An Assessment of the Engagement of Information and Communication Technologies in the Dissemination of Agricultural Information in Plateau State

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Abstract

The study was an assessment of the engagement of information and communication technologies in the dissemination of agricultural information in Plateau State. It adopted the survey research design, using quota, purposive and systematic sampling techniques. Questionnaire was administered on 373 respondents alongside oral interview for the collection of primary data. Data collected were analyzed using simple percentages while Chi square test of independence was used to test the hypotheses. The study was anchored on the diffusion of innovations and supported by the uses and gratifications theory. Findings revealed that ICTs have been employed in farmers training at the centre and farmers are open to the new innovations. Further findings showed that ICTs have impacted positively on farmers' knowledge and practice of agriculture. The study concludes that the use of information and communications technologies has improved agricultural productivity through effective agricultural communication for farmers and extension workers as well. The study therefore recommends among other things that, though the internet does not serve as the primary source of agricultural news stories for both farmers and extension workers, their training should incorporate instructions on how effectively to utilize information and communication technologies especially the internet in sourcing agricultural information.

New Words: ICT, New media, agricultural communication, extension workers, social media.

Background to the Study

Information and communication technologies have emerged as an important sphere of the day-to-day experience in modern day societies because of their ability to reach out to large audience within the shortest possible time and also elicit instant feedbacks and reactions thereby bringing about interactivity between senders and receivers of a message who may be millions of miles away from each other.

ICT as a broad term emerged in the latter part of the 20th century and they refer to on-demand access to content anytime, anywhere, on any digital device, as well as interactive user feedback, creative participation and community formation around the media content (Manovich, 2003:17).

ICTs offer various useful tools for communication, among which include: electronic mail, global system for mobile communications, the World Wide Web, newsgroups, remote access, file transfer, text-based and voice-based chat (Lister, dovey, Giddings, Grant & Kelly, 2003:12). These options have greatly improved access to agricultural information as agricultural researchers and farmers alike can source information relating to their problem online. Effective agricultural development require access to information on all aspects of

agricultural production, processing, marketing and icts are already showing the potential to play an important role in the delivery of this information to this sector (May, Karugia & Ndokweni, 2007).

ICTs such as the internet with its affordance like the e-mail system have become one of the most important communication technology in the world because it connects so many people worldwide bringing about interconnectivity between people who are far away from each other (Lister et al, 2003:13). This has made it possible for the receiver to access agricultural information from the web and also respond to the sources of the agricultural message through e-mails. There are agricultural science databases on the internet, such as Access to Global Online Research in Agriculture (AGORA), Agricultural Online Access (AGRICOLA), and Agricultural Information System (AGRIS), that provide current research information for agricultural scientists across the globe. Furthermore, the facilities offered by the Internet like; www, e-mail and the file transfer protocol could be explored by agricultural scientists and researcher to improve their research and publish their research findings online (Alhassan & Afolabi, 2012:2-3).

Information communication technologies have brought about great improvement in agricultural development in Nigeria. Giving credence to this, Adebayo and Adesope (2007:86) assert that the use of new media in the mainstream of Nigeria agricultural system have surely brought great improvement in the dissemination, utilization and application of scientific agricultural information for purposeful development of the system. 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 all over the world. ICTs have aided meaningful societal transformation in agriculture related development. This transformation is a function of reliable agricultural research network. A network in this context entails a group of individual or institutions linked with commitment to collaborate in solving a common agricultural problem(s) and to use existing resource more effectively. This network is enhanced through new media options which provide scientists, administrators and information personnel with rapid and reliable information while increasing productivity and decreasing communication costs by reducing

the physical means of communication channels (Kerrigan, Lindsey & Novak, 1994) in (Adebayo & Adesope, 2007).

