



Assessment of Use of Information and Communication Technologies among Farmers in Benue State, Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Author ENM designed the study, wrote the protocol and supervised the work. Authors ENM and MOA carried out all field work and performed the statistical analysis. Author CIE managed the analyses of the study. Author ENM wrote the first draft of the manuscript. Author MOA managed the literature searches and edited the manuscript. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/AJAEES/2016/22512

Editor(s):

(1) Anthony N. Reztis, Department Business Administration of Food and Agricultural Products, University of Western, Greece.

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Reviewers:

(1) Anonymous, Agricultural Research Council, South Africa.

(2) Shelley Gupta, Pune University, India.

Complete Peer review History: <http://sciencedomain.org/review-history/14161>

Original Research Article

Received 6th October 2015

Accepted 17th March 2016

Published 14th April 2016

ABSTRACT

The study assessed use of Information and Communication Technologies among farmers in Benue State, Nigeria. Data were collected from a sample of 80 respondents using interview schedule/questionnaire. Frequency, percentage, mean scores and standard deviation were used for data analysis. Majority of the respondents were males (70%) and married (82.5%). A greater percentage (98.8%) of the respondents was using radio, about 96% were using television and 91.2% used mobile phones, among others. Benefits of ICTs as indicated by the respondents include obtaining information on weather forecast (M=2.0), increasing access to markets (M=1.8), obtaining information on best time to plant given weather conditions (M=1.8), obtaining information on best time to harvest given weather conditions (M=1.7), ensuring effective communication with fellow

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farmers and extension agents (M=1.7), providing information on weather, pests and diseases outbreak (M=1.7), etc. The study recommends adequate provision of rural infrastructure such as electricity by three tiers of government (federal, state and local) to enhance use of ICTs like mobile phones, television, computer, Internet, etc for access to agricultural information for optimum productivity.

Keywords: Information and communication technologies; agriculture; benefits; farmers; Nigeria.

1. INTRODUCTION

Information and Communication Technologies (ICTs) can be broadly referred to as technologies that facilitate communication, processing and transmission of information by electronic means [1]. ICTs are communication devices or application, encompassing radio, television, cellular phones, computer and network hardware and software, satellite system and so on, as well as the various services and applications associated with them, such as video conferencing and distance learning. ICTs are often spoken of in a particular context, such as ICTs in education, healthcare, or libraries [2].

The importance of ICTs lie less in the technology itself than in its ability to create greater access to information and communication in underserved population [3] Many countries around the world have established organizations for the promotion of ICTs, because it is feared that unless less technologically advanced areas have a chance to catch up, the increasing technological advances in developed nations will only serve to exacerbate the already-existing economic gap between technologically "have" and "have not" areas. The United Nations actively promoted the use of ICTs for development as a means of bridging the digital divide [4].

A strong linkage between Research-Extension-Farmer-Input Linkage System (REFILS) complemented by flawless new information and communication technology use have served as a very good media through which rural farmers acquire improved agricultural technologies which are typically site specific, depending on climate, soil condition, cropping system, market requirement, etc [5].

Information and Communication Technologies facilitate exchange of information among farmers in Benue State, Nigeria. Radio for example has been very effective in disseminating improved agricultural technologies to farmers but broadcasting times are sometimes not appropriate for the farmers. Radio could be

linked to the Internet and a few initiatives have been started on this concept such as the Internet radio in Sir Lanka (Internet Radio in Sir Lanka). This enables users to access programs on the web at convenient time and sends feedback through e-mail or chat. Broadcasters could disseminate the latest information promptly. So many Internet and web-based systems or projects have been set up, managed and found by international research centers to help farmers have access to improved agricultural technologies. These information and technology services gotten from the use of new ICTs facilitate decision-making by farmers in rural areas [6].

Information communication technologies can be an effective means of providing development workers with relevant information on markets, technology prices, successful experiences, credit facilities, government services and policies, weather, crops, livestock, and natural resources protection. However, in order to have a significant impact on development programs, ICT services must be readily accessible and meaningful to broad segments of rural populations, especially farmers, and the information they carry must be adapted and disseminated in formats and languages that they can comprehend. They must also serve people's entertainment, cultural enlightenment, and human needs [7]. Rural communication and information management play an important role in spreading information on successful farmer innovations and in getting access to new knowledge. Participatory development programs increasingly use rural radio, television, and other mass communication media as tools for farmer-to-farmer exchange. In some places, farmers use mobile phones to get information on market prices. The use of the Internet and CD-ROMs by development workers, researchers, and farmers for networking and information exchange is gradually increasing as communication facilities improve [8].

