

CHALLENGES FACING SMALLHOLDER FARMERS' ICT-BASED MARKET INFORMATION SERVICE (MIS) PROJECTS: THE CASE OF BROSDI AND WOUGNET IN UGANDA

Narathius Asingwire¹

College of Humanities and Social Sciences, Makerere University,

P. O. Box 7062 Kampala, Uganda

Tel. +256 752 790594; E-mail: asingwiren@yahoo.com

Julius Juma Okello (Corresponding Author)

Department of Agricultural Economics, University of Nairobi, P. O. Box 29053, Nairobi,

Kenya. Tel. 254 727869515 E-mail: jjokello@gmail.com

Abstract

Access and use of information and communication technologies (ICTs) by the smallholder rural farmer is envisaged to improve their welfare due to increased access to input and output markets. This study analyzes the constraints to the use of such tools for market linkage in Uganda and policy implications. The paper draws from a case study of two local organizations ICT-based projects namely, Busoga Rural Open Source Development Initiative (BROSDI), and Women of Uganda Network (WOUGNET). The constraints identified include lack or poor to ICT tools, poor ICT infrastructure, inadequate resources and high levels of poverty, low levels of literacy, inappropriate modes of information transfer, socio-cultural dynamics and sustainability issues. The paper argues that reaching the poor illiterate smallholder farmers requires redesigning the information content and delivery modes so that the information comes in audio form and in ICT tools that do not require literature. Also the government and private sector need to work hand in hand to ensure access and usability of ICT tools in rural areas by the former investing more in making electricity available in rural communities and the latter extending network boosters to remote rural areas

Key words: Smallholder farmers, ICT-based MIS projects, challenges, policy lessons

1. Introduction

Uganda is estimated to have a population of about 30.7 million people with a rapid growth rate of 3.5 percent per year. Approximately, 15% of this population is urban while the majority (85%) lives in the rural areas (UBOS, 2009). It is estimated that 31% of the Ugandan population lives below the poverty line constituting about 8.4 million Ugandans (GCAP Uganda 2009; UBOS 2009). The nominal per capita income currently stands at \$506 (NDP, 2010) with majority of the population receiving income from agricultural related activities. Ugandan economy is primarily based on the agricultural sector; it employs the biggest proportion

(73.3%) of the labour force and contributes 21.5% to Uganda's GDP (UBOS, 2009).

Over 75% of Uganda's population derives its livelihoods directly or indirectly from subsistence and semi-subsistence agriculture. Majority of the farming communities are smallholder farmers who by their nature have low productivity, low marketable surplus and therefore low investment (Birungi, 2007). Smallholder farmers faced with inaccessibility to adequate market information usually trade in low volumes which relegates them to thin imperfect rural markets. Access to markets for such farmers is greatly influenced by availability of market information (Barrett, 2009). Lack or asymmetry of information is thus considered to be some of major

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constraints to smallholder farmers' access to markets (Shepherd, 1996). A key issue therefore in developing smallholder agriculture in Uganda has been how to improve farmers' access to markets over time, and hence improve their welfare.

In order to increase smallholder farmers' access to markets, a number of ICT-based projects have emerged in the last one decade Uganda. These projects use new and old generation ICT tools to provide market information to farmers in an attempt to resolve information access problems. A few recent studies have examined the role of effect of new generation ICT tools (Kiiza et al, 2011; Yamano and Megumi, 2009; Burrell and Matovu, 2008). Kiiza et (ibid) find that the use of ICT-based information increases the use of high yielding seed varieties and also the margins earned by farmers. Megumi and Yamano (2009) find that the expansion of mobile phone coverage increase market participation by farmers. Burrell and Matovu (ibid) argue that mobile phones reduce transportation and other transaction costs suggesting that the improved participation in the market likely arises from the savings in transportation and transaction costs.

While studies that assess the effect/impact of ICT-based tools such mobile phones continue to grow, there has been, to our knowledge, very little focus in the literature on the performance of projects that use ICT-based applications and tools to provide market information services to farmers. In particular information on the constraints such projects encounter remain scanty. Yet learning about such constraints can help improve the design of future ICT-based projects. This study examines the constraints two ICT-based

market information service projects have encountered and discusses the policy implications of these challenges. This study focuses on two ICT-based in northern Uganda namely, BROSDI and WOUGNET. The projects were implement with donor funding to help boost farmer market linkage and farm productivity and targeted smallholder farmers. The rest of the paper is organized as follows; Section 2 provides the background highlighting the application of ICT in agricultural sector in Uganda; Section 3 presents the methodology used in carrying out the study; Section 4 provides an analysis of constraints faced by information service projects in linking smallholder farmers to markets; Section 5 is a synthesis of policy implications while Section 6 presents the conclusions.

