

## Full Length Research Paper

# The Effect of Information and Communication Technology (ICT) utilization among Small Scale Farmers in Bauchi Local Government Area, Bauchi State, Nigeria

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**ABSTRACT:** This study analyses the effect of Information and communication technology (ICT) utilization among small scale farmers in Bauchi local government area of Bauchi State, Nigeria. Data for the study were collected from both primary and secondary sources. A multistage sampling technique was used to select the respondents. In the first stage, four (4) crops farmers groups (rice, maize, sesame, and groundnut) were randomly selected from Bauchi Local government area. In the second stage, twenty (20) farmers were also randomly selected and from each group, as respondents this gives 80 respondents for the study. The techniques used for data analysis were descriptive and inferential statistics. The result shows that Male and married individuals dominated the use of ICT to source information for agricultural production in the study area. The result also shows that 62.05% obtained information on farming through radio, 6.02% got theirs through television, 25.00% through GSM while 6.02% got their information on farming through the internet. The result indicated that all the respondents have access to one source of information or the other: Land preparation (8.09%), seed variety (25.05%), planting date (8.07%), plant spacing (7.05%), fertilizer application (19.01%), herbicides application (9.05%), pesticides application

(12.03%) and modern storage (8.01%). The Effects of ICT Utilization on crop production shows that the coefficient of age, level of education and farm size was found to be significant at  $P \leq 0.01$  level of probability and relates positively with information and communication technology utilization. The result shows that availability, quality of information/relevance, and ease of access to the ICT facilities is the major (43.75%) factor influencing their preference to ICT use. Based on the findings of this study, it is pertinent to make some recommendations. Extension workers should encourage the farmers to donate money for the purchase of computers systems to be using for online registration and marketing their products. The government should provide television viewing centers in villages for them to watch television programs on agriculture. Adult education should also be provided to small scale farmers to enable them to keep records of their farming activities.

**Keywords:** Analysis, ICT, agriculture, information and Bauchi State

## INTRODUCTION

The use of Information and Communication Technologies (ICTs) in agriculture, just like in the other fields of knowledge, has been gaining popularity in Africa and Nigeria in particular. During the last two decades, the world witnessed an unprecedented growth in the area of

ICT. The use of conventional communication channels such as farm/home visit, personal letters, and use of contact farmers, for disseminating agricultural information is counterproductive. This calls for the adoption of ICTs by both researchers and extension workers to transmit

relevant information to farmers in a most efficient way. It has therefore become necessary for all stakeholders to join hands in developing ICT world in Nigeria since it has the potential of transforming agriculture through agricultural extension in the country. An agricultural extension worker can learn new technologies, rainfall forecasts, commodity prices, etc and use that information to advice farmers in villages. The importance of ICTs in development process was long recognized and access to ICTs was even made one of the targets of the Millennium Development Goal No. 8 (MDG 8), which emphasizes the benefits of new technologies, especially ICTs in the fight against poverty. "With 10% percent increase in high-speed internet connections, economic growth increases by 1.3% percent" observed a World Bank report on Information and Communication for Development (World Bank, 2008). The potentials of Information and Communication Technology (ICT) to make agricultural extension in developing countries more effective appear unassailable (Omotayo, 2005). ICT is commonly used to embrace a multitude of media including telephone, television, video, telex, voice information systems, fax as well as those requiring the use of the personal computers fitted with a modem or supply technologies that facilitate communication, processing and transmission of information by electronic means ranging from radio and television to telephone (fixed or mobile) and the internet (Warren, 2001; CTA, 2003; Omotayo, 2005). Nkwocha et al. (2009) reported that ICT can promote access to and sharing of information in agriculture and allied industries. The inherent advantages in the pluralistic and seamless nature of information flow via ICT, if properly explored, will have a significant positive effect on the productivity of extension service providers. The international network of computers in particular is a global information superhighway and a haven of sort for continuously updated information on all fields of study. The broad objective of this study is to analyses the factors influencing small scale farmers utilization of the information and communication technologies (ICTs) for agriculture information delivery in Bauchi state: while specific objectives are to: describe the socio-economic characteristics of farmers in the study area, determine the factors influencing the use of ICTs among farmers in the study area

## METHODOLOGY

### The study area

Bauchi Local Government Area (LGA) is located at the South eastern part of Bauchi state with a population of 493,810 based on the 2006 population census (Bauchi LGA, 2009). Bauchi (LGA) comprises of four districts, namely, Bauchi, Galambi, Zungur and Miri. It covers a land area of 3,540,701 square kilometers. Bauchi (LGA).

