



Assessment of Information and Communication Technologies Used for Disseminating Innovations by Extension Agents in Ogun State, Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Author AA designed the study. Author OMD performed the statistical analysis. Author OTA wrote the protocol, and wrote the first draft of the manuscript and managed literature searches. Authors AA, OMD and OTA managed the analyses of the study and literature searches. Author AA corrected the draft and sent it out after all authors have read and approved the final manuscript.

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ABSTRACT

This research work was carried out to investigate the crop farmers' assessment of information and communication technologies (ICT) used for innovation dissemination by Extension Agents in Ogun State, Nigeria. A multi-stage sampling technique was employed to select 105 crop farmers from two agricultural zones: Ikenne and Ilaro. The data collected in June and July 2013 were analyzed using descriptive statistical tools such as means, frequency and percentage distributions; while inferential statistical tool-chi-square was used to determine the relationship between the variables selected. The study showed that crop farmers were between the ages of 41 and 60 years, and their mean age was 47 years, 74.3% were males, 83.8% were married, 84.8% were literate, 59.0% were members of cooperative societies, 80.9% attended extension programmes, 56.2% cultivated between 2 - 6 acres of farmland, and majority (56.2%) were earning between ₦10, 000.00 – ₦30, 000.00 monthly and a mean of N16,939.39K. Radio, landline telephone, television, slides, DVD and overhead projectors were the most used information and communication technologies by Extension Agents.

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Also, there was a significant relationship between age ($X^2=74.075$), educational background ($X^2=55.774$), area of specialization ($X^2=86.517$), number of agricultural shows attended ($X^2=27.989$) and ICT used ($X^2=377.323$). The problem faced by crop farmers were inability of farmers to use ICT ($X^2=93.971$), inability of farmers to perceive its benefits ($X^2=108.524$), lack of technological infrastructure ($X^2=292.095$), high cost of technology ($X^2=191.114$), Not enough time to spend on technology ($X^2=138.592$), no understand of the value of ICT ($X^2=66.848$), lack of training ($X^2=189.057$), and lack of supporting facilities ($X^2=209.248$) of farmers in usage of information and communication technologies; and adoption levels of farmers. Hence, it was recommended that efforts should be directed towards improving the level of utilization of ICTs by organizing training workshop for Extension Agents.

Keywords: Assessment; information communication technology; innovation dissemination; extension agent; crop farmer.

1. INTRODUCTION

Agriculture remains the bedrock of Nigeria's economic and nutritional development with an estimated 70% of the country's over 140 million populace living in rural areas and engaging in agricultural-related activities [1,2,3]. Thus, agriculture provides employment for a large percentage of the nation's population, food for the populace and raw materials for agro-based industries. However, despite the involvement of large percentage of the population in agriculture, the country continues to spend the lean foreign reserve on importation of food. The perpetual food shortage is often blamed on ineffective agricultural research, lack of continuity in agricultural policies and programmes, poor implementation by administrators, low quality of extension and poor linkage system between research, extension and farmers [4].

However, the role of public agricultural extension service has traditionally being to provide the important link between agricultural researches and farming communities, especially for technology transfer in support of agriculture and rural development. However, strong criticism of public agricultural extension services has circulated in recent years [5]. According to [6] this criticism is due to its top-down approach, which has been supply-driven, technically weak, catering only for large farmers (progressive farmers) and providing insufficient coverage of the small-scale farmers, who are the producers of the bulk of food crops in Nigeria. This implied that proven agricultural technologies which are needed to ensure higher productivity and food security, do not reach the millions of small-scale farmers scattered in the rural areas. Consequently, these farmers have managed to obtain information from sources such as other farmers, inputs dealers, produce buyers and NGOs [7].

Given the urgent need for current Agricultural Knowledge and Information System (AKIS) by farmers, the use of conventional communication channels such as farm/home visit, personal letters, and use of contact farmers, for disseminating agricultural information was counterproductive. This calls for the adoption of Information and Communication Technologies (ICTs) by both researchers and extension workers to transmit relevant information to farmers in a most efficient way [8]. Agricultural Extension, which depends largely on information exchange between and among farmers and a broad range of other actors, is an area in which ICT can have significant impact.

