

Research Application Summary

The role of mobile phones in accessing agricultural information by smallholder farmers in Ethiopia

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Abstract

Information and communication issues have been key topics for agricultural education and extension for decades. Farmers need information on weather forecasts, inputs, improved cultivation practices, pest and disease management and market prices. Old information and communications technologies such as radio and television have been and continue to be important tools in the attempt to link farmers more closely with market demands, yet access to agricultural information continues to be challenging to smallholder farmers. The rapid growth of mobile phone use in developing countries has introduced a technology that offers several advantages over other alternatives in terms of costs, geographic coverage and ease of use. Although a 'new' information technologies have created additional media for overcoming the information gap, a number of factors pose limitation to the accessibility of information for rural communities. In line with this, a study was conducted in the Eastern Hararghe Zone of Oromia regional state of Ethiopia to assess the current status of mobile phone use and to determine the major factors affecting mobile phone use by smallholder farmers in the study area. Descriptive statistics and a binary logistic regression model were used for analyzing the data. Among the 120 sample respondents, majority (67.7%) were mobile phone users. The study indicated that education level, family size, off-farm income and perception of mobile phone use were significant determinants of mobile phone usage. Characteristics of farmers can be used to introduce and promote use of agricultural information through mobile phones to improve agricultural performance in Ethiopia.

Key words: ICT, information, mobile phone, smallholders

Résumé

Les questions d'information et communication ont été des sujets clés pour l'éducation et la vulgarisation agricoles pendant des décennies. Les agriculteurs ont besoin d'informations sur les prévisions météorologiques, les intrants, les pratiques culturales améliorées, la gestion des ravageurs et des maladies, et des prix du marché. Les anciennes technologies de

l'information et des communications telles que la radio et la télévision ont été, et continuent d'être, des outils importants dans la tentative de relier plus étroitement les agriculteurs avec les exigences du marché, mais l'accès à l'information agricole continue d'être difficile pour les petits exploitants agricoles. La croissance rapide de l'utilisation du téléphone mobile dans les pays en développement a mis en place une technologie qui offre plusieurs avantages par rapport à d'autres alternatives en termes de coûts, la couverture géographique et la facilité d'utilisation. Bien que des «nouvelles» technologies de l'information ont créé des médias supplémentaires pour surmonter le déficit d'information, un certain nombre de facteurs causent la limitation à l'accessibilité de l'information par les communautés rurales. Dans cette optique, une étude a été menée dans le Hararghe Zone Est de l'Etat régional d'Oromia en Ethiopie pour évaluer l'état actuel de l'utilisation du téléphone mobile et de déterminer les principaux facteurs qui influent sur l'utilisation du téléphone mobile par les petits exploitants dans la zone d'étude. Les statistiques descriptives et un modèle de régression logistique binaire ont été utilisés pour analyser les données. Parmi les 120 répondants, la majorité (67,7%) étaient des utilisateurs de téléphones mobiles. L'étude indique que le niveau d'éducation, taille de la famille, le revenu hors ferme, et la perception de l'utilisation du téléphone mobile étaient des déterminants importants de l'utilisation du téléphone mobile. Les caractéristiques des agriculteurs peuvent être utilisées pour introduire et promouvoir l'utilisation de l'information agricole par le biais de téléphones mobiles pour améliorer les performances agricoles en Ethiopie.

Mots clés: TIC, l'information, téléphone mobile, les petits exploitants

Background

A factor that has to a great extent limited agricultural transformation strategies implemented over the years in Ethiopia, could be attributed to the weak research-extension-farmer linkages. This could be addressed by the use of improved access to agricultural advisory services (AAS) (Sanga *et al.*, 2013). The current advancements in Information and Communication Technologies (ICTs) have brought a new opportunity for enhancing AAS. ICT is emerging as an important medium for communication and exchange as well as a tool for development at local and community levels. However, in most developing countries this potential is yet to be effectively leveraged (World Bank, 2012). Among the modern ICTs used in Eastern Ethiopia mobile phones are widely used among the farmers (Endalew *et al.*, 2014). Modern ICTs, specially mobile phones can and support drive participatory communication, including communication from those on the margin of traditional research-extension process and used to deliver services to the larger numbers of rural people than they could not reach before. According to Trading Economics, (2014) there were more than 25 million mobile phone subscribers in Ethiopia as of 2013 with majority users being urban dwellers. Hence this study was to examine how mobile phones can facilitate access to agricultural information and knowledge among farmers in the country taking Haramaya as a case study.

