

Agricultural Information Access Among Smallholder Farmers: Comparative Assessment of Peri-Urban and Rural Settings in Kenya

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ABSTRACT: Farmers continuously gather new information to keep up with the emerging trends and technologies, and they also store and share this knowledge. The agricultural system in Kenya includes multiple sources available for the farmers as well as a wide range of ICT (information and communications technology)-based innovations for knowledge acquisition. This study investigated farmers' access to different sources of knowledge as well as ICT through a comparative assessment between peri-urban and rural settings, and found that setting and information needs are major influences on sources used. Despite the huge emphasis placed on the need to use ICTs to facilitate information access among smallholder farmers, the adoption levels of these technologies is still very low. This is largely due to lack of information about the existence of such technologies, and there is a need to create awareness about the ICT-based innovations and the potential they have for addressing the challenge of information access among farmers.

RESUMÉ: Les agriculteurs ne cessent de recueillir de nouvelles informations pour se maintenir à la hauteur des nouvelles tendances et technologies, et ils stockent et partagent également cette connaissance. Le système agricole au Kenya comprend de multiples sources disponibles pour les agriculteurs ainsi qu'un large éventail d'innovations basées sur les TIC pour l'acquisition de connaissances. Cette étude a enquêté sur l'accès des agriculteurs à différentes sources de connaissances, ainsi qu'aux TIC

Information, communication and knowledge have always mattered in agriculture, with farmers continuously seeking information, communicating with each other and sharing knowledge on new agricultural technologies. As this study found out, farmers have varying information needs and use different channels to communicate and have knowledge embedded in their attitude, practice and experiences which they share among themselves. This is true because Hartwich et al., (2007) argue that lack of exchange of information and knowledge among and between farmers and those who produce farm-relevant knowledge is the key issue in pro-poor agricultural development. The Agricultural Sector Development Strategy for Kenya (ASDS 2010–2020) lists various opportunities and advantages which can be exploited to build a robust and dynamic agricultural sector (GoK, 2010), including human resources. Knowledge such as that discussed in this study is embedded in sys-

grâce à une évaluation comparative entre les zones périurbaines et rurales ; et a jugé que l'établissement et les besoins d'information influent principalement sur les sources utilisées. Malgré l'énorme accent mis sur la nécessité d'utiliser les TIC pour faciliter l'accès à l'information parmi les petits exploitants, les niveaux d'adoption de ces technologies sont encore très faibles. Ceci est dû en grande partie au manque d'information au sujet de l'existence de ces technologies, et il est nécessaire de créer une prise de conscience des innovations basées sur les TIC et de leur potentiel pour relever le défi de l'accès à l'information parmi les agriculteurs.

RESUMEN: Los agricultores continuamente recopilan nueva información para mantenerse al día con tendencias y tecnologías emergentes, y también almacenan y comparten este conocimiento. El sistema agrícola en Kenia incluye múltiples fuentes disponibles para los agricultores, así como una amplia gama de innovaciones a base de tecnologías de la información y la comunicación (TIC) para la adquisición de conocimientos. Este estudio investigó el acceso de los agricultores a las diferentes fuentes de conocimiento y a las TIC mediante una evaluación comparativa entre entornos periurbanos y rurales. Los resultados indicaron que el entorno y las necesidades de información son los factores que ejercen más influencia en las fuentes utilizadas. A pesar del gran énfasis en la necesidad de utilizar las TIC para facilitar el acceso a la información entre los pequeños agricultores, los niveles de adopción de estas tecnologías aún son muy bajos. Esto se debe principalmente a la falta de información sobre la existencia de este tipo de tecnologías. Es necesario crear conciencia acerca de las innovaciones basadas en las TIC y el potencial que tienen para hacer frente al desafío del acceso a la información entre agricultores.

tems and is also embodied in persons. This is evidence that there is availability of knowledge in the Kenyan agricultural sector. Sustainable agriculture is knowledge intensive and Juma (2011) articulates that for this to happen, key functions like extension and commercialisation including research and teaching need to be closely integrated. This implies success in KM, managing the knowledge available from the various institutions and actors.

