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ICT Database Use and Information Utilization by Nigerian Scientists in Agricultural Research Institutes

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Abstract

The research was designed to investigate the correlation between information technology (ICT) use and agricultural information utilization by scientists in Nigerian Research Institutes; determine scientists' ICT knowledge; frequency of ICT use; types of ICT used and problems associated with ICT use. The correlation research and descriptive design were used for the study with a population of 1,153 scientists from 10 agricultural research institutes and a sample size of 101 selected through stratified/proportionate random sampling. Structured questionnaire was used to collect data and 192 copies of returned questionnaire were usable. Data collected was analyzed using frequency tabulations and counts, and scores. Frequency counts were scored using Likert 4-point scale. A hypothesis was formulated to test the relationship between ICT use, and agricultural information utilization. Pearson Product Correlation coefficient was used for test of hypothesis at 0.05 level of significance at 90 degree of freedom. Result showed a significant correlation between ICT use and agricultural information utilization by scientists, that scientists had high level of ICT literacy, patronized ICT on weekly, monthly and bi-monthly rates. ICT types used were identified and problems of ICT use as low bandwidth, low broadband; slow speed network and poor maintenance culture were identified. Recommendations included resources showing in line with FG/Galaxy Backbone accord, integrating maintenance culture in ICT development agenda and integrating local content digitization to promote North-South reciprocal information inter-glow for a comprehensive information globalization.

Keywords: *Information access, Agricultural Scientists, ICT Use, Database*

1.0 Introduction

The age-long socio-welfarist notion of information as a free commodity has dramatically changed to a perception of information as a commodity of value that can be bought and sold and a factor of productivity with the advent of Information and Communication Technology. The consequent emergence of cyber-café managers as information providers for fees lends credence

to such reasoning. Hawkins (2002), notes that knowledge and information have become the most important currency for productivity, competitiveness, and increased wealth. Information can be seen as man's accumulated knowledge desired from all subjects in all forms and from all sources for enhancing user's search for data, skills, and ideas for tasks accomplishment in every vocation. A formal definition of information by Shannon and Weaver (1959) cited in Meadow, (1992) from an engineering view point is a series of codes, symbols and messages, with a measure of certainty. The author also draws strong distinctions among the terms:- data, knowledge and information while affirming that datum is a string of elements, symbols and integers or letters given a value of an attribute.

Data could be a collection of readings from an anthropologist in the field which represent identified but unevaluated symbols. Information connotes evaluated data while knowledge represents a higher degree of certainty data validity than information. Shannon and Weaver (1959) cited in Meadow, (1992) posit that information as a data changes the mood of the receiver. Information therefore only assumes a value when it changes the mood or state of the receiver. Drawing from this therefore information seekers must be circumspect in selecting their information needs. He must distinguish rumour as unverified and unsubstantiated information, metaphysics as information based on speculative philosophy or supernatural beliefs, and news as an unexpected message believed to be true but lacking in conceptual importance in information retrieval and research.

Agricultural information is described by Oladele (2006) as a system of information network covering a range of agricultural practices on environmental analysis, irrigation, fertilization, crop production, harvesting and processing. It also provides information for improving production level of crops and animals. Webster (1998) defines a scientist as one learned in science especially natural sciences. He is distinguished by his ability to investigate, state problem, frame questions; for the technician to fix the problem so that significant facts can emerge. Agricultural scientists are research officers conducting investigation into agricultural problems to proffer solutions for increasing productivity, diversifying food forms and foreign exchange earnings. Agricultural information utilization entails the application of agricultural information for achieving explicit objectives including research, extension services accessing inputs, loan facilities, obtaining commodities prices, and acquainting with practices and accessing new technologies. Akintunde (2004) assesses ICT as a combination of three complex technology integrating computer, telecommunications and electronics for information processing and transfer. This technology has facilitated information access and delivery within a global network to ensure information globalization which otherwise could have been impossible.

1.2 Objective of the Study

The study seeks to determine the relationship between ICT databases use and agricultural information utilization by scientists. Other non testable but descriptive objectives were:

i. ascertaining scientists' ICT knowledge,
ii. scientists' frequency of ICT use,
iii. types of ICT used, and
iv. problems of ICT used.

1.3 Hypothesis

A hypothesis was formulated to guide the outcome of the study thus:

There is no significant correlation between ICT use and agricultural information utilization by scientist.

