ACCESS TO INFORMATION COMMUNICATION TECHNOLOGIES (ICTS) FOR AGRICULTURAL TRANSFORMATION THE CASE OF BOTSWANA: A DEVELOPING COUNTRY PERSPECTIVE

Poloko NTOKWANE[1] and Monametsi MOSWEU[2]

[1]University Librarian – Botswana University of Agriculture and Natural Resources. Gaborone. Email: pntokwan@yahoo.com

[2]Assistant Librarian - Botswana University of Agriculture and Natural Resources. Gaborone. , Email: mosweujnr@yahoo.com

Abstract

The paper aims to look at the current levels of deployment of ICT by different Units of the Agricultural Sector in Botswana. The agricultural sector is the major contributor to economic development and the most relied upon by the majority in developing countries, Botswana being one of them. Agricultural information is needed for the improvement of agricultural research outputs which can help developing countries achieve food security to fight hunger and alleviate poverty. Through the era of information explosion and information communications technology there is need to use ICT's in different areas of agriculture so that farmers will not be left out. The paper will look at how ICT's are used in agricultural extension and advisory services, the current and future roles of ICT in agricultural marketing, expert systems and GIS information applications and use of social media. The research/study will also cover opening access in sharing agricultural data and information and find out if there are any agricultural open archives and repositories in the country. Using the survey research design and questionnaire and interview as the major data collection instruments, the nine (9) ministry departments, and four parastatals are selected for the study. The findings will be presented in the form of tables and pie charts. The recommendations from the study will inform policy makers in making ICT's use initiatives in the provision of extension services and advisory services to farmers to transform Botswana's agriculture.

Keywords: E-agriculture, ICT's, Access, agricultural extension, advisory services

1. Introduction

The agricultural sector is the major contributor to economic development and the most relied upon by the majority in developing countries. According to Ntokwane (2012) Agricultural information is needed for the improvement of agricultural research outputs which can help developing countries achieve food security to fight hunger and alleviate poverty. The agricultural sector is also facing a number of challenges such as population growth, shortage of water, climatic changes and urbanisation that hamper food production. According to Stienen, Bruinsma and Neuman, (2007) agricultural information is scattered on different stakeholders. These stakeholders include farmers, universities, research institutes, extension services, commercial enterprises, and non-governmental organizations. The above authors (2007) stated that the information is often poorly documented and hard to access, and that indigenous knowledge on

good practices and lessons learned about innovations is generally not captured. So for this vast knowledge to reach its intended audience it has to be mined, repackaged, transferred through the right medium on time to satisfy the need. Botswana has an enabling environment for the use of ICTs. This has been realised through the formulation of the National ICT Policy for Botswana, referred to as Maitlamo ICT Policy (2004) to create an enabling environment for the growth of an ICT industry in the country and provide access to information and communication facilities in the country. Through the National ICT policy Botswana planned to provide free access to information and knowledge that will help improve livelihoods of Botswana society in terms of socio-economic development. Development of ICT is seen as enhancing access to e-governance and local information relevant to communities. Areas of need for ICT include, among others, ICT usage in homes and communities; a national HIV/AIDS awareness, agricultural sector, public education and basic education to enable citizens to actively participate in the information economy. Botswana has a well-developed modern telecommunications infrastructure, which remain underutilized (Sesigo Project, 2011). The fixed line and fibre optic infrastructure is adequate to provide wired telephone lines, mobile telephone, radio, and television to communities in Botswana. Development of ICT build public libraries through a collaborative partnership between the Sesigo Project, Ministry of Youth Sport and Culture (MYSC), the Bill &Melinda Gates Foundation (Sesigo Project, 2011) is meant to provide free access to internet to provide free access to information and e-government services in communities in Botswana. But there are challenges of access in areas where there is no infrastructure.

1.1. Statement of the Problem

Information communication technologies (ICTs) have benefits of changing people's lives by improving access to information and sharing of knowledge. In agriculture it can enhance access to agricultural markets; improved agricultural practices and information on weather but there exists a digital divide between those who can and cannot access ICT. This divide will continue to widen unless interventions are made to ensure that digital technology and information is accessible to all. Although Botswana has an ICT enabling environment the divide is still prominent.