Farmers most especially experience many challenges with respect to information

dissemination and accessibility to ICTs in increasing their agricultural knowledge. Most farmers in Nigeria, Benue state inclusive, are resident in the rural areas where there is poor ICT infrastructural development in terms of electricity supply, Internet facility, telephone service and low level capacity of gateways to national or international network satellite system. Inadequate supply of these facilities may be a barrier to the use of ICTs by farmers [9]. Majority of rural farmers do not have computers for information and data management and where these are available they may not have telephone or Internet access. This has made information exchange for agricultural production almost impossible.

The productive use of ICTs require at least the attainment of basic literacy level. Literacy is a serious constraint to using ICTs. Over 70% of people living in rural areas are farmers with little or no western education coupled with the low computer literacy level which makes the use of ICTs by farmers difficult [10]. The cost of purchasing radio and television sets, printed media such as newspapers, magazines, bulletins and lack of infrastructural facilities especially electricity hinders the use of ICTs by farmers in rural areas. Wrong timing of agricultural programs on radio and television are also factors militating against effective use of ICTs among farmers [11]. The questions therefore are what are socio-economic characteristics of respondents? What are types of ICTs used by respondents? And what are benefits of ICTs to respondents?

The specific objectives of the study were to:

- i. Describe socio-economic characteristics of respondents;
- ii. Identify types of ICTs used by respondents; and
- iii. Ascertain benefits of ICTs to respondents.

2. METHODOLOGY

The study was carried out in Benue state, Nigeria. The state derived its name from River Benue, the largest river in Nigeria. It was created on February 1976 along with six other states of the federation. It has a landmass of 6.575 million hectares. Benue State has a total population of 4,219,244 million people [12]. It is made up of 413,159 farm families.

The State is bounded by Nasarawa State in the north, Taraba State in the east, Cross-River

State in the south, Enugu State in south west, Ebonyi State in the south central, Kogi State in the west and in the south east by Cameroon republic. The State is administratively divided into three zones namely; Zone A (Eastern zone), Zone B (northern zone) and Zone C (Central zone).

The predominant occupation of inhabitants of Benue state is farming with over 80 percent engaged in the occupation and highly noted for substantial cultivation of arable crops such as yam, cassava, rice, soybean, maize and other staples. Livestock especially small ruminants are reared extensively in the state. The main source of livelihood of the people is agriculture, hence the Food Basket of the Nation. The population for the study comprised farmers in Benue State, Nigeria. Zone C was selected for this study out of the three zones using simple random sampling technique. Two blocks (Apa and Agatu) out of nine blocks were selected purposively for the study because of proximity. Also, two circles were selected from each of the blocks using simple random sampling technique. A list of farmers in each of the circles was obtained from a key informant. Using the list provided, twenty (20) respondents were selected from each of the communities using simple random sampling technique. This gave a total of eighty (80) respondents used for the study.

Data were collected using interview schedule/questionnaire. Interview schedule was used for illiterate farmers, while questionnaire was used for literate farmers. The interview schedule/questionnaire was divided into three sections (A-C) based on the specific objectives of the study. Section A provided information on socio-economic characteristics of the respondents. The second section sought information on types of ICTs used by the respondents. The third section centered on benefits of ICTs to respondents. Frequency, percentage, mean scores and standard deviation were used for analyzing data collected for the study.

3. RESULTS AND DISCUSSION

3.1 Socio-economic Characteristics of the Respondents

3.1.1 Sex

Majority (70%) of the respondents were males, while 30% of them were females (Table 1). The

predominance of males in the study area may be attributed to the tedious nature and hard work involved in agricultural production. The findings agree with [13] who reported that agricultural production in Anambra state is dominated by males.

3.1.2 Age (years)

About 36% of the respondents were within the age range of 31-40 years, 28.8% were within the age range of 21 – 30 years, while about 16% were between 51 and 60 years, among others. The mean age of the respondents was 36.2 years. This shows that people of all ages were involved in agricultural production in the study area. Both the young and aged farmers produce in order to feed members of their families.

3.1.3 Level of education (years)

A greater percentage (83.7%) of the respondents had formal education, while 16.3% had no formal education (Table 1). The mean number of years spent in school was 11.3 years. Education will facilitate farmers' ability to use ICTs and appreciate their importance in farming activities. Education has been identified as a major factor in the adoption and absorption of technology [14].

3.1.4 Marital status

Majority (82.5%) of the respondents were married, while 17.5% were single. The proportion of married persons involved in farming was high. The predominance of married people implies that it is a source of livelihood for the farmers and their family since marriage is often associated with occupational stability and responsibility. Household members can also provide source of farm labour.

