UTILIZATION OF SELECTED INFORMATION AND COMMUNICATION TECHNOLOGIES IN DISSEMINATING AGRICULTURAL TECHNOLOGIES TO FARMERS BY EXTENSION AGENTS IN OGUN AND OYO STATES OF NIGERIA

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ABSTRACT

New and emerging technologies challenge the traditional agricultural information dissemination process and the way the information is managed. Information and Communication Technologies (ICTs) is having a major impact in the departure from the traditional way that the government, media, academics, and others have controlled information. This study investigates different ICT facilities available for disseminating agricultural technologies to farmers; examined the socio-economic characteristics of extension agents; determined attendance of ICT training and ICTs used by extension agents in disseminating agricultural technologies. Data were obtained from 287 extension agents (EAs) in Ogun and Oyo of Nigeria with the aid of structured questionnaires. Data collected were analyzed with frequency counts, percentages and Spearman's rho and Chi-square analyses were conducted to test significant relationship among variables. The results showed that both male and female were involved in extension service; different ICT facilities were available and extension agents used these different ICTs to disseminate agricultural technologies to farmers. Also sex of (EAs) $(x2=77.355; p<0.05)$, marital status $(x2=275.125; p<0.05)$ and years of experience in extension service $(r=0.732; p<0.05)$ have significant relationship with the use of ICTs. It was concluded that ICT facilities used in disseminating agricultural technologies to farmers had improved extension services in the two States.

KEYWORDS: *Agriculture, Extension Agents, ICT*

INTRODUCTION

It is generally believed that extension services, if well -organized and implemented it will enhance agricultural productivity (Romani, 2003). The term 'extension' is herein defined to mean 'advisory and other services' that help rural families to make efficient use of the productive resources at their disposal (Katz, 2002). Agricultural extension services provide farmers with vital information, which include prices in the crop, modified seed varieties, crop management, farm management practices, and marketing details. Exposure to such activities is intended to increase farmers' ability to improve on the use of their resources, increase their farm incomes and improve their standard of living. Ogunwale (1998) remarked that Agricultural extension refers to a set of activities which involves communication, information, demonstration and technical training geared towards disseminating improved farm technologies to farmers and transforming their skills, knowledge, and attitudes towards improved farm productivity and standard of living. Agricultural extension and advisory services play a vital role in the development of agriculture and can be a major factor in the process

of improving the welfare of farmers and other rural habitats. Anderson (2007) defines the terms agricultural extension and advisory services as "the whole set of organizations that support and facilitate people who are into agricultural production to proffer solutions to problems encountered by the farmers and to obtain information, technologies, and skills to enhance their livelihoods".

An extension services can be structured and conveyed in various forms, but their utmost aim is to increase farmers' productivity and income. According to Anderson and Feder (2003) improvement in productivity are only possible when there is a difference between actual and impending productivity. They suggest two types of 'gaps' that contribute to the productivity differential – the technology gap and the management gap. Extension can contribute to the decline of the productivity differential by increasing the promptness of transfer of technology and by increasing farmers' knowledge and supporting them in refining farm management practices (Feder et al., 2004). Furthermore, extension services also play a vital role in consolidating information flow from farmers to researchers (Anderson, 2007).

Furthermore, extension modalities include ICT -a based delivery which provides advice to farmers online and other approaches such as the promotion of model farms (Birner et al., 2006). In line with CTA (2003) Information and Communication Technologies are skills which facilitate communication and thus the processing and diffusion of information electronically. The utilization of ICT for agricultural extension and rural development is substantial especially now that its use has witnessed an improvement in the majority of the rural areas in numerous African countries (CTA, 2003).

This study therefore, accessed utilization of selected Information and Communication Technology (ICT) in disseminating Agricultural technologies to arable crop farmers by Extension Agents (EAs) in Ogun and Oyo States, Nigeria. Specifically, it described the socio-economic characteristics of EAs; investigated different ICTs available for disseminating agricultural technologies to farmers and examined various ICT facilities used by the EAs in the area.

METHODOLOGY

The study was carried out in Ogun and Oyo States of Nigeria. The study employed a multistage sampling procedure. The first stage involved the selection of 80% of EAs in each State.

During the second stage, 108 EAs and 179 EAs were randomly selected from Ogun and the Oyo States respectively which sum up to a total of 287 EAs that constituted the sample size of the study. The structured questionnaire was used to obtained necessary information from the respondents. The descriptive statistical tools used include frequency counts, percentages and mean, while Spearman's rho and chi-square were used as the inferential tool to reach a logical conclusion on the research hypotheses.