Effective knowledge and information management in the agricultural sector will be achieved when the right knowledge and information is delivered to the farmers and other stakeholders at the right time in a user-friendly and accessible manner. To realize this, farmers should be involved in the knowledge management process as knowledge generated in a participatory manner has a greater likelihood of being accepted and acted upon by the farmers. This participatory approach will also enable the integration of traditional or tacit knowledge of farmers with

TABLE 1 – Organisations engaged in agricultural research in Kenya

Public-funded institutions	Commodity-funded institutions	International research institutions
<ul style="list-style-type: none"> ▪ Kenya Agricultural Research Institute (KARI) ▪ Kenya Forestry Research Institute (KEFRI) ▪ Kenya Marine and Fisheries Research (KEMFRI) ▪ The University of Nairobi ▪ Egerton University ▪ Jomo Kenyatta University of Agriculture and Technology 	<ul style="list-style-type: none"> ▪ Coffee Research Foundation (CRF) ▪ Tea Research Foundation (TRF) ▪ Kenya Sugar Research Foundation (KESREF) ▪ International Maize and Wheat Improvement Center (CIMMYT) 	<ul style="list-style-type: none"> ▪ International Centre for Insect Physiology and Ecology (ICIPE) ▪ International Livestock Research Institute (ILRI) ▪ International Centre for Research in Agro-Forestry (ICRAF)

(Source: SRA, 2004)

the modern forms of knowledge, and further enhance the utilization of knowledge disseminated to smallholder farmers.

Knowledge management in the Kenyan agriculture sector (with respect to generation and dissemination)

According to the SRA (2004), there are twenty eight agencies engaged in agricultural research which fall under different categories such as public funded, commodity funded, and international research institutions and universities (see Table 1).

There are extension and advisory service providers in Kenya, both government and non-government, and the government of Kenya, recognizing the constraints facing the extension system, recently shifted to a policy of pluralistic extension provision (National Agricultural Sector Extension Policy—NASEP). This policy also appreciates that there are various sectors involved in agriculture activities and incorporates the activities of other sectoral ministries including livestock and fisheries.

Information and Communication Technologies (ICTs) also greatly influence how information and knowledge are accessed and shared in Kenya. There is increased use of ICTs in Kenya, which is viewed as an ICT hub in the Sub-Saharan region. The Kenyan government (GOK) has embraced various interventions to promote ICT use not just in agriculture, but in the government systems and processes as a whole. The national development blueprint (Kenya Vision 2030; Republic of Kenya, 2005) outlines that the Government of Kenya recognises the importance of ICTs in economic development and has initiated major steps to promote their use including the development and implementation of policies and regulations aimed at attracting investment within the ICT sector. Box 1 captures some of the interventions the Kenyan government has taken to promote ICT use.

Further, there is a huge body of knowledge embedded in the farmers' systems. As Rivera et al., (2001) articulate, agricultural knowledge is created from both modern and indigenous sources; the modern knowledge is

created through scientific research by universities and research institutes, while the indigenous knowledge or the tacit knowledge is embedded in traditional knowledge, innovations and practices of local communities and is developed outside the formal education system. Thus, indigenous knowledge equally contributes greatly to the agricultural information landscape.

Box 1 – ICT Use in Kenya

- The E-government program (www.e-government.go.ke) was established in 2004 with a mandate to manage the implementation of ICT programs in government. There is an e-government strategy in place under this program, and it envisions the use of ICTs to transform government processes and provide services, information and knowledge to all government customers. This program is one of the fundamental elements in the modernisation of the government.
- There is an open data portal in place under the Kenya Open Data Initiative (www.opendata.go.ke) which provides and makes available to the public all government data on various subjects including expenditure and other programs.
- In 2007, the GoK launched the Kenya ICT board under the Ministry of Information and Communication, to oversee the development of ICT in Kenya. It has mandates for capacity building, advisory services to the government and marketing Kenya as an ICT hub (www.ict.go.ke).
- The extension policy (NASEP) advocates for use of ICTs and mass media in the approaches used by extension service providers. This policy promotes ICT in agriculture and extension through increased investment in agricultural knowledge and information systems, and also providing incentives to the private sector which is the main provider of communication and information technology services.
- The GoK has also liberalised the mobile cellular market in the country, which has seen the penetration of mobile phones and a widespread use of these in Kenya. As a result, voice and short messaging services have gained more popularity and are thought to offer easy accessibility.