2.0 Literature Review

Full deployment of ICT in agriculture and rural development in sub-Sahara Africa involved several players of change that started with e-governance, policy designs development and implementations in Kenya where improved agriculture and rural development and living standards have been recently experienced. The launching of the Nigerian Communication Satellite (NIGCOMSATI) on May, 13 2007 by the Nigerian Communications Commission intends to improve communications within Africa, Europe and America. As studied by Ugah and Okafor (2008), the Nigeria National Information Technology Policy also envisions ICT use, wealth creation, job generation, poverty eradication, global competitiveness and educational development. Lawal & Ani, (2007) and Oyeneke (2007) note extensive use of ICT databases by students, academics and researchers for enhanced access to agricultural information. Such databases include access to Global On-line Research on Agriculture (AGORA) and The Essential Electronic Agricultural Library (TEEAL) and On-Line Access to Research and Environment (OARE). Health Internet Network Access to Research Initiative (HINARI) was rare and hardly featured. Khalif (2009) also highlights the use of Safricom database for easy access of market information by Kenyan farmers. Tackie and Adams (2007) on information utilization by engineers identify technical information as relevant information needs sourced through primary sources in both textual and e-formats. The application of ICT in research institutes for easy and quick access of agricultural information was reported by Fagbami, Akintola & Palemo, (2009).

Okocha (2014) lists the types of agricultural information used to include research/technical, academic/educational, extension, business/economic, statistical, industrial, planning/policy/management. Ugah (2009) also opines that ICT offers the quickest most current and relevant media for accessing agricultural information by students academic and researchers. Observation borne out of long experience on information seeking habits of scientists showed that scientists in seeking agricultural information types shunned textual Library resources and patronized ICT databases and cyber-café sources.

2.1 Statement of the Problem

From literature so far available, there has not been any quantitative analysis or measurement of the relationship between ICT databases use and the utilization of agricultural information by scientists. Even with the availability of huge amount of information in databases the utilization of agricultural information by scientists has not been fully investigated. This problem constitutes the major objective of the study.

3.0 Materials and Methods

The correlation and descriptive research designs were used. The study population was 1153 scientists from 10 agricultural research institutes in Nigeria. The sample size was 101 determined through the stratified/ proportionate random sampling technique. Structured questionnaire was used for data collection. Ninety-two copies (91%) were retrieved and found usable and analyzed using frequency counts, mean scores and percentages. Frequency counts were scored using Likert 4-point scale. Pearson product moment correlation coefficient was the statistical formula used to determine (r) for hypothesis testing and computer assisted Statistical Package for Social Sciences used to determine correlation (r).

Results were presented with descriptive statistics using mean scores frequency tabulations and scores, hypothesis testing was done through Pearson Product Moment Correlation at 0.05 level of significance.

Table 1: Questionnaire Administration and Response Rate

Institutes Number	Number of questionnaire administered	Response rate		Questionnaire returned (%)
		M^x	F^{xx}	
National Veterinary Research Inst., Vom	13	8	3	84.6
Cocoa Research Institute Of Nigeria, Ibadan	4	2	2	100
Nigerian Inst. of Oceano-graphy, Lagos	10	5	4	90
Raw materials Research and Dev. Council, Abuja	14	9	3	85.7
National Horticultural Research Inst., Umudike	9	4	4	88.9
National Root Crops Research Inst. Umudike	8	4	4	100
Nigerian Inst. For Fresh Water Res.,New Bussa	5	5	0	100
Rubber Research Inst.of Nigeria, Benin	10	5	5	100
Forestry Research Inst. of Nigeria, Ibadan	18	12	4	88.9
Nigerian Inst. for Oil Palm Research, Benin	9	6	3	100
Total	**101**	**60**	**32**	**91.1**

4.0 Result and Discussion

Table 2: Respondents' Knowledge of ICT

State of Knowledge	No. of respondents	SA	A	D	SD	Total score	Weighted mean score	S
*Excellen*t	92	3 (12)	7 (21)	36 (72)	46 (46)	151	1.64	0.86
Very good	92	4 (16)	8 (24)	39 (78)	41 41	159	1.73	0.77
Good	92	18 (72)	33 (99)	18 (36)	23 (23)	230	2.5	0
Fair	92	36 (144)	44 (132)	5 (10)	7 (7)	293	3.2	-0.7
Poor	92	3 (12)	4 (12)	40 (80)	45 (45)	149	1.62	0.88

S = Standard deviation

Table 2 show s that scientists with good knowledge of ICT had a mean of 2.5, those with fair knowledge scored 3.2 mean and accepted as high.