Statement of Research Problem

The interactivity of information and communication technologies have upgraded the availability of agricultural information as a study by the American Farm Bereau Federation Survey of Young Farmers and Ranchers in 2009 found that 46% of young (aged 18-35) farmers and ranchers who use computers regularly interact in some form of social media. These producers used Twitter, a social networking site, to share news from around the farm (Hoffman, 2009). By this, farmers were thus brought in contact arrays of related agricultural information which have improved their productivity and level of living. The availability and accessibility of ICT is important to agriculture development. Consequently, agricultural scientist and farmers alike must have easy and unlimited access to new media options. Salau and Saigbe (2008) studied 3 tertiary institutions and the Agricultural Development Programme (ADP) in Nassarawa State in 2006 to determine the accessibility and the level of utilization of new media options by agricultural scientists and extension workers. The findings revealed that agricultural researchers had 87% access to new media options while extension workers had 66%. On the level of utilization, agricultural researchers had 84% while extension workers had 70.3%. These percentages affirm that the use of new media in agricultural communication is viable.

Against this backdrop, this study aims at bridging the research gap through an empirical investigation of the key dimensions to how ICTs have been used in agricultural communications in Plateau State in particular references to Agricultural Service Training Centre Kassa/Vom and the challenges encountered by agricultural scientists and farmers alike in using new media to access agricultural information.

Objectives of the Study

The aim of the study is to:

1. Find out the various forms of ICTs available to agricultural communicators and farmers at Agricultural Services and Training Centre (ASTC).

2. Evaluate the use of ICTs in agricultural services and training of farmers at Agricultural Services and Training Centre (ASTC).
3. Ascertain the effects of the use of ICTSS on farmers' knowledge and practice of agriculture.
4. Identify the factors militating against the use of ICTs in agricultural communication and proffer solutions.

Review of Related Literature

This section reviews related literature to new media and agricultural communication. A number of studies have shown the advantages of ICTS over traditional media of communication in disseminating agricultural information. This section is divided under the following sub-headings: new media and traditional media, agricultural communication in Nigeria, and new media in agricultural communication.

The development of ICT such as the Internet and the World Wide Web has brought about a level of interaction between people around the world. This process is often surrounded and enveloped by exciting events which go far beyond the new medium itself.

Something to note about ICT is that they are not completely new. They have in many instances been growing out of traditional media over time, so that there is a need for historical perspective in the discussion of new media. Marvin (1988) in Leckenby and Collier (2003:4) observes that new technology is a historically relative term. We are not the first generation to wonder at the rapid and extraordinary shifts in the dimensions of the world and the human relationships it contains as a result of new forms of communication.

Historical linkages between new and traditional media have been consciously attempted by some researchers. Leonhirth, Mindich, and Straumanis (1997) compared the mailing list with the telegraph, the round table and the bonfire. Murray (1997) in Leckenby and Collier (2003:5) Indicated that when a medium is in an early stage of development, it is still depending on formats derived from earlier technologies instead of exploiting its own extensive power. Thus, the internet is still in its early stages. McMillan (2001) as cited in Leckenby and Collier (2005:5) privides an excellent overview of the new and traditional media question. She notes that many observers tend to write about new media such as

networked computing and telecommunications as if they had been recently discovered in their fully developed state. This goes to show that it has developed to its current status over time. Williams, Strover, and Grant (1994:467) defined new media as those which offered new services or enhancement to old services and included such applications as microelectronics, computers and telecommunications..

As noted earlier, interactivity has often been construed to be the primary differentiating factor between the internet and other media particularly traditional media. Television is time-constrained, unless the viewer has carefully videotaped the commercials for playback at a more convenient time. But accessing the World Wide Web can be done at any time (Stern, 1995:12). Interaction also indicates that users can get information instead of tis being given to them. Williams (1998) in Leckenby and Collier (2003:6) noted, in addition to interactivity, demassification and asynchronistic as factors critical to new media.

According to Rice and Williams (1984) in Leckenby and Collier (2003:6), new media tend to form a link between mass media and interpersonal media to a greater extent than did their forerunners. Cathcart and Gumpert (1983) in Leckenby and Collier (2003:6) indicated that new technologies facilitate mediated interpersonal communication. Radio is but one example of the great spike which I\CTs inject into the world both causing and caused by great events in history. It is this composite of historical events, not just the advent of the new medium and its technical wonders, which make new media such an important and noteworthy point of immense interest..