The major economic activity of the area is agriculture, which include both crops and livestock production. The major crop production activities include Maize, Sorghum, Millet, Sesame, Cowpea, Rice, Sweet Potato and Groundnut. Animal production includes sheep, goats, cattle and poultry (BSAP, 2009).

### Methods of data collection

Data for the study were collected from both primary and secondary sources. The primary data were collected using structured questionnaire designed and administered to the respondents in the study area

### Sampling techniques

Multistage sampling technique was used to select the respondents. In the first stage, four (4) crops farmers groups were randomly selected from the four districts (Bauchi, Galambi, Zungur and Miri) of Bauchi Local government area. In the second stage, twenty (20) farmers were also randomly selected and from each district as respondents this gives 80 respondents for the study.

### Tools of analysis

The techniques used for data analysis to achieve the stated objectives are descriptive and inferential statistics. Descriptive statistics and regression analysis were used to achieve the objectives.

## RESULTS AND DISCUSSION

### Socio-Economic characteristics of respondents

Respondent's generally differs in socio-economic characteristics. These characteristics influence the capacity of respondents to utilize information and communication technology. Such differences in socio-economic characteristics of respondents also provide the context within which utilization of information and communication technology can be understood. The socio-economic characteristics of respondents considered for this study include the age, gender, and marital status, level of education, household size, farm size, annual farm income and possession of ICT facilities.

### Age of the respondents

Age of the respondents is one of the most important socio economic characteristic in understanding their views about a particular problem. By and large, age

**Table 1:** Distribution of respondent's according to age.

Age (years)	Frequency	Percentage
≤ 20	03	3.07
21-30	22	27.05
31-40	30	37.05
41-50	10	12.05
51-60	11	13.07
≥ 60	04	5.00
Total	80	100

Source: Field survey, 2018

**Table 2:** Distribution of respondent's according to gender.

Gender	Frequency	Percentage
Male	75	93.07
Female	5	6.02
<b>Total</b>	80	100

Source: Field survey, 2018.

indicates level of maturity of an individual as such, becomes important for examining respondents. The results in (Table 1) revealed that 37.05% of the respondents fell within the age bracket of between 31 to 40 years; also 27.05% of the respondents were within the age bracket of 21 to 30 years, while 13.07% of the respondents were within the age bracket of 51 to 60. These values are a representation of large number of able-bodied farmers within their youthful age that have greater tendency to utilize new innovations. Bemire and Manyong, (2003) reported that age of an individual affects his mental attitude to new ideas and hence influence information and communication utilization in several ways. On the contrary Asiabaka *et al.*, (2001) reported in their study that farmer's ability to utilize information and new farm innovations decreases with age. The older the farmer, the less likely they will utilize information. Typically, younger farmers are more willing to take risk than older farmers Ofuoku, *et al.*, (2006) found that age is related to information and communication utilization because the stage of life of farmers affects their attitude towards information's usage. The older the farmers are the more likely they are willing to put farming related information to use. This finding does not agree with Lemchi *et al.* (2003) who stated that the older the farmer is, the more risk averse he/she is.

### Gender of the respondents

Gender is an important variable in any given social situation which variably affect social or economic phenomenon. It was investigated for this study. Data related to gender of the respondents is presented in (Table 2). The result reveals that majority (93.07%) of the respondents were male while 6.02% of them were

female. The most probable reason for such overwhelming majority of male farmers is that the male farmers constitute the household heads and they respond on behalf of the households except in a situation where the household head is female, various studies (Onu, 2006; Idrisa *et al.*, 2007) found that gender plays significant role in having access to production resources and hence utilization of innovation.

