of competence in using the internet to access online resources

The results presented in Table 7 show that more than half (53.9%) of the respondents were good with search formulation while using the internet to access online resources. Forty-three

Table 6. Means of acquiring e-resources

Means of acquiring e-resources	Agric. Researchers	Extension workers	Total (%)
Open sources accessed through the internet	83.9	77.5	81.4
Subscriptions made through the consortium for university and research libraries	38.7	87.5	57.8
Subscriptions made by institution	41.9	65.0	51.0
Donors	24.2	65.0	40.2
Personal subscription	35.5	100	20.6

*multiple responses

Table 7. Rating of competence in using the internet to access online resources

Criteria	Frequency of each level of competence			
	Very good	Good	Average	Below average
Search formulation	53.9	38.2	2.9	5.0
Identifying appropriate information sources	5.8	8.8	43.2	42.2
Selecting the right search tool	44.1	41.1	11.8	3.0
Search evaluation	37.3	40.2	13.7	8.8

Table 8. Training on e-resources search technique

Training on e-resources search technique	Agric. Researchers	Extension workers	Total (%)
Trained			
Yes	56.5	17.5	41.2
No	43.5	82.5	58.8
Type of training			
E-learning workshop on the use of OARE, AGORA, HINARI and Google scholar	41.9	5.0	27.5
General use of the internet and search engines (e.g. Google)	14.6	12.5	13.7

percent (43.2%) on the average could identify appropriate information sources, 44.1% were able to select the right search tool and 40.2% could evaluate their search result.

Researchers and extension workers in the study possessed some measure of knowledge in search formulation, identifying appropriate information sources, selecting the right search tool and search evaluation based on their self-assessment which may not necessarily reflect their true skills. This could be attributed to the fact they may want to disguise ignorance, not realising how much more there is to learn (Mtega et al. 2014). It is pertinent to emphasize based on the result presented in Table 7 that, training and retraining of respondents will help improve respondents' competence in the use of the internet. Lack of professional development for researchers and extension workers can hinder effective use of ICTs and its associated resources (Association of African Universities, 2000). With the application of ICT, research and production activities can be improved tremendously. More skills enhancement trainings/workshops can help respondents effectively access the vast amount of scientific and technical information available online to meet basic information needs.

Training on e-resources search technique and type

With respect to training on e-resources search techniques, less than half (41.2%) of respondents indicated they had been trained (see Table 8). They went further to indicate the type of training which include: e-learning workshop on the use of OARE, AGORA, HINARI and Google scholar (27.5%) and general use of the internet and search engines (13.7%). However, it is important to note that researchers have had more trainings (56.5%) when compared with extension workers (17.5%).

The application of ICT and staff training through information literacy programmes can

remarkably enhance respondents' efficiency and output. This in return will have positive influence on research-extension output as well as the society at large. The primary goal of in-training in an organization is to produce outstanding quality service, to achieve total customer satisfaction, aggressive sales growth and optimum profits (Adekunjo et al. 2013). Information literacy has a significant influence on research-extension activities, as it enables the researchers and extension workers to determine the extent of information needs, access the required information effectively and efficiently, evaluate information and its sources and understand the economic, legal and social issues surrounding the use of information, as to accomplish a specific goal.

CONCLUSIONS

There is a clear indication from this study that agricultural researchers and extension workers used ICTs/online resources in the bid to meet their information needs. This is a clear indication that respondents had embraced computer literacy and internet services. Nonetheless, management of the research institute and Edo State ministry of agriculture should subscribe for online resources for the benefit of respondents who desire to use relevant online resources but are hindered by cost and technical issues. To gain access to more e-resources, agricultural institutes should join the Consortium for University and Research Libraries (COTUL) so that they can enjoy economies of scale associated with collective subscriptions. Likewise, management of the research institute and Edo State ministry of Agriculture, should note that poor investment in ICT infrastructure can in the long run prevent many farmers from getting affordable and reliable agricultural support services from their employees.

This study is not behavioural theory-based. Further studies in this regard could use theory or theoretical model. This would make possible to investigate the

causal relations of some variables used in this research.

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CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest regarding the publication of this manuscript.

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