

PROMOTING ICT BASED AGRICULTURAL KNOWLEDGE MANAGEMENT FOR INCREASED PRODUCTION BY SMALLHOLDER RURAL FARMERS IN UGANDA: A CASE OF COMMUNICATION AND INFORMATION TECHNOLOGY FOR AGRICULTURE AND RURAL DEVELOPMENT (CITARD), BUTALEJA.

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Abstract

The Agricultural sector has the greatest potential for improving rural livelihood, promoting food security, reducing hunger and eradicating poverty. According to World Bank (2015), 78% of the worlds' poorest people live in rural areas and work mainly in agriculture. They must therefore be lifted out of poverty. Knowledge and information management can play a pivotal role in enhancing agricultural productivity and development. The farmer requires timely inputs on weather forecasts, sowing time, availability and recommendations on inputs, availability of credit, expert advice on maintaining his crop in healthy condition, information on markets and on all other areas of interest to him and his family. Information and Communications Technologies (ICTs) have a potential to contribute significantly to achieving major agricultural benefits. It can give a new lifeline to the societal needs and enhance productivity of agriculture which, if natered effectively could become transformational factors. If properly used, ICTs enable appropriate knowledge and information to reach knowledge intermediaries and smallholder and family farmers in a timely manner. The aim of the paper is to: examine the modern ICT systems that have been utilized by CITARD to deliver effective public agricultural extension services in the rural Butaleja. Specific objectives included: identifying he agricultural information of the Btaleja family farmers, To ascertain the different information needs of farmers in Butaleja, examine the contribution of ICTs on rural smallholder farming in Butaleja; examine to what extent CITARD is extending ICT training to rural farmers to be able to access and utilize the existing ICT facilities, and, to identify the challenges faced by Butaleja in accessing and utilising CITARD; and finally, the paper proposes ways of addressing the challenges for effective information access, utilization and dissemination.

Keywords: Agriculture; Smallholder-farmers; ICTs; Food security; Information and knowledge.

1. Background

The Agricultural sector has the greatest potential for improving rural livelihood, promoting food security and reducing hunger and eradicating poverty. According to World Bank (2015), 78% of the worlds' poorest people live in rural areas and work mainly in agriculture. They must therefore be lifted out of poverty. Knowledge and information management can play a pivotal role in enhancing agricultural productivity and development. Information and communication technologies (ICTs) have continuously mattered in agriculture. Since time immemorial, farmers' agric information seeking process has been a traditional one whereby it was mainly oral based.

However, with the emergency of ICTs, the information seeking behavior and process of farmers have been made much more simplified. Today, questions such as: What is the most effective planting strategy on steep slopes? Where can I buy the improved seed or feed this year? How can I acquire a land title? Who is paying the highest price at the market? How can I participate in the government's credit program? Have always got answers with the help of computers fully connected to the Internet. Before the advent of ICTs, agricultural practitioners rarely found it easy to obtain answers to such questions, ICTs allow farmers to get up to-date information which is not only helpful in their daily farming lives but even for endless challenges in agricultural and healthcare situations. Given the challenges in the agricultural sector, the arrival of ICTs is well timed. Public and private sector actors have long been on the search for effective solutions to addressing both the long- and short-term challenges in agriculture, including how to answer the abundant information needs of farmers.

According to Lowder, Skoet and Singh, (2014), ICT is one of these solutions, and has recently unleashed incredible potential to improve agriculture in developing countries specifically. Technology has taken an enormous leap beyond the costly, bulky, energy-consuming equipment once available to the very few to store and analyze agricultural and scientific data. Mammo-Yared, (2014) states that with the booming mobile, wireless, and the Internet industries, ICT has found a foothold even in poor smallholder farms and in their activities. The ability of ICTs to bring refreshed momentum to agriculture appears even more compelling in light of rising investments in agricultural research, the private sector's strong interest in the development and spread of ICTs, and the upsurge of organizations committed to the agricultural development agenda.

1.1 Overview of the Communication and Information Technology for Agriculture and Rural Development (CITARD)

CITARD is a Community Based Organization in Butaleja that is working to help local community members to achieve sustainable development through information sharing on best agro practices and marketing, Environment conservation, and clean energy.

