ADOPTION OF INFORMATION AND COMMUNICATION TECHNOLOGIES BY FARMERS IN LOKOJA LOCAL GOVERNMENT AREA OF KOGI STATE, NIGERIA

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ABSTRACT
The study analyzed adoption of Information and Communication Technologies (ICTs) among rural farmers in Lokoja Local Government Area (LGA) of Kogi State, Nigeria. Multi-Stage random sampling technique was used to select 120 respondents. Descriptive and inferential statistics were employed for data analysis. Result shows that the majority (62.5%) of farmers were male, while 37.5% were female, 28.3% had age bracket of between 31 – 40 years, 49.2% were single and 32.5% of the respondents completed secondary education. More than half (51.7%) of the respondents were full-time farmers, which implies that the majority of the respondents depended on agriculture for their livelihood. The result on awareness of ICT facilities reveals that all (100%) were aware of mobile phone and radio set as means of agricultural communication, 60% and 45.8% were aware of Computers and Geographical Information System respectively. 44.2% were aware of global positioning system to locate and define spatial features for cultivation, 39.2% were aware of Internet and Web Design, 35% and 34% of the farmers were aware of World Space Satellite Radio, respectively, while 5.8% were aware of Yield Monitoring Technology for crop improvement. Results on proportion of use of ICTs showed that a good proportion of the respondents (60%) made use of mobile phone for communication. About 87% of the farmers were not using any of the various ICTs and it was attributed to the low level of education, low income level and complexity of the technology. It was recommended that appropriate government agencies responsible for agricultural development should carry out thorough review about ICT facilities in the area by updating them with modern ICTs.

Key Words: *Adoption, ICTs, Farmers, Awareness, Extension Agents*

INTRODUCTION

Adoption of innovation in agriculture expresses willingness of a farmer in accepting change which was alien to him and practicing it due to perceived advantages in it. It represents a full- scale integration of recommended practices or innovation into on- going farm operations. It is a process because adoption of improved practices or technologies is not a single unit act. Adoption consists a serious of actions which are preceded by thoughts. The adoption process is essentially a decision-making process.

The term information and communication technology (ICT) can be used to embrace a multitude of standalone medium including telephone, video, television, tele-text voice information systems and fax, as well as those requiring the use of personal computer fitted with a modem (Warrem, 2014). ICT is an electricity – based means of seeking, communicating, storing, accessing, manipulating and sending information thus creating and improving the global economy. Aina (2018) noted that information is one of the resources required for the improvement of agricultural production and also observed that farmers who are hooked up to new information technologies fare better in farm practices. Communication makes technical know- how accessible to increased knowledge about production, transformation, organization and marketing dimensions of agriculture. Improved agricultural technologies have been disseminated to rural farmers using different communication channels. These channels include (printed publications newsletters, books, journals, leaflets, photographs, sketches and posters), participatory resources (games, puzzles, theatre), interpersonal exchange media (television, radio, video)and new technologies such as internet, websites, on-line discussion groups, web logs, e-mails, data bases, mobile phones, or web cams (Mc- Bean, 2017).

There are several emerging ICT tools used in farming such as Geographical Information System (GIS), mobile mapping, hand held personal computers or personal digital assistants, precision agriculture, mobile (cellular) phone applications, Frequency Modulated (FM), community radio stations, radio frequency identification, World space satellite radio and internet and web- based applications and their application in small – scale agriculture. Modern ICTs play a key role in communicating knowledge and information to rural agricultural communities.

Although ICTs have been used as tools to serve small- farmers in Africa to provide effective communication. These efforts have been in form of projects, which have been disjointed and unconnected (Kasora,2016). A priority setting exercise in West African region identified a number of challenges including poor infrastructure, inadequate ICT skills, poor and expensive connectivity, the absence of appropriate ICT policies and language barriers (Mukailu et al, 2017). Nwala (2018) opined that the key factors affecting adoption of ICT in agriculture were in adequate knowledge or information concerning an innovation, adoption of wrong communication channels and incompatible client needs. Although most of the farmers and researchers now have computers for information and data management, most of the computers have neither telephone nor internet access (Aroyodo, 2015). Meeraky, et al (2018) noted as a result of the emerging new paradigm of agricultural

development, old ways of delivering important services to citizens are being challenged; traditional societies are also being transformed into knowledge societies over the world.