1.2 Objectives of the Study

- To determine the level of deployment of ICTs for extension services
- To identify the types of ICT tools used by extension officers and farmers.
- To determine the role of ICT 's to extension services and advisory service delivery
- To determine the usefulness/benefits of ICT's to extension officers/farmers.
- To determine the challenges and limitations on the use of ICTs by extension officers / farmers
- To determine the possible ways the extension officers/farmers perceive could improve the use of ICTs .

1.3 Research Questions

- To what extend has ICT been used in the Ministry of Agriculture?
- What ICT tools have been used in the Ministry and its parastatal?
- What is the role of ICTs to extension and advisory services?
- What are the benefits ICTs to extension and advisory service delivery

- How efficient and effective is the use of ICTs for extension and advisory services resources in agricultural libraries and agricultural information institutions?
- What are the challenges/limitation/barriers on the use of ICTs for extension and advisory services by extension officers/farmers?

1.4 Purpose of the Study

The study looks at the current levels of deployment of ICT by different Units of the Agricultural Sector in Botswana.

1.5 Significance of the Study

This study is expected to inform policy makers in making decisions on the deployment of ICTs to transform Botswana Agricultural Sector.

1.6 Scope and Population of the study

The study covers the nine (9) Ministry departments, and four parastatal of the Ministry of Agriculture in Botswana. It is limited to the Extension and advisory service coordinators at these departments.

1.7 Research Design

In this study the researcher choose to use a survey as the research design. The survey was employed to collect data from a selected population using a questionnaire to determine access to information communication technologies (ICTs) for agricultural transformation in Botswana**.**

1.8 Population of the Study

The population of this study covers all the departments and parastatal of the Ministry of Agriculture making thirteen (13).

1.9 Limitation of the Study

The study was limited to the Ministry of Agriculture departments, divisions and its parastatal. Extension agents and farmers were not reached and most of the parastatal due to time constraints.

1.10 Background of the Thirteen Agricultural Sectors

Agriculture is way of life for an average Motswana. In line with the theme of the National Development Plan 10 (NDP10) which is Accelerating Achievement of Vision 2016 through NDP 10, the agricultural sector has been identified as one of the areas that have a great potential to diversify the economy and create employment, especially in rural areas. According to Vision 2016 (2009) the agricultural sector faces challenges of declining productivity and the need for sustainable methods. According to Botswana National Development Plan 10 (NDP10), since independence, Botswana has been implementing social protection and empowerment programs aimed at reducing poverty and most of these programs are agriculture related. The Ministry of Agriculture's mandate is to develop a sustainable and competitive basis for the agricultural sector by improving farm incomes, generating employment opportunities and raw materials for agri-businesses; conserving agricultural natural resources through the promotion and adoption of appropriate technologies and management practices. Below are the nine departments, divisions and parastatals of the ministry:

- **Botswana Meat Commission (BMC)** promotes the development of the country's beef and related products globally.
- **Botswana National Veterinary Laboratory** provides national laboratory services through disease diagnosis, research and food quality assurance.
- **Botswana University of Agriculture and Natural Resources** offers higher diploma and degree programs in agricultural sciences and short courses offered by its Centre for In-service and Continuing Education (CICE).
- **Botswana Vaccine Institute (BVI)** supports livestock industry by manufacturing relevant vaccines and providing services of the highest quality through utilization of the best technology, skilled and dedicated employees to combat economically devastating livestock diseases.
- **Corporate Services Division** coordinates resources and provides administrative and other support services to the Ministry of Agriculture Divisions and in some cases, to the Independent Departments of the Ministry of Agriculture to enable them to deliver on their mandates.
- **Department of Agricultural Business Promotion** (DABP) promotes a commercialized, diversified, sustainable and competitive agricultural sector through business skills transfer, market access negotiations, and promotion of agricultural cooperatives and associations.
- **Department of Agricultural Research** carries out research to generate improved crop and livestock production technologies that promote the development of a productive and environment friendly agricultural sector through commodity and factor focused programs in arable, animal and range research**.** The department also carries out research support services in seed production and certification, soil, plant and feed analysis and genetic resource conservation.
- **Department of Animal Production** provides quality service to livestock farmers and other stakeholders through effective extension service.
- **Department of Crop Production** provides technical services to farmers and general public in order to improve agricultural productivity and efficiency and thus improving people's living standards.
- **Department of Extension Services Coordination** coordinates all agricultural programs and projects in the country to enhance the performance of the sector.
- **Department of Veterinary Services** provides quality service to farmers and other stakeholders in order to promote sustainable livestock industry through; prevention and control of animal diseases, effective extension service, and provision of veterinary public health service this will be achieved through a dedicated, skilled, well-resourced and highly motivated staff.
- **Division of Agricultural Information** promotes agricultural and rural development in Botswana by providing support the extension service by providing useful information dissemination and public relations in terms of being more responsible to the needs of the Ministry of Agriculture and the farming community at large. The Division has six sections of Publication, Broadcasting, Campaigns, Audio Visual, Graphics and Photography.
- **The Division of Research and Statistics (DRS)** provides specialized applied social research, policy research and development, monitoring and evaluation and agricultural statistics.

