# Awareness of Selected Information and Communication Technologies for Extension Training on Improved Agricultural Practices Among Extension Agents of Ogun and Oyo States, Nigeria

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**Abstract**
Over several decades agricultural production in Nigeria has improved through the extension services, coupled with the invention of ICTs in recent time. The application of any ICT gadget would be determined by its awareness and its appropriateness for the intended purpose desired to serve by the user. This study, therefore, assesses awareness of selected ICTs for disseminating agricultural information to farmers by the Extension Agents (EAs) of Ogun and Oyo States, Nigeria. Multistage sampling method was employed to obtain data from 287 EAs with interview schedule and Focus Group Discussion (FGD). Using both descriptive and inferential statistical tools, the paper analyses personal characteristics of the EAs in both States; agricultural crop information disseminated through the selected ICTs and level of awareness of the selected ICTs among the EAs. It was deduced in the study that the EAs and extension agency used different ICTs in disseminating agricultural information to farmers in the areas, though the EAs have different level of awareness on the usage of selected ICTs for such purpose, with GSM-phones ranked $1^{st}$ (wms=4.76), radio (wms=4.63=$2^{nd}$), extension bulletins/posters/newsmagazine ranked $3^{rd}$ (wms=3.74) respectively. The PPMC analysis revealed that age (0.117*), educational level (0.145*) and years of working experience (0.176**) of EAs recorded a significant relationship with awareness level of selected ICTs at both 1% and 5%. The T-test analysis further revealed that a significant difference existed in the awareness level of the selected ICTs among the EAs of Ogun and Oyo States. The study, therefore, recommends the need to encourage the use of other ICT gadgets apart from GSM-phonesthrough adequate awareness on the use and appropriateness of ICTs for disseminating agricultural information to users and also socioeconomic characteristics of the applicants for extension service should be given consideration during recruitment exercise.

## 1. Introduction
Agriculture plays significant roles in the development of any nation especially in the area of food production, employment generation, and provision of raw materials for the industries respectively. The aforementioned roles rely on information available to the rural farmers through the extension services via the village extension agents. Information services for farmers' at the national and regional level are a promising new field of research and application in the emerging field of e-agriculture (Gakuru, 2009). With the emergence of Information and Communication Technologies (ICTs), traditional agriculture has been reformed, eventually contributing to the significant improvements in agricultural productivity and sustainability.

     Many countries now regard the understanding of ICT and mastering the basic skills and concepts of ICT as part of the core of education, alongside reading, writing and numeracy. According to CTA (2003), Information and Communication Technologies are technologies which facilitate communication and thus the processing and transmission of information electronically. The use of ICT in agricultural extension and rural development is significant especially now that its use has witnessed an upsurge in almost all areas of rural life in several African countries where it has provided a medium for adequate access to agricultural information, despite the persisting problems of access, connectivity, literacy, content and costs (CTA, 2003). With particular reference to Nigeria, Adebayo and Adesope (2007) viewed ICT as a very important feature in the Nigerian agricultural sector in contemporary times, though it is still a new concept, and an increasing number of professionals are appreciating its use for academic and development work. In this respect, Omotayo (2005) observed that agricultural extension depends largely on information exchange between and among farmers and a broad range of other actors. Frontline extension workers, who are the direct link with farmers and other actors in the agricultural knowledge and information system (AKIS), are well positioned to make use of ICT to access expert knowledge or other types of information that could facilitate the accomplishment of their routine activities.

Hence, this has become imperative in view of the increasing use of ICT among the frontline Extension Workers in South-west, Nigeria.