RESULTS AND DISCUSSIONS

Socio-Economic Characteristics of Eas

Table 1 revealed that above average of the EAs sampled in both States were between the age range of 31 – 40 years (i.eOgun (58.3%) and Oyo (57.5%) with the mean age of 37.84 (Ogun) and 38.50 (Oyo) respectively. The pooled percentage was 57.5% and the mean age was 38.25. The results imply that the EAs in both states are in their active age of service and provided them an opportunity to be aware of technologies in vogue and that are expected to influence their level of utilization of different ICTs in the dissemination of various agricultural technologies to their respective clientele in

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the State. This corroborates Salau and Saingbe (2008) who remarked that younger officers are expected to have a higher level of ICT awareness and utilization. This age distribution of extension workers in the two States reveals that there are crops of young versatile and very active extension personnel in the both States. This will facilitate effective communication and use of ICT facilities in disseminating agricultural technologies to farmers at farm levels to boost food production. Also, this new generation of young and committed extension workers will be able to make a career in agricultural extension.

Table1 also reveals that majority of the EAs sampled from Ogun State (85.2%) and Oyo (93.9%) were male, while the pooled percentage was 90.6; and the female percent were 14.8 and 6.1 for both Ogun and Oyo States. This result implies that both genders are involved in the extension service. This is an indication that extension service is a no sex bias services as both male and female are involved in Nigeria agricultural production. It also implies that agricultural extension service involved both sexes, male constituted larger percent. This finding agrees with FAO (1993) which reveals that 94.0% agricultural extension agents are male worldwide, and that of Dunn (1995) who noted that extension is male-oriented and that of all the world's EAs, 15% are women. This finding therefore, reveals the need to critically re-examine the extension staff recruitment and placement process in the two States. It is a known fact that women are increasingly involved in agricultural production, so, more female extension workers should be recruited and placed at village level so as not to widen the gap between female farmers and extension workers in the two States in particularly and the country at large.

Results further reveal that all the respondents in both States are literate with the different educational background. This implies that majority of the extension agents in both States (Ogun and Oyo) hold relevant educational qualifications. Their educational status is expected to have an influence on their ICT literacy level and encourage its use in disseminating agricultural technologies to farmers being their clients. Arokoyo (2005) identified high-level illiteracy of farmers and computer illiteracy among scientist and extensionists among others.

This finding is in agreement with Arokoyo (2005) and revealed that the crop of extension personnel in the two States are highly literate and possibly will have no difficulty in understanding the necessary concept and application of ICTs in agricultural extension service delivery. Ogunwale (2003) and Ogunwale (2004) revealed that several socio-economic factors have a significant relationship with the adoption of farm innovations and technologies by small-scale farmers in Nigeria.

These factors include age, sex, years of experience and level of educational attainment of extension agents, Therefore, with necessary ICTs supports and training, the EAs will have no problem whatsoever in the application of ICTs in disseminating improved farm technologies and practices to farmers in the two states.

Table 1 further reveals that 36.1% (Ogun) and 35.2% (Oyo) of the EAs had between less and equal to 5 years of experience in extension services as a profession, 38.9% (Ogun) and 40.8% (Oyo) had between 6.10 years of experience, 13.9% (Ogun) and 15.6% (Oyo) had between 11 – 15 years of experience, while 11.1% (Ogun) and 8.4% (Oyo) had over 15 years of experience as at the time of data collection process. The mean years of experience of the EAs in extension service were 8.28% (Ogun) and 8.03 (Oyo) with the pooled of 8.13. The results imply that majority of the EAs had between 6 – 10 years of working experience. The difference in their years of experience may be due to variations in their years of recruitment into extension service as a profession. And their years of experience in extension service may also have an influence on their expertise in the utilization of ICTs in disseminating agricultural extension technologies to farmers in the study area.

This also implies that the extension agents were well educated with appreciable years of experience on the job. This is in support of Oakley and Garforth (1997) who reported that agricultural extension agent is an educated trained professional working with farmers. Training skill and ICT facilities available for disseminating agricultural technologies This section identified and discussed respondents' training skill of ICTs and different ICT facilities they knew that were available/meant for disseminating agricultural crop technologies.