Literature summary

Information and knowledge are critical components of poverty alleviation strategies, and ICTs offer the promise of easy access to huge amounts of information useful for the poor on

time. ICTs have been shown to play an important role in improving education, livelihoods, poverty, agriculture, trade and health as it can contribute to better access to information and subsequently, markets and production (Rao, 2006). The mobile phone is one of the most exciting forms of ICTs, which has the potential to allow countries to leapfrog older technologies and begin converging with the rest of the world in terms of economic performance. It significantly reduces communication and information costs for the rural poor on agricultural technologies (Coyle, 2005). The livelihood of a vast majority of people in East Africa is highly dependent on income from agricultural products. Therefore, the success to reliable and timely market information is vital for agricultural development in the region and provides a basis for producers and traders to make informed marketing decisions (LMIS, 2011). The link between ICTs such as mobile phones, livelihoods and poverty stems from the recognition that information is a critical factor for development purposes. Mobile phones have the potential to amplify the speed and ease, and to introduce new modes with which information is communicated. Phones can enable interactive communication flow unhindered by space, volume, medium or time, thereby influencing the existing communicative ecologies (Tacchi *et al.*, 2003). A study conducted in Uganda demonstrated that farmers could use mobile phones to find out the latest crop prices and in Tanzania mobile phones helped farmers to save travel time and cost (Adel, 2005). Phones provide other uses as recording tools, listening devices, and catalysts for dialogue. Community radio stations are incorporating mobile phone technology into programming for advisory services in agriculture (Gakuru *et al.*, 2009). Many African countries Kenya, Malawi and Uganda, mobile banking is another ICT-based service which has had a tremendous impact on the socio-economic status of farmers. It enables them to send and receive money using their mobile phones (ITU, 2010).

Overa (2006) found that both producers and traders benefited considerably from the use of mobile phones after their introduction in 2001 in Ghana. In contrast, Jagun *et al.* (2008) found little change to the structural characteristics of transactional relationships which remained localised and intermediated. In fact the use of mobiles had consolidated the power and influence of market intermediaries (middlemen) due to their role in accessing complementary market resources such as access to capital and materials. Similarly, a study carried out in India points towards the strong position of established commission agents and traders in local supply chains who are the major price setters. Traders and input dealers also provide an important source of information particularly related to agricultural technology and techniques (Mittal *et al.*, 2010). Mobile phone usage has sharply increased and is projected to continue among rural farmers. In many areas of Africa farmers are using mobile phones where internet services are not good the farmers are obtaining the information about agriculture issues (Gakuru *et al.*, 2009). Most regions in Asia and sub-Saharan Africa show varying levels of mobile telephony ownership. Digital wireless phones have great potential to bridge the gap between the “haves” and the “have-nots”, given their accessibility, affordability, and fast infrastructure implementation. As of ITU (2012) report, in Ethiopia 20.524 million cellular phones and 797,500 main line phones were in use. According to the same report in 2007, there were 89 internet hosts and 447,300 internet users in 2009. Although mobile phone coverage is mostly limited to major cities, it is making rapid advances in most of the countries in the Eastern Africa region (Aker, 2010).

The important route to reduce poverty in rural areas is considered to be the enhancement of market participation by rural farmers, as it can increase net returns to agricultural production (Verheye, 2000). Better access to agricultural information is expected to improve farm productivity, reduce cost and or encourage market participation by farmers. Jensen (2007) and Aker (2008) both exploit the staggered introduction of mobile phone coverage to estimate the impact of mobile phones on agricultural markets in developing countries. Jensen (2007) finds that the expansion of mobile phone coverage leads to a significant reduction in the dispersion of fish prices across markets, as well as a decline in waste. This led to important welfare improvements for both fishermen and consumers; fishermen's profits increased by three percent, consumer prices declined by four percent and consumer surplus increased by six percent. Aker (2008) in Niger found that the introduction of mobile phones reduces dispersion of grain prices across markets by ten percent. The effect is stronger for those market pairs with higher transport costs, namely; those farther apart and linked by poor quality roads.

Mobile phones are being integrated into existing agricultural trading business chiefly because of the crucial role they play in improving the exchange of supply and demand of information between farmers and buyers (Verheye, 2000). In Uganda, Martin and Abbott (2011) also conclude that farmers used their phones for a range of farming activities, especially to coordinate access to agricultural inputs (such as training, seeds or pesticides) (87% of farmers), accessing market information (70%), requesting agricultural emergency assistance (57%), monitoring financial transactions (54%) and consulting with expert advice (52%). A study in Peru observes that the introduction of mobile pay phones in selected Peruvian villages had raised agricultural profitability by 19.5% by increasing the value that farmers received for each kilogram of agricultural production by 16% and reducing agricultural costs by 23.7% (Beuermann, 2011).