It is worthwhile to note that traditional media typically do not disappear over time. They may become less important or changed but usually do not disappear from the scene. Like the Internet, Traditional media such as television and radio are also devices for wireless communication; however, these are only one-way communication. Interactivity is one of the most important features of the wireless communication now possible via the Internet. When it comes to the media these days, such interactivity is the most frequently discussed issue, and this is a multidimensional concept. The first conceptualization of interactivity comes from an interpersonal communication perspective (Ha & James, 1998:45). Here, interactivity is defined as the facility for individuals and organizations to communicate directly with one another, regardless of distance or time.

The second conceptualization of interactivity comes from a mechanical perspective (Ha & James, 1998:459). This is the approach viewing interactivity as a given technological characteristic of a medium. Steuer (1992:75) defines interactivity as the extent to which users can participate in modifying the form and content of a mediated environment in real time, and he classifieds a variety of media, based on three interactivity levels (high/medium/low). Additionally, he focuses on the functioning of three elements in interactivity: the speed with which content can be manipulated; the range of ways in which content can be manipulated; and mapping.

.In the online environment, users have control over their entire communication experiences; they initiate, sustain, and terminate communication with commercial websites whenever they deem necessary. As traditional and ITs duke it out for the leadership role, Mainwaring (2009) highlights some undeniable benefits of social media a subsidiary of new media over traditional media in getting consumers attention for products and services which include; Cost, Intimacy, Targeting, Nimbleness, Measurement, Newness, Exponential, participatory, Proximity, and Future.

Goodwin, Chiarelli and Irani (2011) did a study titled *"Is Perception Reality? Improving Agricultural Messages by Discovering How Consumers Perceive Messages"* to assess how consumers interpret agricultural messages. Using focus group research methodology, the study assessed how consumers interpret agricultural messages typically found on commodity organizations' websites in Florida. Four focus groups were held in the fall of 2010. Results indicate that the participants found most of the messages to be unfavorable, rather than favorable.

Theoretical Framework

The study is anchored on diffusion of innovation and uses and gratification theory. Diffusion of innovation refers to an idea, behavior, or object that is perceived as new by its audience and how such technology is adopted. Diffusion of innovations theory is relevant to this work because new media provide an array of new innovations in agriculture that require farmers to adopt if they desire an improvement in their overall output. By accepting these technological innovations in agriculture, farmers agricultural yields are improved upon as a result the availability of improved, tested and trusted methods of farming.

The acceptance or rejection of agricultural innovations disseminated to farmers totally depends on how such messages are communicated to them.

While the uses and gratification theory attempts to explain the uses and functions of media for individuals, groups, and society. It has to do with the benefits that attract and hold audiences to various types of media and the types of content that satisfy their social and psychological needs. The theory basically discusses why people choose particular media to fulfill certain needs.

its relevant to this work lies in the fact that it uncovers how individuals in agricultural communications use new media to gratify their communication needs and discover the underlying motives for their use of certain media in communicating agricultural information.

Research Methodology

The study adopted the survey research design. The population of the study was arrived at by summing up the number of employees and the number of farmers trained at ASTC. According to ASTC Records (2012), there are a total of 108 employees working at the centre and have so far trained and interacted with 5,428 farmers. Therefore, the population of this study is 5,536 consisting employees of ASTC and farmers trained at Kassa/Vom.

A sample size of 373 was statistically determined using TaroYamane's formula as cited in Mora and Bas (2010). To ensure a close representative of the population characteristics, the multi-stage sampling procedure was adopted hence quota, purposive and systematic sampling technique were adopted during the study. This is because of the variation in the population proportion of farmers trained and agricultural extension workers at ASTC Kassa (3,266) and those at ASTC Vom (2,270). Even distribution of sample size would result to a bias result; hence quota sampling technique was used for the distribution of sample size between the centre at Kassa and Vom.