### Marital status of the respondents

Marriage is one of the most important social institutions. The perception and attitude of a person can differ by his marital status in term of maturity and responsibility towards understanding and giving response to questions asked. This variable tells whether the respondents under study were married or not, divorced or widowed. The results in (Table 3) reveals that majority (56.00%) of the respondents were married, single 25.00%, widowed 10.00% while 8.07% were divorced. The percentages of marital status implication for utilization of information and technologies coincide with the findings of Idrisa (2007) in a similar research who stated that married people constitute the highest percentage. On the other hand married people have more responsibilities and hence they take whatever they do with high levels of seriousness. In that case, they will be willing to seek information about improved technologies so as to enhance the welfare of their families. Furthermore, with the fact that female being married, can be a serious hindrance to utilization of information and technologies. This is more especially in the study area where culture restricts interaction between males and females. Women attend functions, including extension training only with the consent of their husbands. This implies that females who

**Table 3:** Distribution of respondent's according to marital status.

Marital status	Frequency	Percentage
Single	20	25.00
Married	45	56.00
Widowed	8	10.00
Divorced	7	8.07
Total	80	100

Source: Field survey, 2018.

**Table 4:** Distribution of respondent's according to house hold size.

House hold size	Frequency	Percentage
≤ 5	15	18.07
6-10	33	41.02
11-15	15	18.07
16-20	8	10.00
≥ 20	9	11.02
Total	80	100

Source: Field survey, 2018.

were not married (single and divorced) have higher access to information. Onu (2006) earlier found that cultural factors formed a serious barrier to information utilization by women in Imo State, Nigeria.

**Household size of the respondents**

This variable was measured by adding the number of wives, children, relatives and dependants that are living with the respondents. Family size is an important variable that can assist in determining the respondent capacity to improve or increase his productivity. The data on house hold size of the respondents is presented in (Table 4). Results from the study (Table 4) shows that 41.02% of the respondents had between six to eight members per family, 18.07% of them had between less than five and nine to eleven members per family respectively, 10.00% of the respondents have sixteen to twenty members per family while 11.02% has more than twenty. Family labour is an important component of labour for small scale farmers. This is mainly because the subsistence farm household is resource poor and may have to depend on family labour for Agricultural activities which in most instances is labour intensive (Idrisa, 2009). Voh, (2000) established that household size is not significantly related to information utilization.

**Level of education of the respondents**

Education is one of the important characteristics that might affect the attitude and ease of understanding societal phenomenon. In a way, the response of an individual is likely to be determined by his educational status and therefore it becomes imperative to know the educational background of the respondents. Education

was the key to successful business planning. It determines the level of success or failure of a business. Table 5 represents the educational level of the respondents. Table 5 showed that majority (43.07%) of the respondents had attained primary level of education and secondary education level accounted for 25.00%; about 7.05% had attained tertiary level of education, and 5.00% Adult education while 18.07% of them had no formal education at all. Education influences farmer's information utilization. Educated people are expected to perform certain jobs and functions with higher efficiency and are also more likely to utilize information and new technologies in shorter period of time than uneducated people (Agbamu, 2006). This may be because educated people can gather process and interpret all available information, differentiate between promising and unpromising investment areas and also make decision more easily with relatively small error. Ofuoku *et al.*, (2006) corroborated in their studies that the level of education of farmers has significant relationship with information utilization by them, because educational level influences information utilization. The higher the level of farmer's education, the more they are willing to use information provided for Agricultural production. Eze *et al.* (2006) discovered in their work that the level of formal education correlated positively with utilization of information on cassava production technology. For instance, the more educated the farmers are the more receptive they will be with regards to utilization of information and adoption of new technologies.

**Farm size of the respondents**

This refers to the total area of farmland (in hectares) used for maize production by the respondents. It was assumed

**Table 5:** Distribution of respondent's according to level of education.

<b>Educational attainment</b>	<b>Frequency</b>	<b>Percentage</b>
No education	15	18.7
Primary education	35	43.7
Secondary education	20	25.0
Tertiary education	6	7.5
Adult education	4	5.0
Total	80	100

Source: Field survey, 2018.

**Table 6:** Distribution of respondent's according to farm size.

<b>Farm size (Hectares)</b>	<b>Frequency</b>	<b>Percentage</b>
<1	30	37.05
1 – 5	15	18.07
6 – 10	10	12.05
11-15	10	12.05
16-20	8	10.00
>20	7	8.07
Total	80	100

Source: Field survey, 2018.

that the larger the farm size the farmer has, the better in utilizing technological packages. Table 6 represents respondent base on farm size. Table 6 shows that majority (37.05%) of the respondents had less than 1 hectare while 12.05% of the respondents had between 1 to 5 hectares and 11-15 hectares of land respectively, 10.00% had 16 to 20 hectares of land, and 8.07% had more than twenty hectares of farm land. It can be seen that a vast majority of the respondents had less than 5 hectares of land. This is typical of Farming in third world countries which is characterized by small farmland holding (World Bank, 2008). Farmers operating on small farmland holdings may view utilization of new technologies as risky. Suri (2005) reported that farm size is an indication of the level of economic resource available to farmers under intensified Agriculture; there is probability of utilizing improved technologies if there is an increase in farm size.