2. Background: ICT and the Agricultural Sector in Uganda

Following the dismal performance of extension workers in providing agricultural related information and services, attempts to resolve the problem of poor access to information by smallholder farmers have focused on promoting access to information through ICTs (Asingwire & Birungi, 2008). The increased focus on modern ICT-based methods of information provision comes from the realization that they can play a major role in (i) communicating knowledge and information to rural farmers, (ii) delivering education and training modules to farmers at low cost, (iii) improving smallholder farmers' access to markets and agricultural credit, (iv) empowering farmers to negotiate better prices, and (v) facilitating and engthening networking among smallholder farmers. Despite the growth in the ICT

infrastructure, it has not been universally enjoyed especially in rural Uganda where majority of smallholder farmers reside. In the rural areas, majority rely on one form of ICT technology – the radio. With support from donors, various development partners including the government are implementing ICT-based interventions to improve access and utilization of information in various streams of development. Accordingly, the Government of Uganda set up Rural Communications Development Fund (RCDF) to improve ICT infrastructure in rural areas and make ICT services accessible. The RCDF provides financial subsidies to implementers as a means of facilitating access to basic communication services in the rural areas where majority of Ugandans live. Through the RCDF, government aims to promote a conducive environment in which agricultural information service projects such as BROSDI and WOUGNET operate.

BROSDI is a donor funded non-governmental organization engaged in promotion of increased agricultural productivity through training of farmers to adopt modern farming practices and increasing their access to market information using ICTs. BROSDI field staff, under its program code-named Collecting and Exchange of Local Agricultural Content (CELAC), recruited and organized interested smallholder farmers into groups. One member of the group (usually one that is more literate than the others) is designated to be the group's contact person commonly referred to as *community knowledge broker*. The community knowledge broker receives information from BROSDI mostly in form of an short messaging system (SMS) and disseminates it to members.

Each CELAC group was given a mobile telephone handset by the project to facilitate its operations, particularly those relating to communication with BROSDI membership and the market.

Like BROSDI, WOUGNET is a donor-funded NGO, which was established to enhance and improve access to agricultural information to and from the poor rural women farmers using various forms of communication and information technologies. WOUGNET is principally engaged in agricultural and market information dissemination to mostly smallholder women farmers in Apac district in northern Uganda where it works with 12 groups of farmers each comprising of 30 women. The 12 women groups were mobilized and formed by WOUGNET's field staff based at the project implementation office commonly known as "*Kubere Information Centre – KIC*". The Centre (KIC) is equipped with computers connected to the internet, recorders and equipment for teleconferencing. In each group, the chairperson is designated as the contact person responsible for receiving information on behalf of the group and also assumes responsibility of providing safe custody for the ICT equipments provided by WOUGNET to the group. Each of the groups was given a CD radio player and a mobile phone. The groups receive two forms of information i.e. agricultural knowledge on farming practices and market information. In the section below we present the method we use in analyzing the information collected before we discuss the performance of the two projects.

3. Methodology

This study uses a case study design based on Yin (1994). The case study

approach is especially useful in explaining observations that are not easily amenable to quantitative analysis. As Yin (1994) puts it, this design can be used to explain contemporary phenomena within some real-life context. In this case study, we use the approach to investigate factors that have conditioned the performance of ICT-based projects focusing specifically on challenges BROSDI and WOUGNET have encountered.

The information used in this case study was generated from various project boundary partners. These included project field staff, project staff at the head offices in Kampala (including project managers, financial officers, etc), policy-makers in the Ministries of ICT and Agriculture, Animal Industry and Fisheries, beneficiaries and non-beneficiaries of the two ICT projects. Study respondents were purposively selected based on their involvement in project implementation or in sectors that formulate ICT-based policies. Information was generated through detailed interviews with each of key informants/boundary partners. Additional information was obtained through focus group discussions. The focus groups comprised 10-15 farmers targeted by the project and were intended to reveal information on the benefits the farmers received from the project as well as their experiences under the project. Multiple qualitative methods of data collection were therefore used. The information collected from the boundary partners and focus group discussions were supplemented with those from desk review of the literature and field observations. Thematic and content approaches were used to analyze the information collected. The information

from the different sources was triangulated along the dominant themes for complementary purposes. Constraints in this study are deemed to be all those factors that act as barriers to Ugandan smallholder farmers from effectively accessing agricultural related market information through ICT-based interventions.