Using cross-sectional data for different countries, Norris (2000, cited by Joseph, 2004), identified that the correlation between the level of diffusion of old media such as telephones, television, radio, newspapers and new media like computers, internet and mobile phones is positive and statistically significant. Most devices can now be linked to others to share and exchange information and allow it to be used in a way that they can be categorized as ICTs. The beauty of ICTs lies in the convergence of the use of old and new technologies. According to Chapman and Slaymaker (2002), even books are been incorporated into ICTs either through the potential of informal web publishing or more informal digital book publishing with designated readers or e-books. ICTs, therefore, are an expanding assembling of technologies that can be used to collect, store and share information between people using multiple devices and multiple media.The effectiveness of ICTs to solve different developmental problems depends on the strength of convergence and content they carry. The strength of convergence is exploited on evidence that no one media is inherently better than others and that a mix of media may often be more effective and efficient than a simple media no matter how powerful. For the issue of content, once ICTs are fed with the appropriate message, they become the powerful tools of possibilities that they are meant to be. ICTs, therefore, promise to improve information delivery or sharing among small farmers if properly exploited (Augustine, 2011). This study conceptualized awareness of selectedICTs as the use of CD/DVD player, CD-ROM, digital camera, projector, flash drive, GSM phone, internet to facilitate dissemination of agricultural information among farmers.

In spite of the fact that agricultural extension brings about changesin farmers' attitude, knowledge and skills through extension education by disseminating useful information and building capacity of farmers but adequate communication methods to achieve these are lacking which can be attributed to poor awareness and usage of different ICT gadgets among the agricultural extension agents.

## 1.2 Objective of the study

This study analyzed the awareness of the use of selected ICTs in disseminating agricultural information by the Extension Agents (EAs) of Ogun and Oyo States, Nigeria. Specifically, the study described the socio-economic characteristics of EAs in the States;examined the extension information disseminated to farmers through identified ICTs by the EAs in the study areas and examined the level of awareness of use of selected ICTs for disseminating agricultural information among the EAs in the study areas.

## 2. Methodology

The study was carried out in the South-West States of Nigeria. The South-West States lie between latitude 6.00°N and 9.00°N and between longitude 2.00°E and 7.00°E. The area comprises six States namely: Lagos, Ogun, Osun, Ondo, Ekiti and Oyo. They collectively cover 114.271 km2, approximately 12% of Nigeria's total area. Vegetation cover in the area includes rainforest, savannah interspersed with trees (deciduous forest) and savanna. Specifically, two States were purposively selected (Oyo State and Ogun State). Oyo State is an inland State in South-West Nigeria. The two States have adequate extension background to represent the whole South-West area with enough extension agents for the purpose of the study. Also, the two States adequately represent the whole six States in terms of agro-climatic conditions and extension methodologies for the dissemination of agricultural technologies. It is bounded in the South by Ogun State and in the North by Kwara State, in the West partly by Ogun State and the Republic of Benin while in the East it is bounded by Osun State. The capital of the State is Ibadan, the most populous city in Black Africa with a population of 5,591,589 (Census, 2006). Oyo State was created on February 3rd, 1976 and covers a total of 28,454 square kilometres of land mass. Agriculture is the main occupation of the people of Oyo State (Oyo State –Wikipedia, the free encyclopedia.htm).Ogun State, on the other hand, is also a State in South-West, Nigeria. It borders Lagos State to the South, Oyo and Osun States to the North, Ondo State to the East and the Republic of Benin to the West. Abeokuta is the capital and largest city in the State. The State's nickname is "Gateway State". It was created on February 3rd, 1976 from the former Western State. The 2006 census recorded a total population of 3,751,140 with a land area of 16,980.55km$^2$. The climate in the two States favours the cultivation of crops like maize, yam, cassava, millet, rice, plantains, cocoa, palm produce, cashew etc (Ogun State –Wikipedia, the free encyclopedia.htm).

These two States have not relented efforts in the development of agriculture which is usually achieved through the Agricultural Development Project under the Ministry of Agriculture. Oyo State Agricultural Development Project (OYSADEP) made up of four Agricultural zones namely; Ogbomoso zone, Ibadan/Ibarapa zone, Saki zone and Oyo zone respectively. Likewise, Ogun State Agricultural Development Project (OGADEP) comprises of four Agricultural zones which include Abeokuta zone, Ijebu-Ode zone, Ilaro zone and Ikenne zone.

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 Oyo States respectively which summed up to a total of 287 EAs that constituted the sample size of the study. Structured

questionnaire was used to obtain necessary information from the respondents. The descriptive statistical tools used include frequency counts, percentages and mean, while Pearson Product Moment Correlation (PPMC) and T-test were used as inferential tools to reach logical conclusions on the research hypotheses.