Table 2 reveals that 86.1% (Ogun) and 82.1% (Oyo) indicated that they acquired certain training skill of ICTs, and all (100.0%) of the EAs in the two states (Ogun and Oyo) indicated that radio, television, compact disc read-only memory (CD-ROM), digitalized camera, projector, and GSM were among various ICT meant for disseminating agricultural extension technologies to farmers, while only 77.8% (Ogun) and 77.1% (Oyo) had knowledge about the usefulness of flash drive in disseminating agricultural extension related technology/information. This finding is in agreement with Sinkaiye (2005) who reported that radio and television were used for disseminating new farm practices among farmers in Nigeria. Again, 80.6% (Ogun) and 70.9% (Oyo) indicated other ICT facilities such as extension bulletins/poster as part of the ICT used in disseminating agricultural technologies. This implies that all the respondents had knowledge of the majority of the ICT facilities in disseminating agricultural extension technologies. The variation in the knowledge of some of the ICT gadgets may be due to differences in their training skill, awareness and understating about the use of the different identified ICT facilities that are meant for this purpose as identified by the extension agents of the selected states. This finding is in line with Ogunwale and Ayoade (2006) who reported that a combination of channels of communication should be used for dissemination and adoption stages of agricultural technologies.

This study revealed that radio and television are being used by the agents to create awareness of the agricultural technologies, while projector and GSM phones are being used to encourage adoption among farmers. ICTs used by the EAs in dissemination of agricultural technologies to farmers Table 3 reveals that 83.3% and 75.4% of the EAs in Ogun and Oyo states indicated CD/DVD Player as part of the ICT used in disseminating agricultural production messages to farmers, 69.4%, 58.3% and 37.0% of the EAs in Ogun; and 61.5%, 38.0% and 48.0% of EAs in the Oyo States indicated CD-ROM, digitalized camera and projector as part of the ICTs used for disseminating information. All (100.0%) the extension agents in Ogun and Oyo States indicated flash drive, GSM phone as the most used ICTs. This implies that all the respondents used one type of ICT or the other for extension services in both Ogun and Oyo States. The variation in the type of ICT used by them may be due to differences in their ICT training skill, the nature of their target groups and the type of relationship that exists between the EAs and their clients especially when it comes to the use of GSM-phone.

Thus, the extension staff recruitment process should consider the ICT knowledge level of extension personnel, and develop in-service training scheme to enhance the capacity of extension workers in utilizing ICTs for the dissemination of agricultural technologies to farmers. This is because e-learning or ICT enabled extension system is one of the fundamental components for the sustainable agricultural development anywhere (CTA, 2003).

TEST OF SIGNIFICANT RELATIONSHIP BETWEEN VARIABLES

Test of Significant Relationship between Selected Socio-Economic Characteristics and Utilization of Icts

The Spearman's rho was used where the variables were measured at the interval level, while chi-square was used for variables that were measured at nominal and ordinal levels. An index was calculated to arrive at ICTs utilization levels of high, moderate and low.

Table 4 shows that extension agents' age, years spent in school, field of academic qualification, and years of experience in the use of ICTs were statistically insignificant to their use of ICTs (r= 1.000, p<0.05; r= -0.057, p<0.05; r= -0.092, p<0.05 and r= 0.101, p<0.05). Table 4 further reveals that there was a significant relationship between extension agents' years of experience in extension service (r= 0.732**, p<0.05) and utilization of ICTs.

This implies that the higher the years spent in extension service, the higher the tendency to improve on the utilization of ICTs for disseminating agricultural technologies to farmers by extension agents. Therefore, there was a significant relationship between years of experience in extension service and utilization of ICTs for disseminating agricultural extension technologies to farmers by EAs.

The result of Chi-square analysis in Table 5 reveals that there is a significant relationship between extension agents' sex, marital status, and religion and utilization of ICTs in disseminating agricultural technologies to crop farmers by extension agents in both Ogun and Oyo States. This result agreed with Ogunwale (2004). This implies that extension recruitment exercise should consider sex, marital status, and years of experience in extension service in employing and deploying extension personnel for extension service.

CONCLUSIONS AND RECOMMENDATIONS

The EAs in Ogun and Oyo States are very young, married and well experienced in the use of ICT tools for disseminating agricultural technologies to farmers. They used different ICT facilities such as radio, television, Compact disc read-only memory (CD-ROM), digitalized camera, projector and GSM for disseminating agricultural technologies. They have acquired training that enhanced utilization of these ICTs for agricultural extension purpose.

It was statistically established that there was a significant relationship between EAs and years of experience in extension service and utilization of ICTs one hand and between EAs' sex, marital status, religion and utilization of ICTs in disseminating agricultural technologies to crop farmers in Ogun and Oyo States on the other hand.

Therefore, there is a need to create a special awareness of different ICT facilities that can be used to disseminate different agricultural technologies to farmers by the extension agents. The extension agents should be trained with different ICT facilities desired to be appropriate for disseminating agricultural extension technologies to farmers and the training should be regularly organized for extension agents so that they can be conversant with the use and application of ICTs for extension service.