According to ASTC records (2012), the total population of farmers and staff of ASTC at Kassa and Vom are 5,536. ASTC Kassa has a population of 3,266 representing 59% of the entire population while ASTC Vom has a population of 2,270 representing 41% of the entire population. To arrive at the actual sample for each of the centres, the percentages were summed up to 100% and therefore, the 373 sample were proportionately distributed between the centre in Kassa and Vom in their ratio as shown below:

ASTC Kassa $\frac{59}{}x \quad \frac{373}{} = 220$ respondents

100 1

ASTC Vom41 x373

100 1

Total number of respondent = 153 respondents

\ Therefore, 220 respondents were taken from ASTC Kassa and 153 from ASTC Vom. When summed up (220+153), the researcher arrived at 373 respondents.

Data Presentation

Data presentation and analysis is made on the 351 copies of the questionnaire retrieved as well as the interview conducted on 10 selected members of the study population.

Presentation of Questionnaire-Generated Data

Table 1: Responses types of new media technologies available at ASTC (n= 47)

Responses	Frequency	Percentage
CD-ROMs	15	31.9%
iPad	0	0.0%
Digitalization	6	12.8%
Social Media	5	10.6%
Emails	15	31.9%
DVDs	6	12.8%
Total	**47**	**100%**

Source: Field Survey, 2021

.Data from the table implies that other forms of information communication technologies in addition to the internet and mobile phones available at ASTC include: CD-ROMS, Digitalization, social media (Facebook, Twitter and Youtube), DVDS, and Emails.

Table 2: Respondents rating of the level of New Media use by ASTC to train farmers (n= 304)

Responses	Frequency	Percentage
Very High	90	29.6%
High	92	30.3%
Low	54	17.8%
Very Low	68	22.4%
Total	**304**	**100%**

Source: Field Survey, 2021

Implications from the table shows that a good number of the farmers who were administered questionnaires have rated the centre high in ICT use. Impliedly, the centre has embraced new media and had employed it in training farmers to adopt new innovations.

Table 3: Responses on the effect of use of New Media on farmers knowledge of agricultural practice (n= 304)

Responses	Frequency	Percentage
Marketing farm produce	158	52%
Acquiring Innovations	100	40.1%
Networking hubs	20	7.9%
application of farm inputs	26	0%
Total	**304**	**100%**

Source: Field Survey, 2021

Information from the table reveals that a greater part of the respondents affirm that the internet is viable in sourcing agricultural information which in the long run improves farmers knowledge and practice of agriculture.

Table 4: Responses on Factors militating against the use of new media in agricultural communication at ASTC (n= 351)

Responses	Frequency	Percentage
High call rates	50	14.2%
Poor network reception	100	28.5%
Illiteracy	76	21.7%
Poverty	54	15.4%
High Cost of commercial browsing	31	8.8%
Unstable power supply	40	11.4%
Others	0	0.0%
Total	**351**	**100%**

Source: Field Survey, 2021

Data from table 4 implies that both farmers and extension workers at ASTC acknowledge the fact that they have not explored their full potentials in relation to using information communication technologies because of the following limitations: High call rates,

Poor network reception, Illiteracy, Poverty, High cost of commercial browsing, and Unstable power supply. However, poor network reception got the highest number of respondents as the major impediment to new media use in agricultural communication at ASTC.

Presentation of Interview-Generated Data

From their various experiences, the extension workers interviewed had at one point or the other interacted and trained farmers on the need to adopt new innovations on their farms. They all agreed that it has been challenging as they have met with a good number of farmers who have refused to adopt new innovations that will help improve their output. Throwing a follow up question, the researcher asked how they have coped with such farmers and how they have been able to convince them to embrace these technological advancements. Their responses were that they keep talking and encouraging them to try the new methods introduced to them and leave the output to speak for it. And at some point, they tell farmers who have tried it and have gotten results to talk to others who are hard-hearted to new innovations.