4. Case Study Findings

The study findings indicate that a number of factors constrain the performance of ICT-based projects. These factors include poor or lack of ICT infrastructure and tools, low levels of literacy, inadequate resources amidst high levels of poverty, inappropriate modes of information transfer, inequitable information provision, socio-cultural factors and negative attitude of smallholder farmers and sustainability. Below, we discuss these constraints in turns.

ICT infrastructure and tools

ICT-based agricultural information service projects are constrained by poor or lack of ICT infrastructure in their efforts to link smallholder farmers to markets as well as providing the much desired technical agricultural information. For instance, while the two projects concentrated on the use of mobile phone short messaging system (i.e., SMS) and radio and television broadcasts, not all farmers had access to mobile telephones, televisions and radios. Accordingly, although farmers were trained in the usage of these ICT tools to access market information, most of them did not have the tools needed to benefit from the training and eventually forgot how to put the skills acquired into practice. The lack of ICT tools needed to access market information by farmers meant that they continued to face the

problem of information asymmetry. At the same time, even where the ICT tools are in existence, putting them to use is also constrained by other challenges that range from unreliable power supply to low receptivity of radio (Asingwire and Birungi, 2008; Mandanda, 2010).

Lack of reliable power supply, limited network coverage, and low receptivity of radio make it difficult for the projects to reach all the target members. At the same time, network coverage in most rural places is very poor. The normal practice has been for mobile phone companies to extend the network only to major trading centers and a few kilometers away from those centers. This makes the use of mobile telephony and web-based technologies by farmers that reside far from these centers difficult. At the same time, the inability of the remotely located farmers to access network cuts off majority of the poorer farmers who tend to be located away from the urban centers (Chambers, 1983). Such remotely located farmers also tend to have no radio coverage especially the FM radios which are commonly used by most ICT-based projects including BROSDI and WOUGNET. Where the phone network coverage exists, some have no access to electricity to be able to charge the phone battery. As a result, farmers are unable to access agricultural and market information because of poor network coverage or lack of battery power on the phone. At the same time, it takes time for the project to reach such remotely located farmers with information because event messages sent via SMS only become accessible when the phones are eventually turned on or the farmer moves his phone to an area with network coverage (Muto et.al, 2009)

Focus group discussions with participants indicated that electricity for powering ICT tools was the primary constraint to deploying ICT-based interventions such as market information services. Although generators and dry cells can be used as alternative sources of power, these alternatives are expensive and unaffordable by the rural majority of poor rural farmers. In addition, rural areas commonly lack landline telephone. The teledensity (main telephone lines per 1000 inhabitants) is less than 0.1 in rural areas in Uganda compared to a worldwide average of 11 and 9.5 for South Africa (Communication for Development Group, 1998). Low bandwidth, congestion and high costs for international calls further constrain telecommunications in Uganda. Given all this, and as Munyua (2003) observes, new ICTs may not be such a cheap means of expanding rural information systems.

Whereas ICT tools such as mobile phone, radio and web-based technologies are considered by both BROSDI and WOUGNET as most appropriate in relaying information to their target beneficiaries, these tools are not accessible to majority of smallholder farmers. Overall, very few rural farmers have personal mobile phones or computers and in some instances, farmers own radios that don't function due to lack of electricity or money to buy dry battery cells. WOUGNET has tried to overcome this problem by working with farmers organized into groups and entrusting the responsibility of disseminating ICT-based information to the holder of the group's mobile phone and/or radio i.e. the group's chairperson who becomes a gate-keeper to information. This link-person is then

expected to pass on the information to group members. The problem with this approach is that information dissemination depends on the character and personality of the link-person. In the event that this link person leaves the group involuntarily or voluntarily, then the group is deprived of information services.

Low levels of literacy

Most of the smallholder farmers targeted by both BROSDI and WOUGNET are either semi-literate or illiterate and are therefore not able to effectively use modern ICT tools. Majority of these farmers cannot for instance use most functions in the mobile phones (including reading and sending text messages) or use internet of to access agricultural information. Indeed, Madanda (2010) found that users of Mobile phones tend to have relatively high level of formal schooling and concluded that users or users of ICT tools, whether women or men were mostly educated elites. In the case of WOUGNET, for instance, one group of 30 members, had only about 3 members who could write/compose and send or retrieve and read an SMS using mobile phone. Thus whereas the WOUGNET project targeted the poor farmers and intended to help strengthen their participation in the market, the approaches available to the project for providing such farmers with the agricultural and market information necessary to do so ended up alienating many of the poorer illiterate farmers. Illiteracy therefore constitutes a major barrier in using the ICT tools to improve market participation by the poor and illiterate smallholder farmers. High levels of illiteracy in project areas is exacerbated by the high school drop-out

rates especially at primary level usually before such dropouts have acquired functional literacy skills in the English language.