2. Data Analysis, Presentation of Results and Discussion of the findings

Thirteen (13) copies of Questionnaire (92% of the population) were administered to the Departments key officers at the Ministry's headquarters and 1 (8%) telephone interview was done. The researchers administered the copies of the questionnaires to the respondents personally. The sections which needed clarification were explained to the respondents. Out of the 12 copies of the questionnaire administered, 9 (75%) were returned to the researcher at the end which made the response rate to be 83 %.

Objective 1: To determine the level of deployment of ICTs for extension services

The findings show that the departments have extension and advisory service of some sort. Information and communications technologies are deployed in all the departments, divisions and parastatal of the Ministry of Agriculture at low level, moderate while some are highly deployed. The respondents were asked about the level of access to and how efficient ICT's were in extension and advisory services. Thirty eight percent (38%) felt it is not yet efficient because of the challenges narrated below, 37 % felt it is very efficient and 25% said it is moderate.

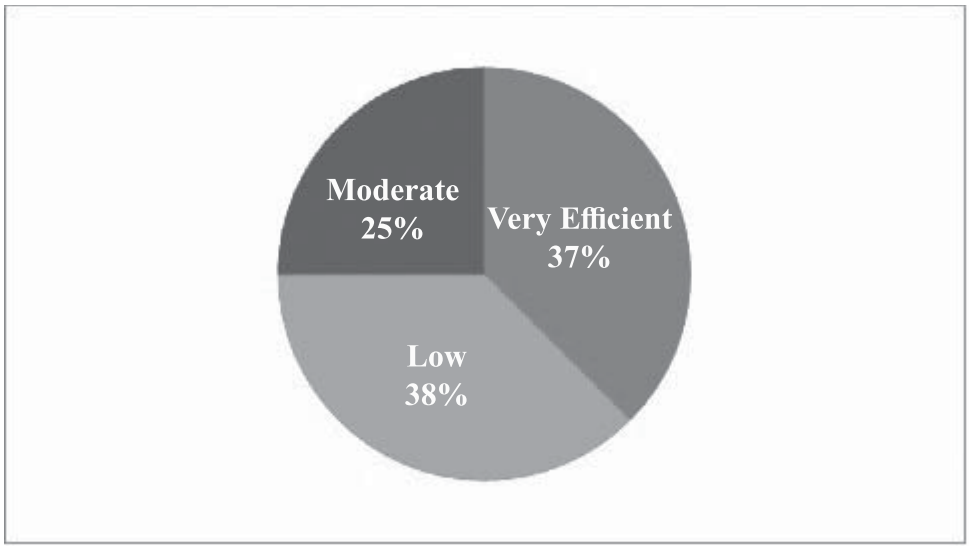

Figure 1: Efficient level of ICT's

Objective 2: To identify the types of ICT tools used by extension officers and famers.