### Possession of ICT facilities by the respondents

The facilities under study include radio, television, telephone sets and computers. Table 7 shows the distribution of the respondent according to ownership of ICT facilities. The result in (Table 8) reveals that majority of the farmers (56.02%) possessed radio sets, followed by those who had television set (12.05%), while those who possessed telephone sets constituted (25.00%), of the respondents, while (6.2%) of the respondents owned personal computers and can browse information through the internet. It is clear that owners of radio set were more

than those of other ICT components. This is because it is relatively cheaper.

### Type of ICT utilize to source information by the small-scale farmers in the study area

ICT (information and communication technology) is an umbrella term that includes any communication device or application, encompassing; radio, television, cellular phones, computer and network hardware and software, satellite systems and so on as well as the various services and application associated with ICT are often spoken of in a particular context, such as ICT in education, agriculture, health care etc. Table 8 shows the ICT component used by maize farmers as source of information on maize farming in the study area. The result shows that 62.05% obtained information on farming through radio, 6.02% got theirs through television, 25.00% through GSM while 6.02% got their information on farming through internet. From this result, radio constitutes the most important source of information to the respondent. This could be because they are the cheapest means of sourcing information and it does not require much effort to get information from this source. GSM and Internet were the least source of information used by the respondents respectively. This may be attributed to high cost of internet facilities and GSM as majority of the small scale farmers in the study area are subsistence farmers and non literate in the formal sense as internet requires certain level of literacy on how to operate and access information.

**Table 7:** Distribution of respondent's according to possession of ICT facilities.

Facilities	Frequency	Percentage
Radio set	45	56.02
Television	10	12.05
Telephone (GSM)	20	25.00
Internet/Computer	5	6.02
Total	80	100

Source: Field survey, 2018.

**Table 8:** Distribution of respondent's according to type of ICTs used to source information.

ICTs	Frequency	percentage
Radio	50	62.5
Television	5	6.2
GSM	20	25.0
Internet	5	6.2
Total	80	100

Source: Field survey, 2018.

**ICT messages (Technology) Utilized by the respondents**

Utilization of innovation refers to the decision to apply an innovation and to continue to use it. Recent information on utilization studies in Europe (Charmala and Hossain, 2015), Asia (Sharma and Pradhed, 2014) and Africa (Abdelmajid and Hassan, 2013) have identified farm and technology specific factors, institutional factors, policy variables and environmental factors to explain the pattern and intensity of adoption. Rao and Rao, (2015) found a positive and significant association between socio-economic characteristic (age, farming experience, training received), cropping intensity, aspiration, economic motivation, innovativeness, information sources, extension agent credibility and adoption. Table 9 shows the distribution of respondents according to ICT utilized. Land preparation (8.09%), seed variety (25.05%), planting date (8.07%), plant spacing (7.05%), fertilizer application (19.01%), herbicides application (9.05%), pesticides application (12.03%) and modern storage (8.01%). Rogers, (2003) found in his study that diffusion corresponds to utilization and assimilation of information. Utilization aims at putting knowledge to work. For farmers to utilize a new agricultural technology they must be aware of the technology, have valid and up-to-date information on the technology, the applicability of the technology to their farming system and receive technical assistance necessary to adopt the technology.

**The Effects of ICT Utilization on crop production**

To ascertain the effect of information and communication utilization among respondents in the study area,