## 3. Results and discussion
### 3.1 Socio-economic characteristics of EAs
Table 1 revealed that above average (Ogun (58.3%) and Oyo (57.5%) of the EAs sampled were between the age of 31 – 40 years 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 result implies that the EAs in both states are in their active age of service. With this age range, they are expected to be aware and conversant with ICTs usage for the dissemination of agricultural information to their respective clientele in the States. 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 both States.

Table1 also revealed that majority of the EAs sampled from Ogun State (85.2%) and Oyo (93.9%) were male, and the female percentages were 14.8 and 6.1 forOgun and Oyo States respectively. This result implies that both genders were involved in the extension service. This is an indication that extension service is a no sex bias service as both male and female are involved in Nigeria agricultural production. It also implies that agricultural extension service involves both sexes with males constituting the larger percentage. Dunn (1995) who noted that extension is male-oriented and that of all the world's EAs, 15% are women.

It was further revealed that all the respondents in both States were literate with 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 awareness and ICT literacy level and encourage its use in disseminating agricultural information to the rural farmers in the areas.This finding is in agreement with Arokoyo (2005) whoposited 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. Considering the pooled percentage, majority (99.0%) of the EAs were married, while only 1.0% were single. It implies that virtually all the sampled EAs are expected to be up and doing in discharging their responsibilities in the extension service as marital status signifies a reflection of maturity.

Table 1 further revealed 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 above 15 years of experience as at the time of data collection. The mean years of experience of the EAs in extension service were 8.28 (Ogun) and 8.03 (Oyo) with the pooled of 8.13years. The result implies that all the EAs have a certain number of years of working experience. The difference in their years of experience may be due to variations in their years of recruitment into extension service. And their years of experience in extension service may also have an influence on their awareness and expertise in the utilization of ICTs in disseminating agricultural extension information to farmers in the study area.

### 3.2 Agricultural information disseminated through ICTs by Extension Agents
Table 2 revealed the various agricultural crop information disseminated through the ICTs and almost all (95.4% and 93.9% ) the EAs in Ogun and Oyo States indicated planting of improved varieties as part of the agricultural crop information disseminated through different ICTs used for extension service, 77.8%, 93.5% and 75.9% of the EAs in Ogun, while 74.9%, 89.9% and 73.2% in Oyo State respectively indicated weed control management, disease/pest management and soil management related information were all among the agricultural extension information disseminated through the ICTs to farmers in the area.Majority (76.0%) and (76.0%) of the EAs in Ogun and Oyo States indicated the use of agrochemicals such as application of herbicide, fertilizer, insecticide as part of information disseminated through ICTs to farmers in the area, 70.4%, 76.9% and 63.9% of the respondents in OgunState and 66.5%, 78.8% 64.8 and 64.2% in Oyo State respectively.

The EAs in Oyo State indicated plant spacing, crop processing storage, harvesting of crops and land preparation as information been disseminated to the farmers through the ICT facilities used by the EAs in the areas, while 69.4% and 64.8% of the respondents in Ogun and Oyo States indicated intercropping/water conservation/treatment of planting materials as part of information disseminated to farmers in the area.The farmers in the two States agreed that all identified crop information was disseminated tothem through the identified ICTs used by the EAs and extension agency, specifically, the GSM-phones, bulletins/posters/leaflets and radio/television respectively.The variation in the percentage of the crop information disseminated to the farmers through the identified ICTs may be due to difference in the information need of the farmers at a point in time in the respective agricultural zones of the selected States. This finding also revealed that selected ICTs can

be relied upon in disseminating urgent crop production information to farmers within a short time depending on the needs of the farmers.

