

Research Application Summary

**Enhancing agricultural knowledge sharing among smallholder farmers in Uganda:
An evaluation of mobile and web technologies**

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Abstract

Agricultural information is critical in improving smallholder agricultural production and linking increased production to markets. Publically funded research and indigenous knowledge are the main sources of agricultural knowledge for smallholder farmers. It is important to ensure that knowledge is disseminated to users to support the innovation process. Information and communication technology (ICT) play a critical role in expediting knowledge sharing and management in a cost effective manner. The emergence of ICTs such as mobile phones has opened unprecedented possibilities to advance smallholder farming. In this paper, we present a review on the use of mobile phones to enhance agricultural knowledge sharing among smallholder farmers.

Key words: Agriculture, information communication technology, knowledge sharing mobile phone.

Résumé

L'information agricole est essentielle à l'amélioration de la production des petits exploitants agricoles et à relier la production accrue aux marchés. La recherche et les connaissances endogènes sont les principales sources de connaissances agricoles des petits agriculteurs. Il est important de veiller à ce que la connaissance soit diffusée aux utilisateurs pour soutenir le processus d'innovation. Les Technologies de l'Information et de la communication (TIC) jouent un rôle essentiel dans l'accélération de la gestion et du partage des connaissances d'une manière rentable. L'émergence des TIC tels que les téléphones mobiles a ouvert des possibilités sans précédent pour faire avancer les petites exploitations agricoles. Dans cet article, nous faisons une étude critique de l'utilisation des téléphones mobiles pour améliorer le partage des connaissances agricoles parmi les petits agriculteurs.

Mots clés: Agriculture, Technologies de l'information et de la communication, téléphone mobile.

Introduction

Up to 62.8% of the population in sub-Saharan Africa (SSA) region live in rural areas where there is poverty and scarcity of agricultural information. This has led to difficulty

in transforming at scale subsistence farming towards a more commercial orientation. (Diao *et al.*, 2010). Africa has seen remarkable innovation towards aiding agro information dissemination to smallholder farmers through mobile phones (Gakuru *et al.*, 2009). This is important especially as acknowledged by Munyua *et al.* (2008) agriculture is vital in facilitating inclusive social and economic development of most African countries. In 2014, the Ugandan government prioritized smallholder agriculture as an area for strategic investment to create wealth and support economic growth (NPA, 2014). In this strategy, shortcomings that affect development and service delivery in Uganda's agricultural sector among which is absence and limited access to useful information by farmers are identified. Remarkably, today the role of ICT in supporting farming cannot be ignored and its unprecedented potential to disseminate agro-information required by smallholder farmers is increasing globally. Emerging ICTs have improved smallholder farming agricultural production through provision of timely access and sharing of knowledge (Muriithi *et al.*, 2009). This advancement has been attributed to the brisk increase in mobile networks, computing and processing power. This has powered a couple of mobile initiatives to provide smallholder farmers with agro-information across the continent. Indeed the manner through which mobile phones are used to provide agro information has changed with advancements in mobile phone developments over the years. The adoption and adaptation of mobile phones as a solution is aimed at filling the timeliness gap and also seeks to bridge the growing split between rural smallholder farming communities and institutional researchers who are currently the primary source of advisory information. In this paper, we present a review on the use of mobile phones to enhance agricultural knowledge sharing among smallholder farmers.

Literature Review

Mobile telephone and agricultural information. In Uganda, the mobile market is both large and is fast expanding as mobile ownership has expanded while growth in fixed lines has also increased but **not fast**. In 1996 there was telephone capacity of 45,145 fixed lines and 3,000 mobile phone lines as compared to 71,056 fixed lines and 1,040,420 mobile phone subscribers in 2004 (Tusubira *et al.*, 2005). Between 2004 to 2016, the number of mobile phone users has increased and functionalities on these phones has improved with the introduction of smart phones. Mobile phones are transforming lives of many smallholder farmers and are widely recognized as an important current and future technology platform for developing nations (Lehr, 2007).

In Africa, inadequate policies coupled with globalisation, and climate change has led to increased challenges by small hold farmers that could be solved by ICT innovations. Over the years, a number of innovations have existed as individual projects rather than collective efforts. Different ICT platforms have been preferred due to difference in literacy levels of smallholder farmers. Munyua *et al.* (2008) in their findings show that radio stations and cellular phone have become important tools in improving small-scale agriculture in rural areas. In Uganda one of the agriculture ICT based innovations, Kudu trade and infotrade are agro-market web based tools that can be accessed with mobile

phones. It gives insight on current market prices, providing an SMS bidding functionality where Agro sellers ask prices and buyers reply with bidding prices. Platforms like Kudu have helped to enlighten farmers about price trends but have fallen short of providing contextualized information relevant to specific smallholder farmer needs and the level of detail is lacking.