3.1.5 Household size (numbers)

Data in Table 1 indicate that 51% of the respondents had a household size of 1-5 persons, 26% had 6-10 persons, while 3% had above 20 persons. The mean household size was about 6 persons. This result shows that the respondents had a fairly large household size. This implies that members of household can provide family labour used for production. Availability of family labour will reduce cost of production among the respondents, thus leads to increase in household income.

3.1.6 Farm size (hectares)

Entries in Table 1 show that about 38% of the respondents had a farm size of less than 2 hectares, 35.0% had between 2 and 4 hectares of farmland, while 27.5% had a farm size of 5 hectares and above. The mean farm size was 4.3 hectares. This implies that the respondents had a large farm size for farming.

3.1.7 Farming experience (years)

Result in Table 1 revealed that 41.3% of respondents had a farming experience of 6-10 years, while about 21% and 20% had a farming experience of 11-15 years and 1-5 years, respectively. The mean farming experience of the respondents was 11.7 years (Table 1). The findings of this study show that most respondents have been involved in agricultural production for a long period of time. The extensive farming experience and use of ICTs will help the respondents to achieve greater productivity as well as sustain agriculture.

3.1.8 Contact with extension agents

Majority (75.0%) of the respondents had no contact with extension agents, whereas 25.0% of them had contact with extension agents. The finding indicates that the level of extension contact was very low. This implies that low level of extension contact will affect the rate at which farmers use ICTs such as mobile phones in obtaining information that will enhance their productivity.

3.1.9 Number of visits

About 46% of the respondents were visited between 1 and 2 times in a year by the extension agents, about 21% were visited 3-4 times, 6.2% were visited 5-6 times, while 1% had more than 6 times of visit. This implies that many of them had several times of visits by the extension agents.

3.1.10 Type of farming

Results in Table 1 also reveal that 46.3% of the respondents were involved in crop and livestock production (mixed farming), while 46.2% and 7.5% of the respondents were producing crops and livestock, respectively. The ability of the respondents to be involved in mixed farming will make them economically stronger and able to

afford ICTs that will facilitate agricultural production.

3.1.11 Membership of organization

All (100%) the respondents were members of one organization or the other (Table 1). This implies that the organization or association helped them to obtain information which may increase their productivity.

3.1.12 Type of organization

Data in Table 1 also revealed that 30% of the respondents were members of religious group, about 24% belonged to farmers' association, 18.8% belonged to fadama user group, while 18.8% belonged to cooperative society, among others. This implies that the respondents belonged to organization which can serve as an avenue to obtain agricultural information using ICTs.

Table 1. Distribution of respondents according to socio-economic characteristics (n= 80)

Socio-economic characteristics	Frequency	Percentage	Mean score
Sex			
Male	56	70.0	
Female	24	30.0	
Total	80	100	
Age (years)			
≤20	6	7.5	36.2
21-30	23	28.8	
31-40	29	36.2	
41-50	13	16.2	
51-60	6	7.5	
Above 60	3	3.8	
Total	80	100	
Level of education (years)			
No formal education	13	16.3	
Primary education	7	8.8	11.3
Secondary education	24	30.0	
Tertiary education			
NCE	19	23.7	
First degree	13	16.2	
Masters degree	4	5.0	
Total	80	100	
Marital status			
Married	66	82.5	
Single	14	17.5	
Total	80	100	
Household size (numbers)			
1-5	51	63.7	5.9
6-10	26	32.5	
11-15	-	-	
16-20	-	-	
Above 20	3	3.7	
Total	80	100	
Farm size (hectares)			
<2	30	37.5	4.3
2-4	28	35.0	
5-7	13	16.3	
8 and above	9	11.2	
Total	80	100	

Socio-economic characteristics	Frequency	Percentage	Mean score
Farming experience (years)			
1- 5	16	20.0	11.7
6-10	33	41.3	
11-15	17	21.2	
16-20	4	5.0	
21-25	3	3.8	
26-30	5	6.2	
Above 30	2	2.5	
Total	80	100	
Contact with extension agents			
Yes	20	25.0	
No	60	75.0	
Total	80	100	
Number of visits in a Year			
1-2	37	46.2	
3-4	17	21.2	
5-6	5	6.2	
Above 6	1	1.2	
Total	20	100	
Type of farming			
Crop production	37	46.2	
Livestock production	6	7.5	
Mixed Farming	37	46.3	
Total	80	100	
Membership of organization			
Yes	80	100	
No	-	-	
Total	80	100	
Type of organization			
Farmer association	19	23.7	
Fadama user group	15	18.8	
Religious group	24	30.0	
Cooperative society	15	18.8	
Thrift	1	1.2	
Women group	4	5.0	
Young farmers club	2	2.5	
Total	80	100	