### 3.3 Level of awareness of selected ICTs available for disseminating agricultural crop information

Table 3clearly revealed the awareness level of the selected ICTs used for disseminating agricultural crop informationamong the EAs of the selected States anda 5-point rating scale of Very High (VH), High (H), Moderate (M), Low (L) and Very Low (VL) respectively were used, weighted mean score (WMS) was computed and ranked accordingly to determine the awareness level of each selected ICT.The result shows that Global System for Mobile Communication (GSM-phone) had the highest WMS of 4.76 and was ranked first, followed by radio (2nd) with WMS of 4.63; extension bulletin/poster/news magazine were ranked third (3rd) with WMS of 3.74. Again television, projector, digitalized camera and digitalized video were ranked fourth (WMS=3.65), fifth (WMS=3.49), sixth (WMS=3.42) and seventh (WMS=3.17) respectively, while CD/DVD Player, internet and flash drive were rated eighth (WMS=3.06), ninth (WMS=3.03) and tenth (WMS=2.94) respectively.

This implies that GSM Phone, radio, TV and other extension material appeared to be the major ICT types,among the EAs selected for the studyhave full awareness of. This may be due to the fact that some of these ICT facilities possessed some desirable qualities over other types of ICTs, such as accessibility, availability and clarity of the informationdisseminated through them which the local farmers appreciate based on the experience of EAs in the selected States. This finding was corroboratedby the responses of farmers during FGD where majority of the farmers affirmedGSM-phone as the most utilized ICT by EAs in disseminating information on improved farm techniques.This fact may constitute the basis for full awareness of some of these ICT facilities (GSM-Phone, radio, television extension bulletins, etc) among the EAs in the study areas. Similarly, most of these facilities especially radio, television give room for wider spread and diffusion of information when they are used to convey extension messages. This assertion corroborates the result of the World Bank (2004) which revealed that world development indicator ranked radio as the most widely used ICT in Nigeria put at 200/1000 people. And extension bulletins/poster, if appropriately designed, encourage diffusion of innovation among the local farmers in Nigeria. This finding is also in line with Olowa (1991) who reported that extension bulletins/posters and other printed materials if well designed and carefully written could be a cheap source of reference for literate and non-literate farmers like.

### 3.4 Test of significant relationship between variables

The result of Pearson Product Moment Correlation in Table 4 revealed that some of the socio-economic characteristics of EAs such as age (0.117*), educational level (0.145*) and years of experience in extension service (0.176**) exhibited a positive and significant relationship with the level of awareness of selected ICTs used for disseminating agricultural information to farmers. This result implies that all the aforementioned socio-economic variables have decisive influence on the awareness level of selected ICTs for this study. It also implies that extension personnel, during recruitment exercise should consider above variables in employing and deploying extension personnel for extension service.

Again, T-test analysis revealed that significant difference existed between the awareness levels of the EAs of the selected States. The differences may be due to the variation in their ICT knowledge level and this may necessitate the need for training on ICTs for the EAs in both States. This assertion is in line with Wikipedia (2006), that knowledge is the awareness and understanding of facts, truth or information gained in the form of experience or learning or through retrospection.

### 4. Conclusion and recommendations

Conclusively, the EAs sampled in the States are agile with different educational background and considerable years of working experience. Both genders involved in extension services in the selected States and majority were married with very few single. Different agricultural information (planting of improved varieties, weed control, pest/diseases and soil management, use of agrochemical respectively) were disseminated through the identified ICTs by the EAs. Some socioeconomic variables influence the awareness level among the EAs. Also, there is a significant difference in the awareness level of ICTs among EAs of both States. Hence, there is need to encourage the use of other ICT gadgets apart from GSM-phone and through the increase of awareness level and provision of training on their appropriateness for the dissemination of different agricultural information. Again, socioeconomic characteristics of the applicants for extension service should be given consideration during recruitment exercise.

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**Table 1: Distribution of respondents by socio-economic characteristics**

| Socio-economic variables | Frequency (Percentage) | | |
|---|---|---|---|
| | Ogun (n = 108) | Oyo (n=179) | Pooled (n=287) |
| **Age (years)** | | | |
| ≤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) |
| Mean: | 37.84 | 38.50 | 38.25 |
| **Sex** | | | |
| Male | 92 (85.20) | 167 (93.9) | 260 (90.6) |
| Female | 16 (14.80) | 11 (6.10) | 27 (9.4) |
| **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 (years)** | | | |
| ≤5 | 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 agricultural crop information disseminated through ICTs by Extension Agents**