Some new ICT-based projects are making efforts to integrate the use of local languages ICT-based market information content. Nonetheless, this approach does not still resolve the problem of inability to read by the majority of rural farmers. At the same time English is still the dominant language used in web-based applications. These findings suggest the need for redesigning the approaches for disseminating information from mobile phone SMS or English content radio and web-based broadcast to audio vernacular broadcasts. One approach applied by WOUGNET that used this approach was the used of pre-recorded CD Roms, videos and DVDs that the farmers can then play on computers, TVs and/or DVD players and listen to the content. Other ICT-based projects have also tried to resolve the language and illiteracy problem through the use of interactive voice-activated CD Roms.

Related to illiteracy or semi-literacy, the lack of information search skills also constrains use of ICT tools to obtain agricultural and market information. Computer-based information systems assume a minimal level of competency in search skills in which majority of farmers, even those with access to computers and internet lack. In addition, most of the agricultural and market information available online is not indexed systematically. Consequently one needs to be well-versed in information search skills to interrogate the system and to effectively use the information found to meet ones' information need.

Lack of adequate resources and high levels of poverty

ICTs can help poor agricultural communities improve their livelihoods by linking them to markets (Burrell and Matovu, 2008). There still remains significant barriers to their adoption by farmers who live under conditions of abject poverty that characterize the areas targeted by the two projects in this study. For such farmers, there are often immediate competing priority needs for the household budget, most of which are the basic survival needs such as food, healthcare for family members, clothing and education. Under such circumstances, spending money on information is not as compelling as spending it on basic needs. Participants of the focus group discussions and the key informants interviewed in this study argued that the appreciation of the role of agricultural and market information in poor communities is still low in rural Uganda and likely to remain so to the extent that if user-fees are levied on services provided by ICT-based projects the targeted/would-be users would simply quit using such information.

In the study areas, as in most rural communities of Uganda, few smallholder farmers can afford to use mobile phones to access agricultural information. A mobile phone call costs about Uganda Shillings (UG.SHS) 360² while an SMS costs about UG.SHS 100. The call tariffs (both voice calls and SMS) are therefore still rather high for an average smallholder farmer in Uganda. Lack of adequate resources, especially money, is not only a constraint to farmers interested in using ICT tools, but also to the ICT-based project managers trying to reach farmers.

² USD is equivalent to Uganda Shillings 2,450/= (July 9, 2011)

Project managers argued that they cannot interact with farmers by providing them agricultural information as frequently as they would wish to because doing so rapidly increases the transportation and communication costs. The findings with regard to the costliness of using ICT tools by rural farmers corroborate those of Okello et al (2009).

Unidirectional mode of information transfer

In both BROSDI and WOUGNET, information is provided via system that allow limited to no feedback. The provision of agricultural and market information via some of the ICT tools such as the internet in these projects is largely one-way, from the Provider (i.e., the project) to a receiver (i.e., the farmer) making the latter a “passive” participant and denying him/her the opportunity to ask questions and/or interrogate the ICT system. It also denies the provider the opportunity to receive instant feedback from the users. This ‘top-down transfer of electronic knowledge’ model for agricultural information systems denies the often illiterate smallholder farmers the freedom to question the validity of the information and/or applicability of the project services to their situation. Appropriate modes of information transfer would require development of software that takes into account farmers’ information needs. This implies that farmers are involved in the design of the project. The two projects examined in this study both did not do this.

Socio-cultural factors and farmers’ attitudes/perceptions about ICTs

Introduction of ICTs into a traditional environment is associated with ushering

in of new changes in the daily lives of communities and affects the ways they have always transacted business. Due to fear of the unknown consequences amidst entrenched socio-cultural factors, change can be directly or indirectly resisted by not embracing it. Similarly, coupled with high levels of illiteracy, male chauvinism is still very strong in Ugandan rural communities. This has negatively affected the use of ICT-based services provided by the BROSDI and WOUGNET by women to enhance their access market information. Madanda (2010), for instance, suggests a link between ICT use and violence against women, which potentially discourages women from using ICT tools to access agricultural information services. The focus group discussions with farmers from the communities covered by the two projects revealed that an increasing number of women have been experiencing spousal conflict arising from mobile telephone use as a result of suspicions, love issues and calls received late in the nights, all of which can greatly constrain the usage of mobile phones for agricultural transactions. Focus group and key informant interviews further revealed that the high incidence of illiteracy in the project communities initially reinforced farmers' negative attitudes and perceptions about the use of ICT tools for agricultural purposes. For instance, in the case of WOUGNET, men were initially not allowing their wives to fully participate in the project by refusing to let them use phones for market information access. The project managers had to spend time and effort educating the community about the benefits of the project in order to overcome some of these socio-cultural barriers to using ICT tools to access

market information and hence participate in the market, although some still remains.