Table 3:*Frequency of Respondents Use of ICT for Agricultural Information*

Frequency	No. of Respondents	SA	A	D	SD	Total score	Weighted mean score	S
Daily	92	21 (84)	10 (30)	26 (52)	35 (35)	201	2.2	0.3
Weekly	92	33 (132)	25 (75)	10 (20)	24 (24)	251	2.7	0.5
Bi-monthly	92	43 (172)	25 (75)	10 (20)	14 (14)	281	3.1	-0.6
Monthly	92	25 (100)	31 (93)	11 (22)	25 (25)	240	2.6	- 0.1
Rarely	92	2 (8)	2 (6)	40 (80)	48 (48)	142	1.5	1

Table 3 on respondents' frequency of ICT use indicated weekly rate 2.7 mean, bi-monthly rate 3.1 mean and monthly rate of mean of 2.6 as acceptable rates. These rates were also considered adequate.

Table 4: Effects of ICT use on Utilization of Agricultural Information

Effects of ICT use on agric information utilization	No. of Respon-dents	SA	A	D	SD	Total score	Weighted mean score	S
ICT use makes agric info easily accessible	92	42 (168)	31 (93)	10 (20)	9 (9)	290	3.2	-0.7
ICT use provides relevant agric information	92	26 (104)	25 (75)	22 (44)	19 (19)	242	2.6	-0.1
ICT use provides adequate agric information	92	43 (172)	19 (57)	17 (34	13 (13)	276	3.0	-0.5
ICT use enhances use of agric Information	92	28 (112)	23 (69)	24 (48)	17 (17)	246	2.7	-0.5
ICT use provides current agric information	92	43 (172)	35 (105)	9 (18)	5 (5)	300	3.7	-1.2

On the effects of ICT databases on agricultural information utilization, respondents' perception on Table 4 shows that all 5 parameters of effects had acceptable and high mean scores as listed ease of accessibility of information 3.2, relevance of information, 2.6, adequacy of information 3.0, enhancement of information, 2.7, currency of information, 3.7. Again ICT here is restricted to digital databases as *TEEAL, AGORA*, *OARE* etc in use rather than ICT hardware

Table 5: Types of ICT[s] provided for the utilization of Agricultural Information

Types of ICT used	No. of Respon-dents	SA	A	D	SD	Total score	Weighted mean score	S
Computers	92	40 (160)	52 (156)	0 (0)	0 (0)	316	3.4	-0.9
Printers	92	32 (128)	60 (180)	0 (0)	0 (0)	308	3.3	-0.8
Scanners	92	14 (56)	39 (117)	21 (42)	18 (18)	233	2.5	0
Projectors/ PowerPoint	92	12 (48)	35 (105)	22 (44)	23 (23)	220	2.4	0.1
Televisions	92	2 (8)	15 (45)	29 (58)	46 (46)	151	1.7	0.8
Radios	92	0 (0)	21 (63)	35 (70)	36 (36)	169	1.8	0.7
Digital cameras	92	12 (48)	26 (78)	26 (52)	28 (28)	206	2.2	0.3
Telephones	92	35 (140)	45 (135)	7 (14)	5 (5)	294	3.2	-0.7

On types of ICT provided Table 5 showed that computer (3.4 mean), printers (3.3 mean), scanners (mean 2.5), telephones (mean 3.2), Internet features (mean 3.3), databases (mean 3.0) were predominant while power points (mean 2.4), televisions (mean 1.7), radios (mean 1.8), and digital cameras (mean 2.2) were in short supply.

Table 6: Problems of the use of ICT in the Provision and Utilization of Agric Information