Similar to other studies, it's believed by CITARD that attaining sustainable development is a worldwide strategic concern. Information and Communications Technologies (ICT) have the potential to give new impetus to the social organizations and productive activity of agriculture which, if natured effectively could become transformational factors (CITARD, 2016). Related studies indicate that the farmer whose welfare huge government machinery and industry is devoted, still suffers from the absence of right information at the required time. In this context it may be useful to mention that CITARD is initiating ICT based services to bridge the knowledge gap between farmers and researchers who are committed to rural upliftment through information sharing for agricultural development and sustainable development.

1. To identify the different information needs of farmers in Butaleja.
2. Examine Contribution of ICTs on rural smallholder farming in Butaleja;
3. To establish to what extent CITARD in extending ICT training to rural farmers,
4. Establish challenges faced in Butaleja in accessing agricultural information.
5. To propose ways of addressing the challenges affecting agricultural information access for effective utilization and dissemination.

2. Methodology

This study presents findings from a case study research design with qualitative research approaches. Data collection methods included focus group discussions, interviews and participant observation. Qualitative approach was the dominant approach because it is a useful method to study human action in their natural settings, attempting to make sense of, or interpret, phenomena in terms of meanings people bring (Creswell, 2009). 12 respondents were selected for the study due to their deep involvements in farming and awareness of the activities carried by CITARD. Butaleja District was also selected due to its high agriculture production and to provide fair representation since CITARD operates within the district. The data sources included videos, audio recordings and pictures.

3. Key findings

Objective One: Information needs of Butaleja farmers

The investigators asked to the respondent the areas of information which they require for day to day activities related to farming. During the face to face interviews, the farmers indicated that they need information on availability of seeds, crop production, and insecticide availability, fertilizer availability.

“We need information on where to find good and cheap seeds, which crops to grow in a particular season, where to find insecticide for our crops and animals and fertilizers” noted a farmer.



Figure 1: A farmer makes a call to a potential rice buyer from Mbale town (Researchers, 2016)

Based on the observations, many farmers were seen and heard using mobile phones to inquire from colleagues about the market prices and the neighboring Mbale town. They could call and find out who is offering the highest price for their rice.

Other areas that were mentioned by farmers include water management, weather and climate information, and agricultural equipment's both traditional and modern. These results to a large extent concur with the findings of Bhagachand, (2012) who found out that farmers need information on availability of seeds crop production and insecticide availability among other needs. Furthermore, the Chairman Doho rice scheme, categorized the information needs of farmers as:

Agricultural Technology - where the farmer needs information on production technology that involves cultivating, fertilizing, pest control, weeding and harvesting.

Agricultural Credit- where he emphasized a point of need for loans and advances granted borrowers to finance and service production activities relating to agriculture, fisheries and forestry and also for processing, marketing, storage and distribution of products resulting from these activities as well as marketing information where he highlighted that this is information that enables him and other farmers make balanced and relevant decisions.

Market information needs of small scale farmers include:

- Information on product planning. This is information on what crop and variety to grow at a given season with marketability of such a crop as an important deciding factor.
- Information on current prices.
- Information on forecast of market trends. This type of information assists farmers in planning their market products.
- Information on sales timing. This assists farmers in ensuring that they do not cause a market glut. It enables them to stagger harvesting and quantity for marketing.

Information on improved/ stable marketing practices. It includes information on improved harvesting methods. This information is disseminated by field level extension workers by demonstration on farmer's fields, at local and wholesale markets.

Objective two: Contribution of ICTs on rural smallholder farming in Butaleja

Information on communal marketing- This enables small scale farmers to have organized sales of marketable surplus and bulk transport of produce. This trend is commonly known as cooperative societies.

ICTs play an increasingly important role in agricultural value chains. Though important, cellphones aren't the only ICT being used by CITARD to improve agriculture. Results from face to face interviews and observations indicate that ICTs used by CITARD encompass radios, digital cameras, geographic information systems (GIS), cloud computing, tracking mechanisms and many more gadgets. According to literature reviews, it was also discovered that there are several ways through which ICTs can be used in agriculture. They include:

- Pricing and weather information systems;
- Applications that can help buyers manage transactions with the thousands of small-scale farmers who supply to them;

- Mobile banking and applications that facilitate quick payments;
- Initiatives to expand the reach of farm extension services through phone, radio, video and sometimes all three;
- SMS or text messaging campaigns for enabling environment advocacy

According to Shanta and Purnima (2009), the increasingly important role of ICTs in agriculture can help change the face of the sector (from outmoded to cutting edge). In fact, it should form part of the larger thrust to attract more young people to the sector.