The findings show that diverse ICT tools are used. These include radio; television, internet, and social media like face book and twitter, video, call center for toll free, websites. The most widely used tool here is the radio. Respondents were asked to show the most accessible tool and the responses showed that the most accessible tool is the radio followed by the instant cellphone messages and television though there are reception/signal challenges.

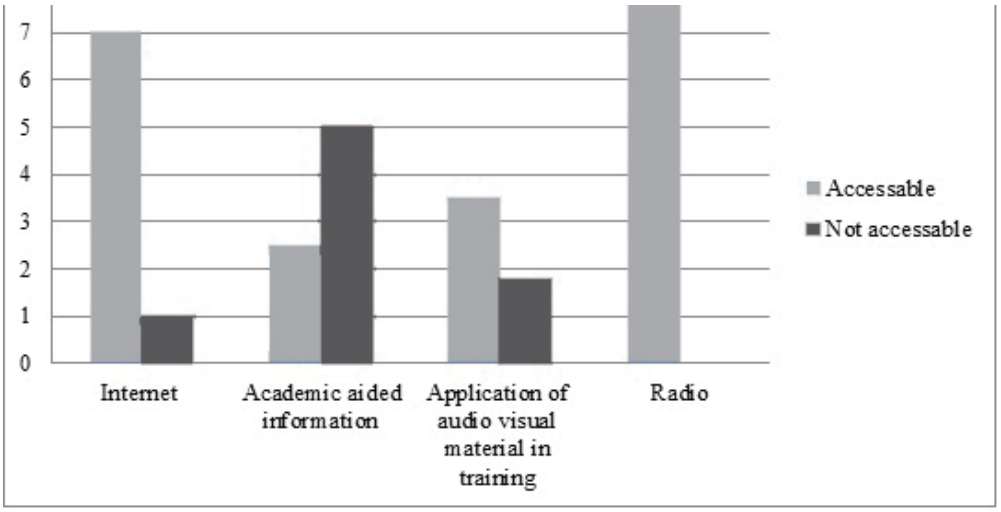

Figure 2: Accessibility points

Objective 3: To determine the role of ICT's to extension services and advisory service delivery.

The respondents were asked to say the role of ICT's in extension and advisory services. ICT's has been described as a communication tool from officers to farmers and from farmers to officers. It has been used to disseminate agricultural information as well as retrieving information. Thirty seven point five percent (37.5%) of the respondents found ICT's to be very efficient while 37.5 % find it efficient and 25% say it's not efficient because of varied reasons. See the challenges.

Extension Officers use ICTs for storing, disseminating retrieving and acquiring information. Some use these for example for keeper cards for livestock. These help in buying feeds for livestock at the livestock feeding centers. Brands certificates are easy and quick to retrieve and do through ICT's as well as permits to import food items from the neighboring South Africa.

Objective 4: To determine the usefulness/benefits of ICT's to extension officers/farmers.

ICT's have been found to be very useful in so many ways.

- Send quick messages through cellphones
- Message reach a large pool of clients
- More user friendly
- Diverse services online
- Accessible at all times provided there is enough reception/signal or connection.
- Timely and current information
- Production increase because farmers are able to market their products which are bought on time thus contributing to food security
- Cheap, can reach remote areas and cut travelling costs for farmers to get information
- Aids in reaching the younger citizens and leveraging on the growing power of social media.

It has been revealed that ICT's are very useful in disseminating agricultural information as well as retrieving information on the subject. Some of the social media networks are used to communicate with the intended clientele. The use of cell phone messages has been seen as the easiest tool for question and answer, notification of outbreaks even calling meetings.

Objective 5: To determine the challenges and limitations on the use of ICTs by extension officers/farmers.

The study revealed that the following challenges are common to all the departments.

- Although ICT's are used for extension and advisory services, they are centralized and mostly in the cities and towns.
- Lack of understanding of ICT's by farmers
- Lack of infrastructure
- Poor network
- Lack of ICT's by both farmers and extension agents
- Lack of facilities
- Youth who are ICT's literate do not listen to the local radio and television channels
- Utilities are not at production areas where farmers are
- Illiteracy rate high only a few who operate at commercial level are literate.
- Lack of budgets for ICT's purchases

Objective 6: To determine the possible ways the extension officers/farmers perceive could improve the use of ICT's.