Research Scientists can relate directly with the farmers through ICTs. Frontline extension workers, who are the direct link between farmers and other actors in the agricultural knowledge and information system, are well positioned to make use of ICT to access expert knowledge or other types of information that could be beneficial to the farmers. It was noted that ICT can bring new information services to rural areas where farmers (end users) will have much greater control than ever before over current information channels [9]. Access to such new information sources is a crucial requirement for the sustainable development of the farming systems. They added that ICT can be of immense help by enabling extension workers to gather, store, retrieve and disseminate a broad range of information needed by farmers, thus transforming them from extension workers into knowledge workers (KW).

Agricultural development in Africa and Nigeria in particular, has been hampered by low level of agricultural information exchange. It was reported that in Nigeria, the national extension service is based on the Training and Visit (T and V) delivery system; traditionally supported by

mobile cinema, video, television, radio and telephone being the only ICTs used by majority of extension workers [10]. During the last two decades, the world has witnessed an unprecedented growth in the area of ICT [11]. In spite of the rapid improvement in information and communication brought about in recent times, by science and technology, most of the extension workers in Nigeria in particular, still rely on the T and V system. Majority of the population in the developing world live in rural areas and has little or no access to agricultural information [12]. This study therefore assessed the Information and Communication Technologies used by Extension Agents in disseminating innovations to crop farmers in Ogun state. These research questions are addressed in this study.

- i. What are the personal and socio economic characteristics of crop farmers in Ogun state?
- ii. What are the types of information and communication technologies used by extension agent in Ogun state?
- iii. What are the farmer's levels of adoption of these innovations?
- iv. What are the problems faced by crop farmers on the use of information and communication technologies while adopting the innovations disseminated by extension agent?

1.1 Objectives of the Study

The general objective of the study was to assess the type of information and communication technologies used by extension agents in Ogun state. The specific objectives are to:-

- i. Describe the personal and socio economic characteristics of crop farmers in Ogun state.
- ii. Identify the types of information and communication technologies used by extension agents in Ogun state.
- iii. Assess the farmer's level of adoption of these innovations
- iv. Investigate the problems faced by crop farmers in adopting the innovations disseminated by extension agents.

1.2 Hypotheses of the Study

Ho 1: There is no significant relationship between the information and communication technologies used by extension agents and selected personal and socio economic characteristics of agents such

as age, gender, education, social status, and economic status in Ogun state.

Ho 2: There is no significant relationship between the problem of farmers in usage of information and communication technologies and adoption levels of farmers.

2. METHODOLOGY

2.1 Study Area

The study is conducted in Ogun state, Nigeria. It lies within 20°45'E and 3°55'E longitude and 7°01'N and 7°8'N latitude in the tropics. Ogun State is bounded in the west by Benin Republic, in the south by Lagos State and the Atlantic Ocean, in the east by Ondo State and in the north by Oyo state. Ogun State covers a land area of 16,409.28 square kilometers and represents less than two percent of Nigeria's landmass. The natural vegetation ranges from fresh-water swamp with mangrove forest in the southwest and diverse forest to the woody Guinea savannah in the northwest. The rainy season starts around the middle of March and continues till late October, while the dry season starts in November and lasts until February, in most locations. Rainfall ranges between 900 and 1600 mm annually. The area is warm throughout the year with an average temperature ranging between 28°C and 35°C. Humidity is between 85 and 95% [13]. Agriculture is the major occupation of the people of Ogun State. The state is divided into four agricultural zones namely Abeokuta, Ikenne, Ijebu and Ilaro by Ogun State Agricultural Development Program (OGADEP). Ogun state has a population of 3,751,014 [14], while its GDP as at 2007 was \$10.47 billion with a per capita income of \$2,740 [15].