Regression model was employed. The estimate of the regression model is presented in (Table 10). The coefficient of age was found to be significant at  $P \leq 0.01$  level of probability and relates positively with information and communication technology utilization (Table 10). This finding is in contradiction with a prior expectation which age was expected to have a negative relationship. The finding is in line with Ofuoku *et al.*, (2006) who found that age is related to information utilization because the stage of life of maize farmers affects their attitude towards information usage. The older the farmer, the more likely they are willing to put farming related information to use. This finding does not agree with Lemchi *et al.* (2013); Asiabaka *et al.* (2010). Table 10 shows that gender of the respondents was a very important factor that influence ICTs utilization in the study area. The value at  $P \leq 0.01$  level of probability indicates positive and significant relationship between gender of respondents and ICTs utilization in this study also agrees with an earlier study (Onu, 2006) that gender plays significant role in having access to ICTs and hence utilization of innovation. Result in Table 12 also reveals a positive and significant relationship between level of education and ICTs utilization in the study area. The value was significant at  $P \leq 0.01$  level of probability level of probability. The positive and significant relationship between level of education and ICTs utilization also agrees with earlier studies (Ofuoku *et al.*, 2006) that level of education of maize farmers has significant relationship with information utilization by them, because educational level influences information utilization. The higher the level of education of the maize farmer, the more they are willing to use information provided by the ICTs facility. Eze *et al.* (2006) also discovered in their work that the level of formal education correlated positively with

**Table 9:** Distribution of respondent's according to crop production Technology Utilized due to ICT messages.

Technology practice	Frequency*	Percentage
Land preparation	32	8.9
Seed variety	91	25.5
Planting date	31	8.7
Plant spacing	27	7.5
Fertilizer application	68	19.1
Herbicide application	34	9.5
Pesticide application	44	12.3
Modern storage	29	8.1

Source: Field survey, 2018

\*Multiple responses

**Table 10:** Multiple Regression Analysis on the effects of Utilization of ICT by the small-scale farmers.

Variables	Estimate coefficient	P-value
(Constant)	0.881	.000***
Age	0.028	.000***
Gender	0.619	.004***
Marital status	0.120	.022**
Household size	0.001	.975
Level of education	0.046	.001***
Farm size	0.328	.003***
Farm income	2.787E-7	.155
Possession of ICTs	0.412	.001***
R <sup>2</sup>		0.84

Source: Regression extract, 2018.

\*\*\* Significant at 1%

\*\* Significant at 5%

utilization of cassava production technology innovation. This situation is equally true of the study area. Table 10 also shows positive and significant relationship between farm size and ICTs utilization. The regression coefficient was positive and significant at  $P \leq 0.01$  level of probability. Farm size has bearing on the capacity of farmers to utilize ICTs and new farm practice. Farmers with large farm size can afford to devote part of their farms to try innovations from the information they received without significantly affecting their total land area. This finding is in agreement with the finding of Onu, (2006) reported that farm size significantly influences farmers ICTs utilization. Farm size is an indication of the level of economic resources available to farmers under intensified agriculture. The coefficient of income was found to be positive however, not statistically significant (Table 10). The positive sign implies that utilization of ICTs increases with increase in income. The non significance of the income variable may be explained by the fact that as income increases; farmers tend to diversify into other income generating activities. This is especially true when farming is on subsistence level. This may be corroborated by the findings of this study were most (57.5%) of the farmers have farm size between 1-2 hectares of land. Result in Table 10 revealed that

possession of ICTs (Radio ownership) had a positive and significant influence on the utilization of information by respondents at  $P \leq 0.01$  level of probability. Radio is one of the sources of information dissemination.

## Conclusion

From the findings of the research work, it was concluded that utilization of information and communication technology by small-scale farmers in the study area was mostly conventional, since majority of them depend on radio for their information need. Based on the assessment of the technology utilization of the respondents in the study area, prompt and optimum utilization of information and communication technology can influence the performance of the respondent in the study area. Thus, utilization of information and communication technology by farmers will lead to increase in agricultural technology in the study area.

## Recommendations

Based on the findings of this study, it is pertinent to make some recommendations. The recommendation made will

assist the farmers towards improvement in their skills and knowledge for the development of Agriculture. The following recommendations are proffered:

- (i) Government should provide credits facilities to the real practicing rural farmers and not pseudo farmers whose interest is not in Agricultural production.
- (ii) Government policies of liberalization and deregulation of the economy should incorporate ICTs infrastructure, so that the prices of ICT facilities like the television, telephone sets, computers and other accessories will be affordable.
- (iii) Farmers should be encouraged to organize themselves into cooperative societies and social groups. This will help in providing the farmers with information, improving their capacity for group bargain and general improvement of their living standard.
- (iv) Farmers should be given more easy access to credits. In light of this, there is need to link farmers to sources of credits given its importance in the utilization of improved agricultural technology. Credit is very important in encouraging farmers to utilize improved technology. Farmers can be linked to credit through establishing financial institutions such as the micro finance banks in the rural areas.

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