Figure 2: Using ICTs in a farmer dissemination workshop (Researchers, 2016)



Figure 3: Using ICTs in a farmer dissemination workshop (Researchers, 2016)

Many recent studies contend that there's a strong link between ICTs and general employment in the rural areas. Agriculture is no exception. ICTs offer employment opportunities in the sector that are both attractive to young people and are in demand.

Using modern ICT systems to deliver effective public extension services in the agricultural sector in the rural Butaleja

Training youth on Web 2.0 tools and developing ICT applications to use in agriculture

At CITARD, they believe the youth have a huge role to play in society. This is why CITARD have set out to teach them how to search for information on the internet using the web 2.0 tools. According face to face interview with the Executive Director (CITARD), he teaches youth how to use of twitter, facebook, instagram, skype, wordpress, emails and many other applications. This is giving them the opportunity to follow events more closely relating to their interests, in return we have more informed young generation that is very productive and able to participate actively in issues that matter to them and their families. It was further noted that CITARD has trained farmers to use the available social media applications to reach out to fellow farmers, extension officers and buyers and sellers. These tools are being used to obtain the best market prices, find crops in high demand, get information on pest and disease control, access to new farming practices and agricultural technologies, and communicate with other farmers and awareness raising. Furthermore, some farmers are using the ICTs to keep records of their farms (Addom and Lohento, 2014).



Figure 4: A CITARD officer demonstrating to farmers new rice planting methods in Doho rice scheme (Researchers, 2016)



Figure 5: CITARD Official demonstrating to farmers how to get information through phone, radio (Researchers, 2016)

When asked about the use of ICT tools to access production information, farmers mentioned looking for the correct use of fertilizers and high yielding certified seeds and weather information. They now have access to several information sources apart from extension workers, so they can cross-check information. This has enabled them to take farming to a higher level, by making bigger investments, and venturing into greater and precisely more multifaceted farming activities.

The radio as the most common ICT in rural households in Uganda.

The radio is the most commonly used ICT in rural households in Eastern Uganda. In a face to face interview with Mr. Abdul Tongi, a 35 year old rice farmer from Butaleja district in eastern Uganda, he has been using ICTs such as his mobile phone and radio innovatively.

He stated that:

“I learned through a local radio agricultural talk show how to set up a nursery bed and manage a rice and vegetables farm in the same scheme. Previously, I used to plant rice and vegetables through broadcasting of seeds. I have been doing this for a long time and paid off less in terms of yields. With the knowledge I got on radio and monthly training we receive from CITARD, I have been able to improve my produce a lot.”

With sensitization by CITARD through a local radio station, Abdul now plants his rice and vegetables in lines.

He also noted that:

“I now manage to locate good fertilizers for my crops. It’s easier to manage the water flow in the gardens, weeding and harvesting is a lot more simple and most importantly, my yields have significantly increased. I now sell my produce to the neighboring Mbale and Butaleja population on local market days. Sometimes customers book in advance and they pay me through my mobile phone, using the mobile money service offered by MTN”.

Use of ICTs to sustain Family Farming and strengthen youth engagement in farming activities

Information is key in agriculture and family farming, and ICTs facilitate access to timely and accurate information needed for improved agricultural production. ICTs have successfully been used to help address some of the challenges in smallholder farming through use of mobile phones (SMS), web (or mobile) applications and internet access. However many ICT tools or applications are inadequate to the farmers with less or no formal education. Different categories of the population require different ICT solutions and they are at different educational levels. For example, the Youth living in rural areas will require other ICT tools than their elderly counterparts in the same area.

But In order to ensure effective use of ICT applications by all small holder farmer communities, CITARD is translating contents or producing them in local languages and ICT tools that are resilient and easy to adopt by the rural young farmer are being promoted.

Capturing, documenting and disseminating local agricultural knowledge



Figure 6: A focus group discussion in Butaleja where Local Knowledge is gathered from the farmers. (Researchers, 2006)

One specific characteristic of rural farming is the rich source of local knowledge that is produced and transmitted from generation to generation. This local content is very useful to the local farming communities. However, CITARD realized it's getting extinct. To salvage the situation, different ICT tools (mobile phones, tablets, computers, information systems, web 2.0 and social media tools etc.) are being used effectively in capturing, documenting, disseminating and storing knowledge and skills by local farmers, including youth, thereby preserving and improving these practices and innovations to support agricultural sustainability.