When asked if they think the use of ICTs have any effect on farmers' knowledge and practice of agricultural innovations at ASTC. All the extension workers confirmed that new media technologies such as the internet and mobile phones have improved farmers knowledge and practice of agricultural innovations at the centre. With the mobile phones, all the extension workers affirmed that they can call their farmers from any part of the state and make enquiries about their farms. The farmers on the other hand have the phone numbers of the extension workers and whenever they encounter any problem, they can call the extension workers to come down or even discuss the problem on phone and proffer solutions when necessary.

To the surprise of some extension workers especially Mr. David Choji who have been an extension worker for the past 30 years, some of the farmers have gone as far as browsing the net to get information about what is required to get more yields. According to him, these farmers are aware of most of the technological innovations available and when in doubt of any of the information gotten, they contact the extension workers. In this vein, if the extension worker is not knowledgeable enough about what the farmers ask, it spurs them to study harder and conduct more research on the issue and others related to it. For Mr. Isaac Matong, farmers trained at the centre ASTC have shown a high level of commitment to accepting the

innovations thought them at the centre. Farmers who have some level of education and are computer literate receive notes on their flash drives and go home to study such notes.

With ICTs like mobile phones, Mr. Jugu Hycenth Gyang confirmed that farmers are now contacted whenever fertilizer is available and farmers on the other hand contact the centre to make enquiries regarding trainings. ASTC help-line according to him has been made available to the farmers. With this, farmers can call the centre to lay complaints experienced on their farms.

In the words of Mr. Bot Luka Chollom, since ASTC is involved in a number of things such as: Agro Mechanical Services; Cultivation equipment; Inputs such as fertilizers, seedlings and herbicides; and produce marketing. Farmers call in to book for these services with the aid of mobile phones. This have made contacts and communication a lot easier compared to what it was before the such devices as mobile phones came on board whereby extension workers must be there on the farms to appraise every situation.

Test of Hypotheses

Two null and two alternate hypotheses were formulated on the effect of information and communication use on farmers' knowledge of agricultural innovations and the relationship between new media use and agricultural training of farmers at ASTC. However, the null hypotheses are statistically tested using Chi- Square Test of Independence with the aid of contingency table and Analysis of Variance (ANOVA) at 0.05 level of significance. Since two null and two alternate hypotheses were raised, when the null is accepted, the alternate stands rejected.

H_0: *Use of ICTs has no significant effect on farmers' knowledge of agricultural innovations.*

To decide whether to accept or reject the null hypotheses, tables 12 and 16 were tested using Contingency Test (Chi Square Test of Independence) as seen in appendix A.

In the calculation, X^2_{cai} is found to be 13.2, Degree of Freedom was 3 and Level of Significant set was 5% (0.05). Hence, Test of Independence at 0.05 also known as X^2_{teb} is equal to 7.810. With the decision rule that H_0 will be set aside if X^2_{cai} is greater than X^2_{teb} or the table value.

Based on the calculation, X_{cai} is greater than X_{teb} therefore; the null hypothesis was rejected and the alternate accepted. Therefore, Hi: *use of ICTs has significant effect on farmers' knowledge of agricultural innovations* stands valid.

Ho: *There is no significant relationship between the use of ICTs and improvement in agricultural training of farmers by ASTC*

The decision whether or not to accept or reject the null hypothesis was reached using tables 12 and 13. This was arrived at using Contingency Test (Chi Square Test of Independence) as seen in appendix B.

From the calculation, X^2_{cai} is equal to 23.1 while X^2_{teb}at 0.05 level of significance is equal to 7.810. Based on the rule that the hypothesis should be accepted if the X^2_{cai} is less than the X^2_{teb} (table value), the hypothesis was also rejected. Thus, Hi; *there is significant relationship between the use of new media and improvement in agricultural training of farmers' by ASTC* was upheld.