Conventional communication channels have been used successfully but these have been monologued and have not been allowed for much interaction with users. Radio for example have been effective for disseminating improved agricultural technologies to farmers but broadcasting times are sometimes not appropriate for most people. Aroyodo (2015) reported that major agricultural innovation rarely reaches the rural farmers who are the major producers in Nigeria. Abdullai et al, (2018) also reported that the costs of software and hard ware as well as poor access to ICT infrastructure are the major problems faced by the farmers in the adoption of ICT in Nigeria. They, however identified other constraints associated with the adoption of ICT which include, poor network and networking, unstable power supply, poor sensitization about ICT and low computer literacy as affecting ICT adoption. These challenges are general in Nigeria in which the study area is not an exception. It is against this background, that in order to improve agricultural production in Lokoja LGA of Kogi State, adoption of relevant agricultural technologies that will provide solution to farmers' need and problems become inevitable.

Therefore, the specific objectives of this study were to: i. determine the socio-economic characteristics of the farmers in the study area,

ii. identify the type and awareness of ICT adopted by farmers and

iii. evaluate farmers' adoption of ICT use in the study area.

MATERIALS AND METHODS

Population and Sampling Selection Technique

The target population for this study comprised farmers from Lokoja Local Government Area (LGA) of Kogi State, Nigeria. Lokoja LGA consists of two (2) blocks (Lokoja and Abugi) and sixteen (16) circles. That is Lokoja block has the following 8 number circles namely Sarkin Noma, Tajimi,Karara, Owara, Jamata, Crusher, Lokongoma/Gadumo and Barracks/zango. Abugi block with the following 8 number circles: Abugi, Mami, Buddon, Eggon, Tsanawa, Kayinko, Ataji and Aginni. From each block, three circles were selected by simple random sampling technique making a total of six (6) circles. From each circle, twenty (20) farmers were selected making a total of one hundred and twenty (120) respondents (farmers).

Sources and Instrument of Data Collection

The required information for this study was obtained from both primary and secondary sources. The primary data were obtained from interview schedule with sample farmers and structured questionnaire. The instrument designed for data collection was the interview schedule.

The instrument was developed, pre-tested and subjected to validity test before being administered. The interview schedule was used to collect the required information needed on the variables to be tested. The secondary data was obtained through text books, journals, bulletins, monographs and internet.

Validity of the Instrument

Content validity was carried out to ascertain that the instrument measured what it is intended or supposed to measure. A draft questionnaire was given to experts in the field. The items of the questionnaire were therefore reviewed and the appropriate items were selected to represent the universe of content of study.

Data Analysis

Descriptive statistics such as percentages and frequency distribution were used to analyze data on socio- economic characteristics of the respondents and farmers' adoption of selected ICTs in the study area.

RESULTS AND DISCUSSION

Respondents Socio-Economic Characteristics

Table 1 showed that respondents between the age range of 20 – 30 years are made up of about 23.3% of the population while those in the age range of 31 – 40 years and 51 – 60 years constitute 25.8% and 16.7 % respectively and 61 – S70 years are made up of 5.8% of the population. This implies that most ICT farmers in the study area were mostly within the middle aged class who still had energy to carry out enterprise activities in food production. The decreasing value of age among the respondents in the area supports the argument that farmers become less efficient as they get older. This could result not only from efficiency loss as producers get old but also because younger workers tend to be more open and likely to be exposed to new methods and techniques involved in the adoption of ICTs. This agreed with the findings of Manda (2014) that young people participate more in ICT in agricultural technologies.

The result also showed that 37.5% of the farmers were female while majority (62.2%) was males. Studies indicate that gender plays significant role in decision making regarding adoption of technologies (Adeyemi et al, 2015). Generally in Africa, men have greater access to productive resources and capital (including mobile phones) than women (Okegwe et al, 2016). It is therefore noted that male farmers would adopt ICT based information and services and will also utilize ICT tools more than females.