Improving access to agricultural knowledge

CITARD has trained farmers especially the youth and women in ICTs so that they can also be used to improve access of individual farmers to extension and advisory services. One interesting example shared in the a one on one interview is that of Bosco Muhofa, a young farmer from Namajji, who learned how to produce organic manure from a video he watched several times at the ICT centre in his village. This ICT center is a small room, whereby a TV set is installed with hundreds of channels, a DVD player, a computer with wireless internet connection, a telephone box, solar lanterns and a battery charger for mobile phones. All these tools are free of charge for the villagers.

He states:

“I watched a film on how to make local manure. The process was very simple and cheap. I don't need any money to buy the cow dung, chicken droppings and green grasses. It had really improved my farming”

This example also demonstrate that traditional ICTs such as the TV, radio and video tapes are still very relevant and useful to provide agricultural information in the rural setting.

4. Challenges faced by CITARD in the process of promoting ICT based agricultural knowledge management to smallholder rural farmers.

Irregular attendance of ICT training by youths, making tracking of progress difficult due to deep rural communities, sometimes the higher levels of participation from young men than young women overwhelm the trainers, Persons residing far away from the centers are unable to attend frequently, the western farming practices have led to the devaluing of local traditional knowledge. Furthermore, social tensions between farmers groups who have access to ICTs and others who do not, as well as between youth and local brokers who no longer profit from the community's ignorance of true market prices have led to the massive misconception of the project's objectives.

Proposed ways of addressing the challenges for effective access, utilization and dissemination of agricultural information.

Develop ICT training and capacity building programmes for youth in farming

Looking at the encouraging results that the of ICTs are bringing about in the lives of farmers in Butaleja and indeed other parts of the country and world, including youth, it is recommended that more ICT training and capacity building programmes are developed at different levels, that specifically target youth in family farming to that they can improve their farm production and increase profitability in a sustainable manner. For example, the use of ICTs for agribusiness, information access and exchange etc.

Strengthening rural telecentres and rural ICT access points targeting farming

The strengthening or establishment of well-managed telecenters/community ICT centres or ICT4Ag centres in rural communities can offer the young family farmer a one stop place to practically access to ICTs and harness diverse applications to support their activities. This will reduce marketing and management communication costs, improve their knowledge and ultimately increase agricultural productivity. It will also support development of non-farms economic activities.

Developing and using ICT tools and applications adapted to rural conditions

When new ICT applications and tools are developed, the rural setting and conditions under which smallholder farms operate should be taken into account. For example, applications should be in local languages, and the tools should be resistant ones that can run with low energy. Solar energy should be promoted.

Using ICT to support extension delivery

The potential of ICT to be used in e-extension service to bridge the gap of extension officer to farmer ratio has not been fully exploited. ICT providers must focus on using the various ICT tools to bring research findings and farm innovations from the research institutions to family farms owners. Here too, the youth can play useful role by interpreting the messages to the farmers and helping them to adopt the innovations. Young women in particular can benefit of these platforms to get increased agricultural knowledge, if needed via distance learning and interactions.

Strengthening the role of rural youth as agricultural information brokers via ICTs

As highlighted throughout the e-debate, the role of youth as innovation brokers cannot be overlooked. To further encourage them to undertake this role and facilitate the process, the use of ICTs should also be encouraged.

5. Conclusion:

ICTs have a critical role to play in developing agricultural value chains around key crops and livestock in the rural areas and supporting smallholder farmers. Rural farmers who majorly comprise of youth and women have become an integral part of the agriculture and can become the brightest future leaders in industry hence supporting our economy. To ably perform their roles, there is a salient need to support their efforts and abilities by improving on the way they communicate and interact with fellow farmers, buyers and suppliers as well as extension officers. ICTs are very well positioned to support them. Government, individuals and other stakeholders including academia must come up and directly and positively support small farms and rural communities. By working together, particularly through partnerships and providing subsidies on ICTs, we can ideally develop stronger national knowledge systems in agriculture, build capacity right across the value chains, and to improve the quality of information used for decision making through effective search and research. Finally to boost growth and productivity, we need to close the gaps between males and females in agriculture and build a sound ICT infrastructure the tackle the issue of the digital divide (Addom and Lohento, 2014).

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