Discussion of Findings

In line with the objectives of this study and the research questions raised and answered, this study attempted to bridge the research gap through an empirical investigation of the key dimensions to how ICTs have been used in agricultural communications at ASTC and the challenges encountered by farmers and extension workers in using ICTs to access agricultural information. The study specifically sought to: Identify the types of new media available to agricultural communicators and farmers at ASTC; evaluate the use of information communication technologies in agricultural services and training of farmers at the centre; ascertain the effect of ICT use on farmers' knowledge and practice of agriculture; and identify the factors militating against the use of ICTs in agricultural communications at the centre.

Findings relating to the demographic variables of the respondents' show that, a high percentage of farmers and extension workers at ASTC fall between the ages of 21-40 years with males dominating the distribution. This shows that active males between the age brackets mentioned above are mostly involved in farming as against females and the other age brackets. A good number of the respondents are married which portend some implication of family responsibility. The educational qualification of the respondents show that a good number of them have formal education as 89.5% of the study population can read and write as against 10.5% who have no formal education and may not be able to read and write. This

implies that the crop of farmers trained at the centre have minimal level of education; they may not find it difficult to understand, appreciate, and apply what they have learnt.

Findings on the types of information and communication technologies available to agricultural communicators and farmers at ASTC show that the centre has a number of new media technologies within its reach. Therefore, farmers and extension workers have access to internet facilities, mobile phones, social media, CD- ROMs, DVDs, Projectors, and digitalization. The projector was also found to be a veritable ICTs employed by the centre in training farmers as shown in the interview. A good number of extension workers affirmed that farmers were trained in the centre with the aid of projectors which help to improve their understanding of what they are taught.

With the presence of these facilities, extension workers and farmers alike have unlimited access to agricultural information online whenever they desire at the centre. This confirms the finding in a study by May, Karungia and Ndokweni (2007) which asserted that effective agricultural development require access to all aspects of agricultural production, processing, marketing and new media options (ICT) have been at the forefront in ensuring delivery of this sector in both developing and developed countries.

The findings show that agricultural agencies have welcomed and embraced the dawn of new media technologies in their ways and approaches to agriculture. This is evident in the presence of new media at ASTC which extension workers have access to in sourcing agricultural information with enthusiasm. Adesope et al (2005) confirms this when they affirmed that there is a high level of awareness to information technologies and sources among agricultural scientists in Nigeria.

In relation to evaluating the use of ICTs in agricultural services and training of farmers at the centre, findings reveal that the centre has adopted new media technologies in a number of ways regarding her service delivery and trainings. Table 21 for instance show that 91.5% of the extension workers use the internet to source materials to train farmers as against 8.5% who don't. These percentages affirm that agricultural extension workers acknowledge the gains of using new media options to improve their knowledge and skills and source for information to train farmers. This is because extension workers that have access to Internet facilities at their disposal have the opportunity to learn more on their own. Extension workers use the Internet

for various purposes which include research, lecture notes, and contact with colleaques online to discuss grey areas.

Findings also affirm that information and communication technologies have been employed to contact farmers' with mobile phones when training sessions are scheduled and for other information. The centre is found online through www.astcplateau.com for enquiries about the activities of the centre. However, this finding upholds Adebayo and Adesope (2007) who in a study found that a good number of extension workers are aware of new media and know how to access the internet on their own to source for materials relating to agriculture.

Findings to ascertain the effect of ICT use on farmers' knowledge and practice of agriculture reveal that farmers trained at ASTC are open to new innovations since 79.9% of them fall within the early adopter and early majority category in diffusion of agricultural innovations. Farmers (92.1%) affirmed that the internet is a viable means in sourcing agricultural information which in the long run improves their knowledge and practice of agricultural innovations. The farmers also alluded that ICT use in agricultural services and training at the centre have positive effects on their knowledge and practice of agriculture. *62.5%* of the farmers rated the effect of ICTs use on their knowledge of agricultural innovations as high. This implies that information communication technologies like the internet have provided an array of information for farmers who can access such information at their convenience to educate themselves of issues that pose as challenges.