Problems of ICT	No. of Respondents	SA	A	D	SD	Total score	Weighted mean score	S
Slow network/slow speed internet	92	27 (108)	36 (108)	13 (26)	16 (16)	258	2.8	-0.3
Non/occasional availability of network	92	33 (132)	26 (78)	15 (30)	18 (18)	258	2.8	-0.3
Power failure	92	30 (120)	33 (99)	17 (34)	12 (12)	265	2.9	-0.4
Loss of data to Virus	92	11 (44)	14 (42)	35 (70)	32 (32)	188	2.0	0.5
Loss of confiden-tiality to hacking	92	18 (72)	13 (39)	27 (54)	34 (34)	199	2.2	0.3
Language translation problem	92	15 (60)	19 (57)	25 (50)	33 (33)	200	2.2	0.3
Low bandwith capacity	92	35 (140)	27 (71)	17 (34)	13 (13)	258	2.8	-0.3
Low broadband	92	24 (96)	34 (102)	20 (40)	14 (14)	252	2.7	-0.2
User's lack of skill	92	17 (68)	12 (36)	37 (74)	26 (26)	204	2.2	0.3
Operator's lack of skill	92	15 (60)	21 (63)	27 (54)	27 (27)	204	2.2	0.3
Rights infringement	92	5 (20)	12 (36)	36 (72)	39 (39)	167	1.8	0.7
Poor maintenance	92	31 (124)	29 (87)	12 (24)	20 (20)	255	2.8	-0.3

Table 6 identified areas of problems associated with ICT use as follows; slow network (mean 2.8), non-availability of network (mean 2.8), power failure (mean2.9), low bandwidth capacity (2.8 mean), low broadband (mean 2.9), and poor maintenance (mean 2.8).

Table: 7 PPMC Analysis of Correlation between ICT databases use (X) and types of agricultural information provided to agricultural scientists (Y)

N	ΣX	ΣX^2	ΣY	ΣY^2	ΣXY	r-value	P	df	Decision
92	1,115	260,127	1,331	357,487	301,027	0.9864	0.05	90	S

P< 0.05, S=Significant, df= 90, Critical value=0.2028

4.1 Test of Hypothesis

The hypothesis was designed to determine the correlation between ICT databases use and agricultural information utilization by scientists in research institutes. To test the hypothesis data collected from respondents' frequency of ICT use (x) and effects of ICT databases use on agricultural information utilization by scientists (y) were analyzed using Product Moment Correlation Coefficient. Result is presented on Table 7. Calculated r value was 0.960, compared with the critical value of 0.2028 at 0.05 level of significance with 90 as degree of freedom. Since the calculated r value was greater than the critical value, the null hypothesis was rejected. Therefore there is a significance correlation between ICT use and agricultural information utilization.

5.0 Findings

Findings revealed that scientists had good knowledge of ICT (mean2.5), and fair knowledge (mean 3.5). for a better understanding of mean score values for good knowledge and fair knowledge, a translation of these scores into percentages stands at 55.4% and 86.7% respectively scientists therefore have high level of ICT literacy. This finding is at variance with previous findings by Fagbami, Akinola & Palemo, (2009) and Eyon, (2006) reporting that poor ICT skills among university staff and student hampered ICT use, the findings therefore constituted an anti-thesis to out-dated studied overtaken by rapid development of ICT revolution promoting training and literacy workshops. There was effective use of ICT for agricultural information by scientists as weekly (mean 2.7), bi-monthly (mean 3.1) and monthly (mean 2.6) were adequate rates of use. Ugah (2009) also validated weekly, monthly and bi-monthly rates of use by academics and students.

Findings also confirmed significant correlation between ICT databases use and agricultural information utilization by scientists. Five parameters of effects; ease of information accessibility relevance of information, adequacy of information, enhancement of information use, and currency of information are components which constitute the main thesis of the study. ICT types-computers, printers, internet features, telephones, databases; scanners were dominant types of ICT used. These were found to be in use in universities in previous study (Olatokun 2007). Findings on problems of ICT included slow network, non-availability of network, low bandwidth, low broadband, power failure and poor maintenance culture.

Conclusion

Scientists had appreciable level of ICT literacy and utilized ICT for agricultural information on weekly, bi-monthly and monthly rates. There was a significant correlation between ICT use and agricultural information utilization by scientists in Nigeria research institutes. ICT types used in research institutes confirmed with the types found in universities and tertiary institutions. Slow network, low bandwidth, low broadband and poor maintenance culture were some of the identified problems of ICT use in Nigerian agricultural institutes.

Recommendations

Research institutes ought to explore Federal government/Galaxy Backbone accord for ICT infrastructure and resources especially higher broadband penetration, higher bandwidth capacity and high-speed Internet network. Institutes within distance of other government establishment should share resources and infrastructure as stipulated in the Galaxy accord Local content. Digitization should be encouraged to promote production of local databases for presently Nigeria's intellectual and cultural legacies as well as support the North-South reciprocal inter-flow of information for a balanced information globalization.

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