The virtual-nature of some of the ICT tools used by the projects to provide market information to farmers also affected their usage. For instance, some participants of focus group discussions expressed discomfort in dealing with traders via e-mail or phone. They are suspicious of the whole environment of trading using ICTs for fear of being cheated by shrewd traders. Using ICT tools in agricultural transactions eliminates physical contact and hence a personal assessment of the type of trader one is dealing with. Indeed, some farmers who belong to the two projects still go ahead and arrange physical visits to mobile phone contacts to ascertain of their true existence and negotiate prices before actual delivery.

Sustainability of ICT Projects

The two projects examined in this study had obvious long-term sustainability problems. Both projects have been heavily donor-funded, although both are making some efforts to generate revenues from the services they provide to farmers. Sustainability of any project needs to be inbuilt at the time of its commencement of operations with clear "donor exit strategy" for the project to have greater odds of success. Discussions with project management and staff did not reveal any appropriate exit strategy. It emerged from the interviews with managers that the role of the projects in improving the conditions of rural communities and the hand-over of such projects to beneficiaries is often at variance with the fact that that these projects act as a source of employment for the founders. Thus founders hang on for as long as it takes, usually ruining the

chances of the project to sustain itself upon take-over by the community.

The difficulty of the communities to afford the costs of information services also suggests that ICT-based projects will need to be perpetually subsidized to meet the needs of poorer farmers. Perpetual subsidization of ICT-based projects on the other hand implies that project will only survive when there is external support. Closer look at the ICT-based market information services (MIS) will reveal that there is a component of these MIS that have public good characteristics. For instance, radio broadcast of market information makes the information available to all the farmers through the signal coverage areas. Hence such farmers would benefit even if they do not invest in the generation and broadcast of the information. Hence it would appear that provision of some forms ICT-based market information services will certainly require external support to be sustained. This support could come from the government or from a development partner.

Both BROSDI and WOUGNET project managers indicated that that even if their donors were to stop funding their activities, they would still continue operating but change their strategies. One such strategy change would be to reduce the portfolio/package of the services they offer to the farmers. The managers further indicated that they have tried to link their farmers to other partners including government and expect that these partners would adopt the project upon donor exit to ensure the continued access to market information. In some communities, model farmers have been identified and trained to act as sources of information and learning for fellow farmers. Through this, and the

established information centres on ground, the project managers hope that farmers will continue accessing information even when the projects have closed. Although this would act as a stop gap measure, project implementers concurred that other aspects of the project aimed at providing information to farmers through training and conducting field visits would be stopped due to their costly nature.

5. Summary, conclusion and policy lessons

This paper examines the challenges facing two ICT-based projects in Uganda designed to help link farmers to markets. It finds that ICT-based projects face serious challenges including ICT infrastructure, socio-cultural and economic factors. It especially finds that poor network coverage limits access to information by remotely located farmers. The study also finds that high levels of illiteracy and poverty limit access by the poor smallholder farmers to ICT-based market information services and thus limits their market access because the market information content tends to be in English. In addition, the study finds that poor access to electricity makes it difficult for remotely located farmers to benefit from projects that use ICT-based project. These problems are exacerbated by socio-cultural factors that militate against free participation in the ICT-based projects especially for women who tend to form the majority of rural farmers.

The study findings imply that although ICT-based projects focus on the poor smallholder farmers, they can alienate the poorest farmers since these farmers tend to be illiterate and are remotely located thus have no access to electricity to charge their phones. They also lack

the literacy skills needed to use the market information content in ICT tools which often is in English language. The study findings with respect to illiteracy imply that reaching the poor illiterate smallholder farmers will require redesigning the ICT-based projects, especially with respect to the information content, so that the information comes in audio form and in ICT tools that do not require the user to be literate. An example of such tool is an interactive audio tool such as CD Rom which farmers can listen to and interact with through voice activated mechanism. The finding relating to poor access to electricity implies that mobile phone handset designers should focus on using freely available power sun as solar energy.

Another implication of the study finding is that the government and private sector need to work hand in hand to ensure access and usability of ICT tools in rural areas. The government should invest more in the making electricity available in rural communities. The private sector mobile phone network providers should on the other hand extend their network boosters to remote rural areas.

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