Table 1: Distribution of the Respondents on Socio- Economic Characteristics

Socio- Economic Characteristics	Frequency (n=120)	Percentage
Age (Years)		
20 – 30	28	23.3
31 – 40	34	28.3
41 – 50	31	25.8
51 – 60	20	16.7
61 – 70	7	5.8
Total	120	100.0
Sex		
Male	75	62.5
Female	45	37.5
Total	120	100.0
Marital Status		
Single	59	49.2
Married	26	21.7
Divorced	8	6.7
Separated	11	9.2
Widow(er)	16	13.3
Total	120	100.0
Level of Education		
No formal Education	7	5.8
Primary School not Completed	9	7.5
Primary School Completed	16	13.3
Secondary School not Completed	22	18.3
Secondary School Completed	39	32.5
Tertiary Education	27	22.5
Total	120	100.0
Household Size		
1 – 4	18	15.0
5 – 8	89	74.17
9 – 12	13	10.83
Total	120	100.0
Farm Size (Acres)		
< 0.05	46	46.67
0.05 - 1.0	29	24.17
1.0 – 2.0	12	10.00
2.1 – 5.0	9	7.50
> 5.0	14	11.67
Total	120	100.0
Occupation (No of Time)		
Full Time	62	51.7
Part Time	58	48.3
Total	120	100.0
Farming Experience		
1 – 10	18	27.50
11 – 20	34	28.33
21 – 30	30	25.00
31 – 40	23	19.16
Total	120	100.0
Membership to Cooperative Society		
Yes	68	56.67
No	52	43.33
Total	12	100.0

Source: Field Survey Data, 2020

The result further indicated that 49.2% of the respondents were single. 21.7% married while 6.7% and 9.2% were divorced and separated respectively. This showed that the majority of the respondents were single. This might imply that singles are more likely to adopt innovations than the married. This result disagreed with the findings of Richard and Ayodele (2016) who stated that married respondents influenced and adopted maize production technologies more than singles because their spouse support and help in Kogi State.

It is believed that education increases human capacity and contributes positively to change farmers' attitudes towards modern technology (Manda 2014). The table revealed that only 8.4% of the respondents had no formal education while majority (46.8%) of them had secondary education. In summary, 91.6% of the respondents (farmers) in the study area were literate possessing diverse formal educational levels ranging from primary education to tertiary education. It is expected that farmers with more years of education would be able to understand the benefits of such new technology. This implies that majority of the participants in new ideas and likely to adopt new innovation. This is in line with Oguche (2015) finding which stated that educational status enhances efficiency of farmers. Majority of the farmers (74.17%) had household sizes of between 5 and 8 persons while 5.0% and 10.83% of the respondents had 1 – 4 and 9 – 12 persons respectively. This result shows that these farmers had moderate family sizes. Therefore, it is expected that the family size would embark on technologies that will increase their farm outputs so that the needs of the family will be met.

The table further revealed that the majority (46.67%) of the respondents had a farm size of < 0.05 acres. This was followed by 24.17% of the respondents who had a farm size of 0.05 – 1.0 acres, 11.67% and 10% of the respondents had > 5.0 and 1.0 – 2.0 acres of farm land respectively while 7.50% had a farm land of 2.1 – 5.0 acres. It has been noted that farm size in some parts of the study area were generally small and therefore recommended that there is need for urgent implementation of land reform policies and programmes that would give farmers access to more land holdings for increase in agricultural production. The result also revealed that 74.4% of the respondents spent full time on farming while 69.6% of them spent part time. This implies that the majority of the respondents in the study area depends on agriculture as a source of livelihood, and may therefore be receptive of innovations and technologies which could improve their farming activities. Moreover, when the farmers spent more time on farming, a positive attitude is expected toward adoption of ICT tools for farming

Furthermore, most of the farmers (28.33%) had 11 – 20 years of farming experience, while 25.0% had 20 – 30 years, 27.50% had 1 – 10 years and 19.16% had 31 – 40 years. This implies that most of them had many years of farming experience. Peterson and Ratnadiwakara (2014) noted that more experienced farmers are more likely not to be flexible and prefer their own traditional way of practicing farming. Accordingly, it is however noted that more experienced farmers would have a negative position toward ICTs. The table also showed that greater proportion (56.67%) of the respondents belong to one form of farmers association, while (43.33%) of them did not belong to any farmers association. This moderate innovativeness and good leadership roles among the respondents were because of group dynamic. However, group membership may entail more social influence and give opportunities to the farmers to have accurate innovations. Hence, farmers who are group members are likely to adopt a given innovation and take advantage of it. It is expected that as members of an association, an increase in the level of adoption of technologies relevant to the association by members exist. This result is in agreement with the findings of Eyekoro et al, (2017), who opined that socialized groups of people are associated with good leadership roles in the community and they make good contact farmers who can readily adopt technologies.

