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The influence of Information and Communication Technology (ICT) on the dissemination of agricultural information among urban farmers in the Northern Guinea Savannah Zone of Nigeria

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ABSTRACT: Information is a key resource for agriculture and rural development. Communication of information is a major function of extension aimed at the promotion of Agricultural development. This study is aimed at determining the influence of information communication technologies in dissemination of information to urban farmers in Maiduguri Metropolitan Council (MMC) of Borno State, Nigeria. Primary data for the study was obtained by administering questionnaire to the farmers through random sample of 60 respondents and 10 extension agents from 6 out of 15 wards of the MMC. Secondary data were obtained from published documents and records. The result revealed that radio was the major medium mostly used with a high percentage of (38%) and preferred by most of the respondents (23%). The problems associated with the use of ICT include inadequate agricultural information (11.6%), time of presenting such Programmes (10%), erratic power supply (41.6%) and lack of access to the use of ICT (6.6%). The chi-square (X^2) result obtained at 0.05 level between farmers use of ICT and age (Cal $x^2 = 6.46$), Tab $X^2 = 5.99$) and educational level cal $X^2 = 42.06$, Tab $X^2 = 16.919$) as well as membership of cooperative association cal $X^2 - cal X^2 - 15.93$, Tab $X^2 = 11.070$). Based on the results, study recommended that; relevant information on both TV and Radio to provide vital and update agricultural information and time of broad cast should be in the evening to coincide with farmers leisure time and allow morning period for their major economic activities.

Keywords: Agricultural extension; Information dissemination; Information Communication Technology (ICT).

Introduction

The objective of Agricultural extension in developing countries including Nigeria is to improve the productivity and livelihoods of rural farmer and their families. The important task of extension is the exchange and sharing of information knowledge and skills.

Extension therefore is essentially a communication process whereby various participants are linked exchange information and is a critical requirement for sustainable development. The paradigm shift in participation and sustainability coupled with revolution in the information and communication, technologies has provided opportunities for extension and rural communities to move into the information age. Arokoyo, (2003).

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The very weak linkage in the Research Extension farmer Input Linkage System (REFILS) in Nigeria as in most developing countries has been a major limiting factor to increase food productivity and sustainable development. Extensive review of literature on Agricultural development by Ojiambo (1995) and Kaniki (1995) showed that there is a direct relationship between research and the utilization of research findings (Kiplangat2003).

Thus, a strong linkage complimented by flawless information flow enhanced by the effective use of information and communication technologies (ICTS); by the extension service will significantly boost agricultural production and improve rural live hoods in Nigeria. There improve rural live hoods in Nigeria. There has been a noticeable trends in the use of ICTS in almost all spheres, of rural life in developing countries in. the recent past despite persisting problems of access, connecting, literacy content and costs. Information is one the basic human needs after air, water, food and shelter. Meera (2002).

Meera (2002) invariably see it as one of the basic necessities of life. Information creates negative entropy i.e. energy to act in the individual. It is thus recognized capacity of information to facilitate and individual group or contours that makes it so vital in the development process. Agricultural information can be said to published or unpublished knowledge or all aspect of agricultural (Aina 1990) and is usually generated through various means. According to Aina (1995) this means include the various Agricultural Research institutes, University of connectional universities, Government registration, Agro - based industries and institution.

It is important that the generated information from these different sources reaches the intended users and ultimately meet their need for study information; it should be noted that the agricultural information users are different from one to another based on their need, and requirements. Aina (1991) opined that each agricultural information users usually have specific information need based on their peculiarity. Some farmers' information needs such as source of credit facilities, issues on land ownership and marketing of agricultural produce are quite different from those of major pests and diseases, proper handling of insecticides and best cropping methods Aina 1991, Kankiki 1989).

Statement of the Problem

The dissemination of agricultural information is very crucial to agricultural productivity of farmers because it's only through this means that they can learn innovations which can improve their productivity. Namaseb (1999) in corroborating this assertion noted that the message (Agric Information) passed by the media cause enhance agricultural productivity of farmers when they have access to it but in disseminating, this information, it is imperative that the specific information needs of the large audience are taken into consideration so as to ensure that their needs and aspirations are met. The need for relevant and current information by the farmer on new agricultural practices is a vital issue that needs to be considered by every nation especially developing country like Nigeria.

It is however important to note therefore the huge responsibility of the extension service and major problems encountered during the course of their activities.

These include staff training, available number of staff, transportation problems related to mass media such as timely feed back, illiteracy and high cost of capital and time that is usually associated with the extension teaching method.