2.2 Sampling Technique and Sample Size

A multi-stage sampling technique was used to select the respondents for the study. Firstly, from these four zones 50% of the zones were selected which were Ikenne and Ilaro. There were four blocks in Ikenne zone and four blocks in Ilaro zone. Therefore, the selection was 2 blocks from each zone. Secondly, 10% of existing cells in each zones were selected, this led to the selection of two cells in Ikenne and Ilaro in an alphabetical order. Thirdly, based on the structure of OGADEP, a cell consists of 80 contact farmers, hence from the selected cells, 25% of the contact farmers were selected and

this resulted into the selection of 41 and 64 contact farmers from Ikenne and Ilaro zones. The research instrument was administered to the respondents in an interview section. The questions were read by the interviewer who helped the crop farmers to record their options immediately. Data collected were subjected to both descriptive and inferential statistics. The descriptive statistics included frequency counts, percentages and means. Inferential Statistical tool used was chi-square analysis.

3. RESULTS AND DISCUSSION

3.1 Personal and Socio-economic Characteristics of the Crop Farmers

3.1.1 Age and gender of farmers

Majority (61.9%) of sampled respondents were between the ages of 41 and 60 years. The mean age of the crop farmers was 47years and at this age they were considered highly productive and active to undertake the strenuous tasks associated with farm work. This is in line with the assertion that farming should not be left to the aged only as most people think [16]. The ratio of the male to female crop farmers in this study was found to be 78:27. This is, however, against gender studies which seem to suggest that women participate more than men in most farming activities [17].

3.1.2 Marital status and education

Majority (83.8%) of the respondents were married, only 5.7% were singles and 9.5% widowed. The high percentage of married respondents signified the importance attached to marriage in most rural societies in Nigeria. Marriage is paramount to the continuous existence of man and the sustenance of the society since members of a society have to form families through procreation. On education, about 50.5% of respondents attended primary schools while 15.2% had secondary education. In all, about 84.8% of the respondents had formal education. This is in line with the assertion that most of the respondents were literate [18]. This is highly expected to enhance extension work and adoption of new ideas and technologies.

3.2 Secondary Occupation

Majority (34.3%) of the respondents did not have other occupation apart from farming, 33.3% were private business owners, and 26.7% were

traders. This implied that most of the farmers do not have other sources of income apart from farming, unlike those with private businesses, trading, bricklaying and farming. This distribution generally revealed the relative importance of farming in southwestern Nigeria and Nigeria in general because agriculture is the largest employer of labour in the country. In fact, those that were not directly engaged in farming (growing crops and raising livestock) were indirectly engaged through marketing of agricultural produce [19] (See Table 1).

Table 1. Personal characteristics of the crop farmers (N=105)

Age-group in years	Frequency	Percentage
21-30	5	4.8
31-40	29	27.6
41-50	34	32.4
51-60	31	29.5
61-70	6	5.7
Mean	47years	
Gender		
Male	78	74.
Female	27	25.7
Total	105	100
Marital status		
Married	88	83.8
Single	6	5.7
Widowed	10	9.5
Divorced	1	1.0
Total	105	100
Educational level		
No formal education	16	15.2
Adult education	11	10.5
Primary education	53	50.5
Secondary education	16	15.2
Tertiary	9	8.6
Total	105	100
Other occupation		
None	36	34.3
Trading	28	26.7
Bricklayer	4	3.8
Tailoring	2	1.9
Private business	35	33.3
Total	105	100

Source: Sample survey, 2013

3.3 Membership of Cooperative Societies

Majority (59.0%) of the respondents were members of one form of cooperative societies or the other while 41.0% do not belong to any form of cooperative societies at all, majority (45.7%) of

the crop farmers did not contribute their monthly due to cooperative society and are not better than non-members since they cannot ripe the advantages of membership. This is in line with another study which concluded that Cooperative Society membership distribution of the respondents showed that majority of the farmers sampled did not belong to cooperative societies [20].

3.4 Attendance of Extension Programmes

About 77.1% of the crop farmers attended one form of extension programme or the other while 22.9% did not attend extension programmes. Also majority (36.2%) of the crop farmers attended extension programme sometimes, 29.5% attended often, 19.0% never attended, while 15.2% attended very often. This indicated a poor performance in attendance of extension programmes by the respondents as asserted by [21].

3.5 Farm Size

Majority (56.2%) of the crop farmers cultivated between 2 and 6 acres of farmland, though about 35% cultivated between 7 and 26 acres while 1.9% of the crop farmers cultivated between 0.1–0.5 acre of farmland. The average farm size of the crop farmers were 6.7 acres. The implication of this was that majority (56.2%) of crop farmers had high usage level of their farm size. Therefore high usage of farm size might result into a larger crop produced. This is in line with the assertion of [19]) that farm sizes owned by respondents were mostly in small and medium scale (See Table 2).