Extension workers also added that using the internet and mobile phones have played a very important role in the diffusion of agricultural innovations because farmers' knowledge and speed in diffusing agricultural innovations are enhanced through new media options and have positive effects farmers. This is further expatiated as 91.5% of the extension workers rated the farmers high in relation to adopting new innovations at the centre using new media options.

This finding is supported by Masuki et al (2010) who acknowledges that new media such as mobile phones have appreciated and rural communities have seen them as easy, fast and convenient way to communicate and get prompt answers to respective problems. Farmers have been more responsive to mobile phones than the internet because it is easier to cope with than internet facilities.

Findings also reveal that the factors militating against ICT use in agricultural communication at ASTC are enormous. They include: High call rates, poor network reception, illiteracy, poverty, high cost of commercial browsing, unstable power supply, lack of exposure by farmers, inadequate equipments, and complexities in the African family system. The main challenge that has impeded new media use is illiteracy, though people can read and write, they barely know how to use internet facilities.

A study conducted by Masuki et al (2010) lay credence to some of the problems mentioned above as to the challenges of ICT use. Masuki et al discovered that illiteracy, poor network reception, and lack of electricity were the major set-backs to new media penetration in most African countries. Alhassan and Afolabi (2012) further identified high cost of using commercial cyber cafe, lack of up to date CD-ROM and lack of time to spend in the cafe were the constraints to new media (ICT) utilization for research. Other constraints they found were poor internet connectivity, lack of subscription to agricultural databases, commercialization of agricultural databases, lack of enough relevant resources on free databases and above all irregular power supply.

Hence, training centres such as ASTC and research institutes should acquire more bandwidth for their Internet connection to be able to accommodate more computers and this will make Internet facilities work faster and also encourage farmers to use them.

Summary and Conclusion

The findings in this study portray the potentials of ICTs in improving agricultural productivity through effective agricultural communication. The study underscores the critical role ICT can play in greater efficiency for farmers and extension workers as a whole. It shows that ICT have played an important role in the diffusion of agricultural innovations at ASTC.

The study identified the types of new media available at ASTC and found that extension workers have employed them to communicate with farmers as regards training and effective service delivery. Farmers trained at the centre were found to be open to innovations and new media have impacted on their knowledge and practice of agriculture positively.

Information and communication technology"s use face some constraints of full utilization and some of such constraints are high cost of commercial browsing, unstable power supply, and poor network connectivity among others.

Recommendations

Based on the findings of the study and conclusions reached, the following recommendations are made:

Programmes that train agricultural communicators and farmers alike should incorporate instructions on how effectively to utilize new media especially the internet in sourcing agricultural information. Though the internet does not serve as the primary source of agricultural news stories for both farmers and extension workers, it is an important tool that ameliorates their plight in sourcing agricultural in formation.

Online Agricultural literacy sites such as Access to Global Online Research in Agriculture (AGORA), Agricultural Online Access (AGRICOLA), Agricultural Information System (AGRIS) and Plant Resources for Tropical Africa (PROTA) where relevant literature can be downloaded should continue to be maintained and improved. Since many agricultural extension workers, communicators, and farmers are unable to contribute to these literacy sites, other individuals such as researchers and university lecturers need to be contacted for assistance in providing such information.

Service providers should put in more efforts at increasing the performance of their network. This will go a long in making calls easier as farmers and extension workers will communicate freely without experiencing network failure. With better network service delivery, farmers can also send SMS (Short Message Service) to extension workers to make enquiries and get responses immediately. Service providers should install network masts in rural areas so that farmers can have unlimited access to extension workers through mobile phones. They should be discouraged from concentrating their activities in only urban areas but should extend such freebies to rural areas.

The government should ensure that rural communities are provided with electricity. When such communities are provided with electricity, farmers with mobile phones will not experience problems in charging their phone and those without phones may be spurred to buy their own. Stable power supply in cosmopolitan cities like Jos will provide an added advantage to ICT use as the prices of internet services will be greatly reduced. With stable power supply, agricultural agencies like ASTC can perform better at minimal running cost as compared to what is expended on buying diesel.

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