Urban agriculture refers to the growing of plants and the raising of animals within and around cities. It has a relationship with the use of ICTS in the dissemination of information because urban agriculture is embedded in and interests with the urban ecosystem. Such linkages include the use of urban resident as laborers; use of typical urban resources like organic waste as compost and urban waste water for irrigation. Urban agriculture is crucial with growing of crops and raising of life stock in urban area like Maiduguri; urban dwellers with more proximity to communication, infrastructure have more access to ICTS. In this respect, the use of ICT as a tool in Agricultural information Delivery in the areas needs to be studies.

Objective of the Study

The general objective of the study is to determine the influence of farmers exposure to the use of ICTS in dissemination of information to urban farmers in Maiduguri Metropolitan Council of Borno State.

The specific objectives included the following.

- (i) Examine socio- economic characteristic of the urban farmers.
- (ii) Examine farmers' exposure to different information and communication technologies.
- (iii) Identify ICTS channels preferred by the urban farmers.
- (iv) Determine the relationship between socio- economic characters of farmers and uses of ICTS as source of information,
- (v) Identify problems associated with use of ICTS among the respondents.

Conceptual Framework

Concept of Information and Communication Technologies (ICTS).

Information and communication technologies (ICTS) can facilitate communication and the processing and transition of information by electronic means. This definition encompasses the full range of ICTS from radio and Television to telephone (fixed and mobile). Computers and the internet (CT 2003). Heek (1999) define ICTS as electronic device for capturing processing storing and communicating information.

Information Communication and Technology Tools in Information Dissemination

With respect to ICTS use, the interest of extension is communication for development as an innovative way of reaching and interacting with people more effectively where ever they may be (FAO, 1998) and ICTS becomes handy tools that have great potential for use in agricultural information dissemination. The range of ICT tools include.

i. Radio, ii. Television, iii. Telephone (fixed or mobile), iv. Short message services v. The web, vi. Cameras, vii. Video, viii. E-mail, ix. Computer x. Contact Data Base and system, xi. CD- ROM, xii. DVD. Reward less of the tool. The focus must be on people who will use the technologies and the content rather the technologies themselves.

Often not included as part of the regular ICTS but are nevertheless, information and communication technologies in themselves are:

- i. Printed materials
- ii. Photographs.

Use of ICTS in Agricultural Extension

Experience has shown that for most developing countries extension agents have used all sorts of traditional information communication technologies including radio, drama, and video/TVs. Presently, both the extension service and the service providers and their clients are experimenting with new digital opportunities that can be effectively used to exchange process, manage and communicate information and knowledge. The digital camera with video capabilities is becoming very popular because a picture is worth a thousand words and will enable even those constrained by literacy to communicate Markus (2002).

Most FM radios have scored high in popularity and listenership because of their special and focus in broad casting to local audience in local languages. Access to radio is extensive compared to any other ICT for person living in the rural areas possessing radio (Arokoyo, 2003).The 6th consultative expert meeting of CTAs observatory on ICTs (CTA, 2003) listed the following as a potential ICT application in extension: i. Enhance farmers ability to collate demanding, ii. Collaborative leaning, iii. Exchange of time sensitive information e.g. market rise, disease outbreaks etc, iv. Make extension system and structures, v. Exploring alternative production technologies, vi. Facilitating multi state holder brain storming, vii. Training and demonstration, viii. Community learning, ix. Early warning for disaster etc and weather fore cast.

Impact of ICTS in Agricultural Information Dissemination.

According to observation on ICTs (CTA, 2003 (if adopted and properly applied ICTs have the potential to transform agricultural extension in developing countries. Their impact could include:

- i. Farmers more intelligent and more varied ICT users,
- ii. Some farmers connect directly by passage extension works,
- iii. Extension re-directed towards those who pay for information,
- iv. ICTs will become every day tools, of extension workers,
- v. Jobs and role of extension workers changer become constants,
- vi. Extension workers need new skills,
- vii. Feed back between extension and cheated will improve.