Types and Awareness of Information and Communication Technology (ICT) Adoption

Table 2 indicates the types and awareness of ICTs adopted by the farmers. Awareness is the first stage in the adoption process. The result of the study indicates that all the respondents in Lokoja Lokoja Local Area (LGA) of Kogi State adopted one or more of the various ICTs. All the respondents (100%) adopted the use of mobile phones and radio set for communication. This could be attributed to the versatility and availability of mobile phones and radio sets in the study area while (60%) of the respondents were aware of the computers. The result further revealed that (45.83%) of the farmers were aware of the use of Geographical Information System (GIS) in analyzing and mapping spatial data and mapping out data suitable for a particular enterprise production, 44.20% of the respondents acknowledged that they were aware of the use of Global Positioning System (GPS) to locate and define spatial features for cultivation while 5.83% of the respondents were aware of the adopted yield data base for crop management. The table also showed that 39.1% of the respondents adopted the sale of farm produce through the electronic market (internet) and 33.0% of the respondents were conversant with the use of market information to achieve the marketing functions of buying and selling.

Table 2: Distribution of Respondents According to Types and Awareness of ICTs Adoption for Utilization

Technology	Frequency*	Percentage
Cell phone	100	100.0
Geographical Information System (GIS)	55	45.83
Mobile Mapping	31	25.83
Computers	72	60.0
Radio	100	100.0
Internet and Web Design (IWD)	47	39.16
Precision Agriculture	33	27.50
World Space Satellite Radio (WSSR)	42	35.00
Distance Learning Application (DLA)	25	20.80
Global Positioning System (GPS)	53	44.20
Yield Monitoring Technology (YMT)	7	5.83
Market Information System (MIS)	28	33.0

Source: Field Survey Data, 2020

Table 3 shows the distribution of the respondents that adopted the various ICTs in the study area. The Table indicated that all the respondents were not only aware of the use of one or more of the various ICTs but also, adopted almost all of them. A good proportion of the respondents (70% and 60%) were using mobile phones and radio set for communication while few (26.67%) adopted computers and 2.5% adopted internet and web design. The result showed that 13.33% of farmers adopted mobile mapping. However, Global system of mobile communication (GSM) has brought about a new era of communication and therefore enhancing information transfer among people in Nigeria.

The study further revealed that 26.67% and 25% of farmers were utilizing computers and internet and web design respectively while 6.67% of farmers were using GIS in analyzing and managing spatial data and mapping out data suitable for particular enterprise production. 4.16% of the respondents were using global positioning systems to locate and define spatial features for cultivation while 5.83% were using yield data base for crop management. Also, about 2.5% of the respondents were using electronic market information technology for the sale of farm produce and to achieve the marketing functions of purchasing and selling.

Table 3: Distribution of Respondents According to Adoption of ICTs

ICT Technology (%)*	**Frequency***	**Percentage**
Cell phone	72	60.00
GIS	8	6.67
Mobile Mapping	16	13.33
Computers	32	26.67
Radio	84	70.00
Internet and Web Design	30	25.00
Precision Agriculture	7	5.83
World Space Satellite Radio	–	–
Distance Learning Application	14	11.66
Global Positioning System	5	4.16
Yield Monitoring Technology	7	5.83
Market Information Technology	3	2.50

Source: Field Survey Data, 2020

* Multiple responses recorded

It is worth nothing that none of the respondents were utilizing world space satellite radio for detecting and measurement of phenomena against unforeseen outbreaks. Among farmers on the other hand, majority of the respondents in the study area acknowledged that they were not using various ICTs. This could be attributed to the low level of education, income level and the non - availability of newspaper, internet and other impersonal sources of information. On the other hand, the relative high level of use of mobile phone and radio may be due to its versatility as well as availability of wide range of information sources.

CONCLUSION AND RECOMMENDATIONS

Effective agricultural extension depends on extension information reaching many farmers and farmers' problems inform of feedback reaching extension quickly and regularly. An effective way of facilitating this process is through the utilization of information and communication technologies (ICTs). There is need for ICT facilities to be available, accessible and usable among rural farmers irrespective of gender. In so doing, the farmers will be more effective in their agricultural productivity.

Based on the findings, the following recommendations are made.

1. For effective and quality Information and Communication Technology (ICT) to take place, Agricultural Information in the study area of Kogi State acquisition, dissemination and application of various agricultural ICT should be encouraged by the government.
2. Agricultural Development Project (ADP) should carry out a thorough review of ICT facilities in the study area with a view to increasing and updating them with more modern information and communication technologies. These facilities should not only be made available but also accessible to farmers.
3. Government should establish television viewing centers in Lokoja Local Government of Kogi State where agricultural programmes can be broad cast and viewed by the rural farmers.

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