The respondent came out with possible ways of improving the use of ICT's as follows:

- Adult education programmes to include use of simple gadgets like cellphones
- Introduce electricity generated equipment
- Use corporative groups
- Introduce community radio stations
- Increase bandwidth to increase internet speed, free Wi-Fi sports across the country
- Electrification of rural areas
- Improve Roads
- Improve access
- Reduce power cuts
- Increase usage of ICT's that can attract young farmers and youth
- Purchase ICT equipment
- Improve connectivity
- Allocate funds for training
- Identify relevant skills and train

- Use open source softwares
- In-house training
- Formal training
- Increase connectivity
- Open social media
- Establish agricultural information resource centers

3. Recommendations

The following recommendations and conclusion were made from the findings:

- Agricultural as the main source of livelihoods needs to be given more financial support also considering the emerging technologies which can be harnessed to enhance agricultural production.
- ICT skills audit should be done to identify gaps and fill them through training and education.
- Good ICT infrastructures and facilities should be put in place. Connectivity should be reliable and where possible be supported by generators which will help during power cuts.
- ICT literacy skills should be an ongoing exercise.

4. Conclusion

In this preliminary study it has been concluded that traditional methods of extension services are still used coupled with some form of ICT use. The extension officers use short message (sms) to target farmers to invite them for workshops, inform them of any outbreak or any other urgent news. Farmers use the same tool for question and answer through the toll free number calling the call center at the Ministry's headquarters. Gathering at the wards for face to face passing of information to farmers is still used through traditional forums called Letsema, Molaletsa and Pitso. It is also concluded that the infrastructure for use of ICTs is not yet adequate at rural areas but only concentrated in the urban areas. Meaning ICTs are used to pass information to extension agents who in turn pass it to farmers. Radio and television are most commonly used ICTs for extension and advisory services. One parastatal has a Geographic Information System that monitors soil moisture. The pilot study discovered that there are two institutions that have started initiatives of developing institutional repositories to create platform for open access to agricultural information. The final conclusion is that ICT's are deployed in extension and advisory services in the Botswana agricultural sector but do not cover rural communities making the digital divide to still exist.

References

Arokoyo T. (2002) ICTs in the transformation of agricultural extension: the case of Nigeria. Available at:http://ruforum.org/sites/default/files/Case_study_Nigeria.pdf. Accessed: [31/01/2016]

Maitlamo Botswana's National ICT Policy LEGISLATIVE FRAMEWORK & CHANGE REPORT Final Report December 2004. Available at: http://www.researchictafrica.net/countries/botswana/MAITLAMO_Botswana_National_ICT_Policy.pdf . Accessed: [31/01/2016]

Ministry of Agriculture Website: Available at http://www.gov.bw/en/Ministries--Authorities/Ministries/MinistryofAgriculture-MOA/About-MOA/Vision-Mission--Values1/ . Accessed: [31/01/2016]

Ministry of Finance and Development Planning, National Development Plan 10. (April 2009-March 2016). Volume 1. Republic of Botswana.

Richardson, D. (2001) How Can Agricultural Extension Best Harness ICTs to Improve Rural Livelihoods in Dev1eloping Countries? Gartner Lee Limited 3 Watson Road South, Unit 1 Guelph, Ontario, Canada DRIC. Available at: http://departments.agri.huji.ac.il/economics/gelb-how-11.pdf. Accessed: [15/02/2016]

Stienen, J., Bruinsma,D, and Neuman, F. (2007). How ICT can make a difference in agricultural livelihoods. Commonwealth Ministers Reference Book. Retrieved from: [http://*www*.iicd.org/files/ICT%20and%20agricultural%20livelihoods.pdf.] Accessed: [31/01/2016]

Yakubu, D.H ., B.Z. Abubakar , T.K. Atala and A. Muhammed (2003) "Use of Information and Communication Technologies among Extension Agents In Kano State, Nigeria" Journal of Agricultural Extension .17 (1) pp162 . Available at: http://www.ajol.info/index.php/jae/article/viewFile/90293/79720. Accessed on [20/2/2016]