Source: Field survey, 2015

3.2 Types of ICTs used by the Respondents

Most (98.8%) of the respondents were using radio, about 96% were using television and 91.2% used mobile phones, 80% used computer; 76.2% used DVD, while 66.2% and 62.5% used Internet and photocopier, respectively (Table 2). This implies that the respondents had ICTs that will enable them to communicate effectively among themselves. Information can spread easily through mobile phones, especially where

there is adequate link between research, extension and farmers, thus ensuring effective communication among stakeholders. The findings of this study also revealed that computer-based ICTs such Internet were rated high. This implies that agricultural information provided through such means can readily be accessible to the respondents. The finding confirms a report from [15] which stated that small-scale farmers can obtain agricultural information through radio, television, Internet and mobile phones.

Table 2. Percentage distribution of respondents according to types of ICTs used

Types of ICTs*	Frequency	Percentage (%)
Radio	79	98.8
Television	77	96.2
Internet	53	66.2
Mobile phone	73	91.2
Print media	24	30.0
Computer	64	80.0
CD Rom	6	7.5
E-mail	19	23.8
Video player	46	57.5
Digital cameras	38	47.5
Flash drive	26	32.5
Diskette	5	6.2
Printer	19	23.8
Scanner	14	17.5
Photocopier	50	62.5
Film projector	14	17.5
DVD	61	76.2
Video machine	19	23.8

*Multiple responses

Table 3. Mean scores of benefits of ICTs to the respondents

Benefits	Mean score	Standard deviation (SD)
Obtaining information on weather forecast	2.0	0.1571
Increasing access to markets	1.8	0.3928
Facilitate easy contact between farmers and buyers of produce	1.7	0.4612
Obtaining information on best time to plant given weather condition	1.8	0.4357
Accessing information on best time to harvest given weather conditions	1.7	0.4357
Accessing information on best techniques for applying fertilizer	1.6	0.5080
Ensuring effective communication with fellow farmers and extension agents	1.7	0.4838
Providing information on weather, pests and diseases outbreak	1.7	0.5057
Easy access to agricultural information such as new varieties of crops, pest and disease prevention and control measures	1.6	0.5648
Providing information about new farming techniques, new food storage and processing technologies	1.6	0.4975
Availability of information of market outlets, source of credits, subsidies and loans	1.6	0.5441

3.3 Benefits of ICTs to the Respondents

The major benefits of ICTs indicated by the respondents in Table 3 include obtaining information on weather forecast (M=2.0); increase access to market (M=1.8); obtaining information on best time to plant given weather conditions (M=1.8); obtaining information on best

time to harvest given weather conditions (M=1.7); ensuring effective communication with fellow farmers and extension agents (M=1.7); providing information on weather, pests and diseases outbreak (M=1.7); accessing information on best techniques for applying fertilizers (M=1.6); easy access to agricultural information such as new varieties of crops, pest

and disease prevention control measures (M=1.6); providing information about new farming techniques, new food storage and processing technologies (M=1.6); and availability of information on market outlets, source of credit, subsidies and loan (M=1.6). Table 3 also indicates a standard deviation that is less than one showing that there is agreement with the various benefits of ICTs as reported by the respondents. Effective use of ICTs can help to enhance greater output of the farmers, increase efficiency and optimize productivity thus boosting income.

However, having ICTs such as computers, Internet, mobile phones, television, radio etc, is one thing, but making effective use of them to access information is another. The finding of this study in agreement with [16] who stated that ICTs can make a significant contribution in agriculture by increasing efficiency, productivity and sustainability of small-scale farmers.

4. CONCLUSION AND RECOMMENDATIONS

Majority of the respondents were males, married, had formal education and a fairly large household size. Various types of ICTs such as radio, television, mobile phones, computer, DVD, Internet, among others were used by the respondents in having access to agricultural information for enhanced productivity. Information and Communication Technologies were beneficial to the respondents in obtaining information on weather forecast, increasing access to markets, obtaining information on best time to plant given weather conditions, obtaining information on best time to harvest given weather conditions, ensuring effective communication with fellow farmers and extension agents, providing information on weather, pests and diseases outbreak, accessing information on best techniques for applying fertilizers and easy access to agricultural information such as new varieties of crops, pest and disease prevention control measures. The study recommends that farmers should be encouraged to make the best use of ICTs available to them through provision of rural infrastructure such as electricity to enhance access to agricultural information for optimum productivity.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Available:<http://www.iicd.org/files/ICT%20and%20agricultural%20livelihoods.pdf>

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Peer-review history:

*The peer review history for this paper can be accessed here:
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