Based on a review conducted across 17 Sub-Saharan African countries, Calandro *et al.* (2010) argued that the national objectives of achieving universal and affordable access to the full range of communications services have been undermined either by poor policies constraining market entry and the competitive allocation of available resources; weak institutional arrangements with a dearth of technical capacity and competencies; and, in some instances, regressive taxes on usage. Munyua (2008) summarized the main challenges and factors that influence the use of ICTs as: high cost of available technologies, inadequate infrastructure and low ICT skills, poor and expensive connectivity, inappropriate ICT policies, language barriers, low bandwidth, inadequate and/or inappropriate credit facilities and systems. In effect, the combination of these constraints would result in a digital divide between the urban and rural areas.

Study description

The study was carried out in the rural area of Haramaya district, Eastern Hararghe zone. The study area lies between 9°22'03''-9°27'12'' N latitude and 41°58'14''-42°05'26'' E longitude at altitude ranging from 1980-2343m above sea level and about 505 km east of the capital city Addis Ababa. The area is characterized by a mean annual rainfall of 751mm.

The maximum and minimum mean annual temperatures of the area are 23.8 and 9.6 °C (Duguma, 2013).

The dependent variable was use of mobile phone for agricultural information as dummy variable taking the value of 1 if sample respondent household is using mobile phone for agricultural information and 0 otherwise. As independent the following variables were hypothesized to affect utilization of mobile phone for agricultural information. Age of the household head, Sex of respondents, Household head education, Family Size, Farm size, Off-farm income, Perception of use, Distance from farmer training center (FTC), Social Participation and Farmers group Membership. Ten explanatory variables (five continuous and five dummy) were included in the model. Table 1 shows the summary of the variables hypothesized to affect the farmer’s uses of mobile phone for agricultural information.

Research application

Once the decision was made regarding the variables to be included in the model, the maximum likelihood method of estimation (MLE) was used to elicit the parameter estimates of the binominal logistic regression model. Based on the model results only family size were found to have a negative sign, while the remaining variables, education, access to off-farm income, and perception of use had a positive sign of association with use of mobile phone among farmers. Despite their differences in relative weighting of factors, most researchers came up with different results as to what factors can influence farmers’ use of mobile phone in agricultural information. Arokoyo (2005) considered the socio-economic, cultural and technological characteristics as the decisive factors that affect use of mobile phone among

Table 1. Parameter estimates of the logistic regression model (n=120)

Variable	Odds ratio	Std. Err.	z
Household head age	1.04Ns	0.05	0.91
Sex of respondents	0.23Ns	0.24	-1.40
Household head education	1.70***	0.36	2.53
Family size	0.64**	0.14	-2.10
Farm size	2.18Ns	1.21	1.41
Off-farm income	5.41 *	5.22	1.75
Distance from FTC	0.99Ns	0.25	-0.03
Social participation	2.69Ns	2.54	1.05
Farmer group membership	0.519Ns	0.49	-0.70
Perception of use	13.61**	16.09	2.21

LR chi2 (10) 107.09
 Probability > chi² 0.0000
 Pseudo R2 0.7010
 Log likelihood -22.836164
 Number of observation 120

Ns not significant, ***, **, * significant at 1%, 5% and 10% probability level respectively

Source: model output, 2015

farmers. To mention some, household characteristics (age, sex, family size, education level and so on), farm characteristics (farm size, off-farm income), and institutional arrangements (access to social participation, access to farmers group membership, distance from farmer training center, and perception of use) are to be considered. The model result reveals that education affects use of mobile phone positively and significantly at 1% probability level. The odd ratio in favor of the use of mobile phone for agricultural information increases by 1.70 units as the education status of household head increases by one year. These study results was consistence with earlier studies (Ashraf *et al.*, 2005)

Family size was significant at 5% probability level and negatively related with the use of mobile phone among farmers. The result is consistent with the hypotheses in that those farmers who have more number of family members have the probability to feed his/her family members than buying mobile phone and then using mobile phone in agricultural information. The odds ratio of 0.64 indicates that under constant assumption the odd ratio in favor of the use of mobile phone for agricultural information decreases by factor of 0.64 as the number of family member increases by one unit. *Off-farm income* result of the study showed that significant at 10% probability level and positively related with mobile phone use among farmers. The households who had access to off-farm incomes are more than 5 times likely to use mobile phone than households who had not access to it , other things remaining the same. The finding was in line with (Chowdhury and Wolt, 2003). *Perception of use* was statistically significant at less than 5% probability level and positively related with use of mobile phone technology and congruent with the prior expectation. The households who are aware of mobile phone uses are more than 13 times likely to use mobile phone than households who are not aware to it, other things remaining the same. Result was in line with a study of mobile phone users in South Asia also highlighted perceptions among users that mobile phones had increased the efficiency of daily activities due to greater contact ability and ability to obtain information (Molony, 2008).

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