3.6 Monthly Farm Income

Monthly estimated farm income showed majority (56.2%) earned between ₦10,000–₦30,000. The monthly mean farm income was ₦16,939.39k. The implication of this was that majority (56.2%) earned average income from their respective farms. This is in line with the assertion of [19]) that respondents' income distribution was of low income group who might not be in position to readily afford or access new ICT facilities. Also, about 37.1% of the crop farmers did not have other source of farm income apart from farming, the mean of non-farm income was ₦10,742.80. The implication of this was that 33.3% of the crop farmers fell to the medium level of the non-farm

income, while the majority (37.1%) did not have other sources of income apart from farming.

Table 2. Socio-economic characteristics of the crop farmers (N=105)

Membership of cooperatives	Frequency	Percentage
Yes	62	59.0
No	43	41.0
Monthly contribution		
None	48	45.7
Less than 1000	13	12.4
1000 – 3000	27	25.7
3001 – 5000	15	14.3
5001 and above	2	1.9
Very often	16	15.2
Mean		

Source: Sample survey, 2013

3.7 Farm Produce

About 87.6% of maize farmers harvested less than 5,000 kg from their farm, and 48.6% of cassava farmers got between 1001 and 5,000 kg. The mean of maize farm was 3,947.62 kg, while that of cassava farm was 5078.10 kg. The implication of this was that majority (87.6%) were in medium level of output from their maize farm while majority (48.6%) were below the average output of the cassava farm. This indicated that most of the crop farmers that benefited from extension programme made less than 5,000 kg from their maize farm and 5,001-10,000 kg from their cassava farm (See Table 3).

3.8 Types of Information and Communication Technologies Used by Extension Agents

Information and communication technologies used by Extension Agents revealed that radio was the most used information and communication technology used by the Extension Agents having 51.6%, followed by the use of slides having 45.2%, telephone landline having 30.1%. Also, 29.0% utilized DVD, 25.8% utilized computer, 24.7% utilized overhead projector as well as 21.5% utilized mobile phone in information dissemination among the crop farmers. This however shows that there are low levels of utilization of various forms of Information and Communication Technologies by the Extension Agents. This may lead to low adoption of innovations by the crop farmers as

they were not adequately educated on the use of Information and Communication Technologies (See Table 4).

Table 3. Economic characteristics of the crop farmers (N=105)

Farm Income (monthly)	Frequency	Percentage
None	24	22.9
Less than ₦10000	11	10.5
₦10000 – ₦30000	59	56.2
₦30001 – ₦50000	3	2.9
₦50001 – ₦60000	8	7.6
Mean	₦ 16,939.39	
Non-farm Income(monthly)		
None	39	37.1
Less than ₦10000	23	21.9
₦10000 – ₦30000	35	33.3
₦30001 – ₦50000	6	5.7
₦50001 and Above	2	1.9
Mean	₦ 10,742.80	
Maize farm output (kg)		
Less than 5000	92	87.6
5001 – 10000	8	7.6
10001 – 15000	2	1.9
Greater than 15001	3	2.9
Mean	3,947.62kg	
Cassava farm output (kg)		
Less than 1000	23	21.9
1001 – 5000	51	48.6
5001 – 10000	25	23.8
0001 – 15000	2	1.9
15001> 20000	4	3.8
Mean	5078.10kg	
Total	105	100.0

3.9 Hypotheses Testing

Ho¹: There is no significant relationship between the Information and communication Technologies used by Extension Agents and selected personal and socio economic characteristics of Agents such as age, gender, education, social status, and economic status in Ogun state.

The results showed that there was a significant relationship between the Information and Communication Technologies used by Extension Agents and their selected personal and socio-economic characteristics (suchas: age

(X²=74.075), educational background (X²=55.774), area of specialization (X²=86.517), previous experience as extension agents (X²=57.301) and number of agricultural shows attended by extension Agents (X²=27.989)). Therefore, the null hypothesis which states that there is no significant relationship between the Information and Communication Technologies used by Extension Agents and their selected personal and socio economic characteristics in the study area was rejected and the alternative hypothesis accepted that: There was a positive and significant relationship between Information and Communication Technologies used to teach crop farmers and Agents` personal and professional characteristics such as age, education, specialization, previous experience as Extension Agents, number of agricultural shows attended by them and ICT used (See Table 5).