Review of Use of ICTS in Urban Agriculture

Urban agriculture can be defined as the growing of plants and the raising of animals within and around cities (Kemsel, 2003). According to IDRC (1998), the rapid urbanization that is taking place goes together with a rapid increase in urban poverty and urban food security. By 2020 the developing countries of Africa Asia and Latin America will be, home to some 75% of all urban dweller, and to eight of the anticipated nine mega- cities with population in excess of 20 miles. It is expected that by 2020, 85% of the poor in Latin American, and about 40- 45% of the poor in Africa and Asia will be concentrated in towns and cities. International agricultural research centers also added that most cities in developing countries have to face difficulties to cope with this development as they are unable to create sufficient formal employment opportunities for the poor. They also have increasing problem with the disposal of urban waster and waste water and maintaining air and river water quality. Urban Agriculture provide a complementary strategy to reduce urban poverty and food security since the cost of supply and distributing food to urban area as and do not satisfy the demand, especially of the poorer sectors of the population. Next to food security, urban agriculture contributes to local economic development, poverty alleviation and social inclusion of the urban wastes. The importance of ICTS Use in urban agriculture is increasingly being recognized by international organization like FAO World Food and Agricultural centers. (FAO, 2004).

Problems Associated with Agricultural Information Dissemination with the Use of ICTS.

- i. The low level of ICT readiness of not only the research and extension organization but indeed of the developing countries themselves. Mostly developing countries have one out of every good Africans outside south African has access to the internet compared to one in 38 in the rest of the World (Mundy & Sultan, 1999).
- ii. High level rural poverty
- iii. High level illiteracy of farmers and computer illiteracy among researchers, and extension.

ICT Facilities in the MMC

The ICTs facilities found in the posters the television, radio news papers,-pamphlets, and telephones etc. A study by Manu, (2002) high lighted some of the ICTs used in Nigeria and Maiduguri Metropolitan Council to data, is the radio and TV that have been the major ICTS used in agricultural extension delivery in the study area.

Television on the other hand has the element of newness a sense of involvement in presentation. Richard (1991) said television brings intimacy, it can keep create a one- to- one line of communication, complex concept are demonstrated through visual means, Television move ideas, people and resources from place to place.

According to Manu (2002), radio is the most important ICT currently used for extension delivery and to a lesser extent, TV and Video both broadcast in English and the local language (Kanuri, Marghi, Bura & Hausa).

The Borno Radio Broadcasting Corporation (BRTV/BBC) distribute and show agricultural video Programmes at the village market centers where TV sets and video machines have been installed for public viewing.

According to Kiplang (2003), the impact of ICTs use in extension delivery remains minimal as confirmed by a recent study to determine the diffusion of ICTS in communication of agricultural information among researchers and extension workers. Internal services are also use.

Materials and Methods

The study area is Maiduguri metropolitan council (MMC) of Borno State Nigeria. It is located in the Sudan Sahel zone of Northern Nigeria and situated within latitude 11.30 -14-5E⁰ and longitude 10- 13 .45° of the equator. Maiduguri metropolitan council share boundaries with Kondiga local government area to the North and Northwest and Jere local government area to the south.

Maiduguri is hot and dry for most part of the year. Annual rainfall ranges from 500 - 600mm which last for three months from June -September. The mean temperature of Maiduguri is between 35 37 vegetation mainly grasses with few drought resistant trees such as Acasia Boaba tree and Nime trees. The people of the state are predominantly farmers, herdsman and fishermen.. Agriculture remains the main stay of the state economy. The state has vast agricultural and livestock development potentials. It is one of the largest centers in West Africa producing major agricultural products like sorghum, millet, maize groundnut, cotton, fruit, vegetable, fish, hide and skin as well as gum Arabic, Borno State dairy (2006). The state capital, Maiduguri is largely comprised with Fulani / Hausa, Shuwa- Arab, Marghi Buka, Kanuri, Gwoza and many immigrants settler from within and outside Nigeria.

Besides, the food crops produced in an around the state capital, fishing activity is predominant in the pre- urban area of Alum. It is in recognition of the federal government in 1973, established the Chad Basin and Rural Development Authority (CBDA), Lake Chad Research Institute in 1976 and consequently Borno State Agricultural Development Programme (BOSADP) with a view to bring about development and sustainability of the state agricultural sector.

Sampling Procedure

The target population of the study is the urban farmers of the Maiduguri Metropolis. The sample frame was drawn from the record provided by the MMC agricultural department and BOSAP headquarters. A sample of 60 urban farmers were randomly selected and interviewed. Six wards was selected randomly from the existing 15 wards in the MMC from each ward 10 farmers were selected by random sampling technique.

Method of Data Collection

Primary and secondary source of data was used for the study. The primary data was obtained through interview with respondent using questionnaires verbal interview with extension agents, officials of agricultural department of the MMC and media house were also collected.

Secondary sources of data used for the study includes official documents from the library, seminar papers, internet and publications by the Borno State Agricultural Development Programmes (BOSADP).