| Agricultural information | *Frequency (Percentage) | | |
|---|---|---|---|
| | Ogun(n = 108) | Oyo(n=179) | Pooled(n=287) |
| Planting of improved varieties | 103 (95.4) | 168 (93.9) | 271 (94.4) |
| Weed control management | 84 (77.8) | 134 (74.9) | 218 (76.0) |
| Diseases/pest management | 101(93.5) | 161 (89.9) | 262 (91.3) |
| Soil management | 82 (75.9) | 131 (73.2) | 213 (74.2) |
| Use of agrochemicals | 83 (76.9) | 136 (76.0) | 219 (76.3) |
| Plant spacing | 76 (70.4) | 119 (66.5) | 195 (67.9) |
| Crop processing/storage | 83 (76.9) | 141 (78.8) | 224 (78.0) |
| Harvesting of crops | 72 (66.9) | 116 (64.8) | 188 (65.5) |
| Land preparation | 69 (63.9) | 115 (64.2) | 184 (64.1) |
| Intercrop./water conserv./Treat. | 75 (69.4) | 116 (64.8) | 191 (66.6) |

**Source: Field Survey, 2012**

**Figures in parentheses are percentages**

**\*Multiple responses**

**Table 3: Distribution of respondents by the level of awareness of selected ICTs available for disseminating agricultural crop information**

| ICT facilities | Frequency (Percentage) | | | | | | |
|---|---|---|---|---|---|---|---|
| | Level of awareness of ICTs | | | | | | |
| | Very High | High | Moderate | Low | Very Low | WMS | Rank |
| Radio | 238(82.9) | 4(1.4) | 33(11.5) | 12(4.2) | - | 4.63 | 2nd |
| Television | 127(44.2) | 53(18.5) | 33(11.5) | 28(9.8) | 46(16.0) | 3.65 | 4th |
| CD-ROM | 32(11.2) | 87(30.3) | 75(26.1) | 43(15.0) | 50(17.4) | 3.03 | 9th |
| Digital camera | 94(32.8) | 78(27.2) | 12(4.2) | 60(20.9) | 43(15.0) | 3.42 | 6th |
| Digitalized video | 64(22.3) | 66(23.0) | 46(16.0) | 77(26.9) | 34(11.8) | 3.17 | 7th |
| Projector | 56(19.5) | 84(29.2) | 91(31.7) | 56(19.6) | - | 3.49 | 5th |
| CD/DVD Player | 44(15.3) | 70(24.4) | 64(22.3) | 78(27.2) | 31(10.8) | 3.06 | 8th |
| Flash drive | 68(23.7) | 27(9.4) | 56(19.5) | 92(32.1) | 44(15.4) | 2.94 | 10th |
| Internet | 32(11.2) | 87(30.3) | 75(26.1) | 43(15.0) | 50(17.4) | 3.03 | 9th |
| GSM-phone | 229(79.8) | 48(16.7) | 10(3.5) | - | - | 4.76 | 1st |
| Ext. bulletins/ poster/news mag. | 87(30.3) | 75(26.1) | 88(30.7) | 37(12.9) | - | 3.74 | 3rd |

**Source: Field Survey, 2012**

**Figures in parentheses are percentages**


**Test of significant relationship between socioeconomic variables and awareness level of ICTs among EAs – using PPMC analysis**

| Socioeconomic variables | Correlation coefficient | P-value | Decision |
|---|---|---|---|
| Age | 0.117* | 0.048 | Significant |
| Sex | -0.112 | 0.059 | Not Significant |
| Marital status | -0.056 | 0.349 | Not Significant |
| Educational level | 0.145* | 0.014 | Significant |
| Years of working experience | 0.176** | 0.003 | Significant |

**Data analysis, 2012**

**\*:Correlation is significant at the 0.05 level (2-tailed)**

**\*\*: Correlation is significant at the 0.01 level (2-tailed)**


**Test of significant difference between awareness level of selected ICTs among EAs of both States**

| States | Paired Differences | | | t-value | Sig (2-tailed) |
|---|---|---|---|---|---|
| | Mean | Std. Deviation | Std Error Mean | | |
| Ogun-Oyo | -26.111 | 4.123 | 0.397 | -65.819 | 0.000 |

**Data analysis, 2012**