As ICTs have evolved in agriculture, they have become more pervasive to those that find them beneficial. Mukhebi *et al.* (2007) discusses findings that show how modern ICTs now offer unprecedented potential to deliver information to poor rural communities and link them to remunerative markets, and thus contribute to alleviating food insecurity, poverty and transforming social and economic conditions. The findings further show that information technology, together with the ability to use it and adapt it, is the critical factor in generating and accessing wealth, power, and knowledge in smallholder farming communities (Mukhebi *et al.*, 2007; Munyua *et al.*, 2008). Growth in mobile phone usage has been explosive and now reaches more than a third of the population. This has reduced transaction costs, broadened trade networks and facilitated linkages to employment opportunities.

Use of ICT in smallholder farming. Using ICT to access market information improves farmers' sales and prices. This gives a positive impact on poverty alleviation and people's livelihoods. However, there is a likelihood of adverse impact of ICT on the rural poor and disadvantaged groups if not well planned and implemented (Mwakaje, 2010). states that ICTs can result in the marginalization of economically disadvantaged groups within developing countries. This is because rural farmers value communication methods, information sources differently and infrastructural issues play a key role in ICT adoption. Foreexample, best practices in developed countries such as supplementing food production with food aid and food stamps (Mwaniki, 2006) only solve the symptom of limited food production in the developing world but not the root causes. Other efforts (Munyua, 2000; Mwaniki, 2006) report possible solutions including interventions to enhance nutrition in communities, interventions to facilitate easy and timely access to markets, building capacity or empowering rural communities, evidence-based policy making, and interventions to create employment for disadvantaged groups, among others. Detailed guidelines of how these possible solutions can be implemented or realized are hardly available. This calls for the need to adopt Information and Communication Technologies (ICTs) to enable the development of a detailed approach that operationalizes and synergizes existing ideas and other ideas towards addressing low production among smallholder farmers. Mwakaje (2010) emphasizes that precaution should be taken on when, where, how and which ICT tools should be used by rural farmers to access market information.

There are several examples of mobile innovation using SMS, including systems such as Frontlines SMS and applications like Twitter, to reach many individuals with advisory information in an efficient and timely manner. The attraction of SMS is based on its low cost and ability to work on all types of mobile phones (FAO, 2012). According to

Duncombe (2012) there are cases where communally owned mobile phones were used to get agro information through voice and SMS. A number of mobile ICTs that have been around since major advancements in mobile technology are reviewed in USAID (2010). These include, E-Soko used in several Sub Saharan African countries, M-PESA in Kenya, Infotrade in Uganda, among others. All these are mobile ICT tools that provide farmers with information on market and market prices. This helps them make decisions regarding when to harvest, when to sell, and how to negotiate prices. The International Small Group and Tree Planting Alliance (TIST) is training farmers involved in community-based reforestation projects in Kenya and Uganda to use Personal Digital Assistants (PDAs) and Global Positioning Systems (GPS) technology to gather reforestation data, which is then uploaded to an online database. In Tanzania, the Family Alliance for Development and Cooperation (FADECO) is using PDAs to access agricultural information, while Manobi in Senegal has developed a platform of services through which fishing professionals can access fishing-oriented or sea safety oriented data and information using PDAs. This reduces the need for face-to-face contact and reduces telecommunication and transport costs (Munyua *et al.*, 2008). According to Gakuru *et al.* (2009) there is a need to upscale projects to take into account the individual context and information needs of farmers. They recommend development of mobile solutions that are customizable, offer variable services (information provision, prices, training/knowledge transfer and transactions) with the potential to transform significantly the modus operandi of agricultural values chains.

Conclusion

Although ICT has unprecedented possibilities to transform how agricultural information, practices and knowledge can be collected and disseminated it has not been put to productive use at scale across Uganda. Grounding on the success in mobile technology advancements, innovations in line with agriculture will redefine the way smallholder farmers practice, trade and access advisory agro information. From the reviewed literature, we note efforts are lacking towards making enabling policies that guide and facilitate leverage of ICT related innovations for agriculture. We further acknowledge that communally owned farm produce can reduce challenges faced by individual.

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