Data Analysis

Descriptive statistic such as means, percentages and frequency table was used for data analysis while chi-square and rank correlation analysis was employed for determining the relationship that exist between selected variables of the study.

Formula for rank correction coefficient

$$r^2 = \frac{1- 6\sum d^2}{N (N^2 -1)} \text{-----equation 1}$$

Where r^2 = Correlation coefficient

d^2 = square of deviation

N = No of problems ranked or observed.

Data Analysis and discussion

The analysis superficially focuses on the socio- economic characteristic of the farmers such as Age, Gender, Education, length of time in farming business and membership of organization.

Also presented are the chi- square analysis to determine the socio-economic variables and farmers' relationship between rankings of constrain to use of ICTS by the urban farmers and extension agents.

Table 1 shows that majority of the respondents are matured farmers .fall within the age range of 26-30 years with a frequency of 23%, those within above 30 years had a total of 40%, 20-25 years had 25% and the frequency distribution indicates that there is high level of labour force supplied to the agricultural sector, hence, high agricultural productivity should be expected.

Table 1. Socio- economic distribution of the respondents.

Variable	Frequency	Percentage (%)
Age		
20-25 years	15	25
26- 30 years	23	*38
Above 30 years	22	40
Total	60	100
Gender		
Male	38	63
Female	22	36
Total	60	100
Education		
Non-formal education	13	21
Primary education	19	31
Post primary	15	25
Quaranic education	2	3
Total	60	100
Length of Experience		
Less than 5 years	18	30
5 -10 years	19	31
Above 10 years	23	38
Total	60	100
Membership to organization		
Co-operative society	20	33
Young farmers club	6	10
Social development association	15	25
Better life Programmes	10	16
Total	60	100
Primary occupation		
Fishing	8	13
Live-stock	10	16
Crop production	10	16
Poultry production	14	23
Mixed farming	17	28
Total	60	100

Source: field survey data 2009

The gender distribution table indicated that out of the 60 respondents 63% were men while 36% were women. This shows that in the study area, most agricultural activities are undertaken by men. The educational levels of the farmers generally indicate high exposure to western education by the respondent.

It can also be said that the farmers will have more interest in obtaining agricultural information which will improve their farming practice because of their exposure to education.

Moreover, there is high level of years spent in farming business. This means majority of the farmers have acquired farming experience due to high duration of time spent in the farming. All this stage, it is expected that the respondents has less difficulties due to familiarly with different process and problems accounted in farming activities.

Frequency distribution of membership to organization shows that up to 33% of the respondents belongs to cooperative society, social development association has 25% young farmers club has 10% better life Programmes has 16% and 15% belongs to other association, we can say that majority of activities such as cooperative societies and social development association, hence they should have better chance of improving their practice through thrift and community development.

Finally, variables from primary occupations revealed that almost all the respondents had Agricultural activities to be expected. Another major occupation was poultry production 23% 13% of them are into fishing with only 1% other occupation. Majority of the farmers obtained their information from extension agents with 31%. Demonstration had 25%, meeting had 23%.

It has also been observed that ICTs plays a vital role in disseminating information to a large population of farmers within the community. Extension agents have great influence towards providing relevant information. Demonstration and meeting covered important techniques of extension method.

Table 2. Access to ICTs by urban farmers

Extension method	Frequency	percentage%
Television	20	33
Radio	23	38
GSM	10	16
Computer/Internet	7	11
Total	60	100

Source: field survey data, 2009.

The table indicated that 33% of the respondents had access to television, 33% used radio, 16% GSM and computer/ internet had 11%. It is clear that radio is highly used as source of information among farmers due to the ability get hold of the listeners attention even without picture, Shettima, (1990) radio is also portably, easily operated and can be handled by anybody even uneducated person. Responding to question in the ICTS medium frequency used by the respondents, about 38% of them indicated radio and went on further to explain that radio were relating cheap, available and understandable than means of communication.

Table 3. ICT facilities used

ICT Facilities	Frequency	Percentage %
Viewing centres	16	26
Internet/Computer	12	20
Radio listening group	26	43
Other	6	10
Total	60	100

Source field survey data 2009.

The table shows ICT facilities within the area revealed that radio listening group had the highest frequency and percentage of 43% viewing centre had 26% which is also high, hence internet had 20%, other having no significant impact on that area.

Table 4 Contact with Extension agents

Contact with extension agent	Frequency	Percentage%
Regularly	10	16
Seldom	21	35
Not regularly	29	48
Total	60	100

Source: field survey data, 2009

The table shows that out of 60 respondents 16% seldom and 48% not regularly which is very poor.