Table 1: Distribution of Respondents by Socio-Economic Characteristics

	Frequency (Percentage)		
Socio-Economic Variables	**Ogun (N = 108)**	**Oyo (N=179)**	**Pooled (N=287)**
Age (year)			
≤30	15 (13.9)	18 (10.0)	33 (11.50)
31-40	63 (58.3)	102 (57.0)	165 (57.5)
41-50	23 (21.3)	47 (26.3)	70 (24.4)
Above 50	7 (6.5)	12 (6.7)	19 (6.6)
Sex			
Male	92 (85.20)	167 (93.9)	260 (90.6)
Female	16 (14.80)	11 (6.10)	27 (9.40)

Marital status			
Married	107 (99.10)	177 (98.9)	284 (99.0)
Never married	1 (0.90)	2 (1.1)	3 (1.0)
Educational level			
OND/HND/NCE	42 (38.90)	40 (22.4)	84 (29.20)
BSc/B.Tech	62 (57.40)	111 (62.1)	173 (60.3)
MSc/M.Tech	4 (3.70)	26 (14.5)	30 (10.5)
Years of experience in extension service (year)			
≤5 39	39(38.9)	63 (35.2)	102 (35.5)
5-10	42(38.9)	73(40.8)	115 (40.1)
Above 10	27(25.0)	43 (40.0)	70 (24.4)
Mean:	5.96	6.19	6.10

Source: Field Survey, 2012

Figures in Parentheses are Percentages

Table 2: Distribution of Respondents by Training Skill and ICT Packages For Disseminating Agricultural Crop Technologies

Frequency (Percentage)			
Training skill	**Ogun (n = 108)**	**Oyo (n=179)**	**Pooled (n=287)**
Yes	93(86.1)	147(82.1)	240(83.6)
No	15(13.9)	32(17.9)	47(16.4)
ICT Packages			
Radio	108(100.0)	179(100.0)	287(100.0)
Television	108(100.0)	179(100.0)	287(100.0)
CD/DVD Player	108(100.0)	179(100.0)	287(100.0)
CD-ROM	108(100.0)	179(100.0)	287(100.0)
Digital camera	108(100.0)	179(100.0)	287(100.0)
Projector	108(100.0)	179(100.0)	287(100.0)
Flash drive	84 (77.8)	138(77.1)	222(77.4)
GSM-phone	108(100.0)	179(100.0)	287(100.0)
Bulletins/poster/news mag.	87 (80.6)	127(70.9)	214(74.6)

Source: Field Survey, 2012

Figures in Parentheses are Percentages Multiple Responses

Table 3: Distribution of Respondents by ICT Facilities Used by Extension Agents

Frequency (Percentage)			
ICT Facilities Used	**Ogun(n = 108)**	**Oyo (n=179)**	**Pooled (n=287)**
CD/DVD Player	90(83.3)	135(75.4)	225(78.4)
CD-ROM	75(69.4)	110(61.5)	185(64.5)
Digital camera	63(58.3)	68(38.0)	131(45.6)
Projector	40(37.0)	86(48.0)	126(43.9)
Flash drive	20(18.5)	37(20.7)	57(19.9)
GSM-phone	108(100.0)	179(100.0)	287(100.0)
Internet	74(68.5)	148(82.7)	222(77.4)

Figures in Parentheses are Percentages Multiple Responses

Source: Field Survey, 2012

Table 4: Result of Spearman's Rho Analysis Showing Significant Relationship between Selected Socio-Economic Characteristics of Respondents and Utilization of ICTs

Variables	X^2-Cal (Pooled Data)	Df (Pooled Data)	X^2-Tab (Pooled Data)	Result (Pooled Data)	Decision (Pooled Data)
Sex	77.355	1	3.84	S	Reject H_0
Marital status	275.125	1	3.84	S	Reject H_0
Religion	97.174	1	3.84	S	Reject H_0

Data analysis, 2013; Correlation is significant at 0.01 level (2-tailed)

Table 5: Chi-Square Analysis Showing Significant Relationship between Selected Socio-Economic Characteristics of Extension Agents and Utilization of ICTS

Socio-Economic Variables	Correlation Coefficient		
	Ogun State	Oyo State	Pooled Result
Years spent in school	0.083	1.000	1.000
Academic qualification	0.098	-0.055	-0.057
Attendance of training on ICTs	-0.056	-0.067	-0.092
Years of experience in extension service	0.045	0.718**	-0.732**
Years of experience in ICTs usage	1.000	0.116	0.101

Source: Data Analysis, 2013; Significant at 0.05 level

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