Table 4. Types of information and communication technologies used by extension agents

ICT	Used	Percentage
Telephone landline	28	30.1
Television	16	17.2
Slides	42	45.2
Radio	48	51.6
Mobile phone	20	21.5
Audio cassette player	17	18.3
Overhead projector	23	24.7
DVD	27	29.0
Print media	6	6.5
Computer	24	25.8

Source: Sample Survey, 2013

Ho²: There is no significant relationship between the problem of farmers in usage of Information and Communication Technologies and adoption levels of farmers.

The data showed that there was a significant relationship between the problem (such as: Inability of farmers to use ICT(X²=93.971), Inability of farmers to perceive its benefits (X²=108.524), Lack of technological infrastructure (X²=292.095), High cost of technology (X²=191.114), Not enough time to spend on technology (X²=138.592), Do not understand the value of ICT (X²=66.848), Lack of training (X²=189.057), and Lack of supporting facilities (X²=209.248)) of farmers in usage of Information and Communication Technologies and adoption levels of farmers.

Table 5. Summary of relationship between the information and communication technologies used by extension agents and their selected characteristics

Extension agents characteristics	N	Df	χ^2_{Cal}	P-level	Decision
Age	93	4	74.075	0.000	S
Educational background	93	3	55.774	0.000	S
Religion	93	1	1.301	0.254	NS
Area of specialization	93	6	86.517	0.000	S
Working with organizations as extension agents	93	1	57.301	0.000	S
Number of agricultural shows attended	93	3	27.989	0.000	S
ICT used	93	19	377.323	0.000	S

Source: Field Survey, 2013

Table 6. Summary of Chi-square analysis between the problems of farmers in usage of information and communication technologies and adoption levels of farmers

Problems	N	df	χ^2_{Cal}	P-level	Decision
Inability of farmers to use ICT	105	3	93.971	0.000	S
Inability of farmers to perceive its benefits	105	3	108.524	0.000	S
Lack of technological infrastructure	105	4	292.095	0.000	S
High cost of technology	105	3	191.114	0.000	S
Not enough time to spend on technology	105	4	138.592	0.000	S
Do not understand the value of ICT	105	3	66.848	0.000	S
Lack of training	105	3	189.057	0.000	S
Lack of supporting facilities	105	3	209.248	0.000	S
Adoption levels if ICT by farmers	105	5	142.943	0.000	S

Therefore, the null hypothesis which states that there is no significant relationship between the problem of farmers in usage of Information and Communication Technologies and adoption levels of farmers in the study area is rejected and the alternative hypothesis is accepted that: There was a positive and significant relationship between the problems faced by farmers while using Information and Communication Technologies and adoption levels of farmers in the study area.(See Table 6 above)

4. CONCLUSION

The study concluded that the crop farmers were mostly males, married, educated, members of cooperative societies, and attended extension programmes, while most of the extension agents were adults, Christians, possessed formal education, and specialized in agronomy. Radio, slides, landline telephone, DVD and film projectors were mostly used by both the Extension Agents and the crop farmers. The study further concluded that the problems associated with lack of technical infrastructure, high cost of technology, lack of supporting facilities, and lack of training, hindered the crop farmers in adopting innovation disseminated to them by the Extension Agents while problems associated with inability of farmers to use ICT,

high cost of technology, and lack of training were perceived mostly by the Extension Agents as the problems hindering the crop farmers in adopting innovations disseminated to them by the Extension Agents.

5. RECOMMENDATIONS

Based on the findings, the following recommendations were made:

- To use the Information and Communication Technologies to disseminate agricultural innovations to crop farmers, the government should strengthen the media agencies, extension agents, and the NGO's.
- Efforts should be directed towards improving the level of awareness of the utilization of Information and Communication Technologies by organizing training workshop for crop farmers by Extension Agencies.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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