Channels Preferred By Farmers

Table 5. Frequency Distribution of Urban farmers by communication channels preferred.

Respondents ICTs	Frequency	percentage%
Most effective radio	35	58
Effective Television	20	33
Least effective internet	5	8
Total	60	100

Source: field survey data, 2009

The table revealed that Radio came up high as the most effective ICT use with 58%) television had 33% only internet were the least rated with only 8% this is a clear indication of how Radio is so important in information indicated Radio as the urban farmers. Respondents indicated Radio as the most useful, stating Radio as highly portable, available and understandable.

Problems Associated with the Use of Different ICT Channels by Urban Farmers .

Table 6 Ranking by farmers and Extension workers problems

Preambles	Ranking of farmers	Ranking by extension	d	d ²
Electric power supply	2.8	3.6	-0.8	0.64
Inadequate information	2.29	4.4	-1.45	2.10
important Agricultural Programmes	3.1	3.3	-0.2	0.04
Broadcast at Odd Hours				
Do not know how to use	2.38	3.0	-0.62	0.38
Lack of access to ICT	1.75	2.4	-0.65	0.42
Extension organization			0	
Make no provision	3.4	3.7	-0.3	.09 :
Radio batteries expensive	3.4	3.7	-0.4	0.4
				∑d ² = 4

Source: Field survey data 2009.

$r^2 = 1 - \frac{6\sum d^2}{N(N^2-1)}$ Calculating correlation coefficient using-----equation 1 for methodology.

$$1 - \frac{6 \times 4}{7(49.1)} = \frac{1-24}{7 \times 48}$$

$$\frac{1 - 24}{336}$$

$$= 7.14 \times 10^{-2}$$

$$= 0.0714$$

$$= 1 - 0.0714$$

$$= \mathbf{0.93}$$

The result shows that (Table 6) there is high association between the farmers and the extension agents. The correlation coefficient is positive and indicating a strong relationship between the farmers and extension agents perception of problems associated with the use of ICTS.

Chi - Square Analysis of Selected Variables

According to the (Table 7), χ^2 cal is greater i.e. $\chi^2 > \chi^2$ tab, which shows a rejection of the hypothesis, the ages of the farmers have influence on the use of ICTs. Calculated chi- square (χ^2 cal) = 42.06 and Tabulated (χ^2 tab) = 16.919. The result obtained showed no significant relationship between educational level of farmer and access to ICT, because the tabulated chi square is less than the calculated. Measuring the educational level of farmers (Table 8) has nothing to do with the use of ICT information dissemination. Calculated chi- square (χ^2 cal) = 9.15 and Tabulated (χ^2 tab) = 16.919.

Chi- square analysis indicates no significant relationship between membership participation of farmers and the use of ICTs, (Table 8) this is because the computed value of χ^2 cal which is 9.15 is less than the tabulated value. Calculated chi- square (χ^2 cal) = 15.93 and Tabulated (χ^2 tab) = 11.070

The major conclusion deducted study indicated a high percentage of Agricultural activity within the community which was aided through important information obtained from the ICTs source and high level of education among the farmers.

Table 7 Summary of chi- square Result of the selected variables. Against the use and non-use of ICT.

Selected variable	Cal χ^2	Tab χ^2	DF	Remark
Age of respondents	6.46	5.991	2	*
Educational level	42.06	16.919	9	NS
Membership	9.15	16.919	9	NS
Length of experience	15.93	11.070	5	NS
Gender	40.22	3.841	1	NS
				NS

* = Significance ($P \leq 0.05$), NS = Not significant at ($P \leq 0.05$), DF = Degree of freedom, χ^2 = Chi- square.

Conclusion

The study provided a major in-sight on Radio and Television and the fundamental role it play in dissemination of vital information. The study also showed a high possibility of affecting positive change in the life and activities of the fanners when additional input and effort are provided to the extension method of communication in order to create a multi-dimensional approach that will adequately suit farmers local situation and conditions.

Recommendation

Based on the findings, the following recommendations are made. Presenting and broadcasting relevant information programme on both Television and Radio to provide vital and update agricultural information farmers.

Time of broadcast should be in the evening to coincide with farmer's leisure time and allow morning period for their major economic activities; the broad cast should be conveyed in the local languages.

Government should provide adequate power supply and prevent power fluctuation. Provision of adequate facilities and training for extension personnel to create an avenue for successful execution of programmes for farmers; more research on information communication that will suit the farmers' local environment should also be created.

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