Purpose of the study

Research and extension are some of the most knowledge intensive elements of agricultural innovation systems where extension services improve the knowledge base of farmers through a variety of means, such as demonstrations, model plots, specific training and group meetings. Rivera et al., (2001) argue that agricultural extension operates within a broader knowledge system that includes research and agricultural education. They further articulate that agricultural information systems for rural development link people and institutions to promote learning and to generate, share and use agriculture-related technology, knowledge and information.

As mentioned in the introductory part of this paper, the Kenyan government's extension policy seeks to address the challenges facing the extension services in the country, including constraints such as staff and capacity. Currently the extension officer to farm household ratio in Kenya is at 1: 1093, against the recommend 1:400 (FAO). The extension policy (NASEP 2008) promises innovative approaches, including a pluralistic approach in extension service provision involving various actors from government as well as the private sector, use of ICT services and provision of a favourable environment to facilitate use of the ICTs. This approach has the potential for enhancing farmers' access to agricultural information. The question, however, is to what extent has this potential been tapped? What is the status of the adoption of the innovations?

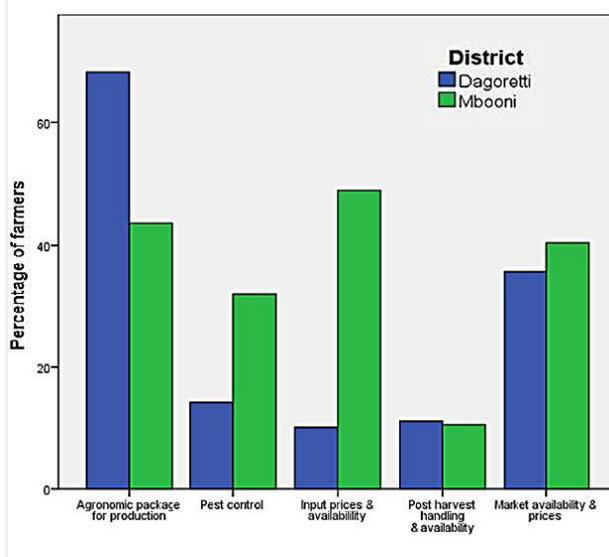
Based on these questions, the study sought to:

- Investigate the accessibility of the various sources of knowledge to the farmers, and the reasons behind the situation.
- Establish the extent to which ICT-based innovations for agricultural information acquisition are being used.
- Compare the findings between peri-urban and rural settings of Kenya.

The study was carried out in two districts in Kenya: Dagoretti and Mbooni. Dagoretti district is in the outskirts of the capital city (Nairobi) about eleven kilometers away and was used to represent the peri-urban setting, while Mbooni is the rural parts of eastern Kenya about two hundred kilometres from the city of Nairobi; this was used to represent the rural setting.

A total of two hundred farmers were reached and interviewed using semi-structured questionnaires, and additional focus group discussions (FGDs) were held with

FIGURE 1 – Farmers' information needs as seen in Dagoretti and Mbooni districts of Kenya



farmers in groups of 20–25 each. Two FGDs were held in each district and these were guided with a structured set of questions. Extension and advisory service providers present in the two districts were further interviewed and a total of sixteen representatives were reached, both government and non-government. Data was subjected to descriptive and inferential statistics using the Statistical Package for Social Sciences (SPSS) software.

Results and discussion

Farmers' information needs differ between the two settings, with farmers in Dagoretti and Mbooni citing preferences for different knowledge types (see Figure 1). The difference was seen to be significant for three types of knowledge: agronomic package, $p = 0.002$; pest control, $p = 0.003$; and inputs prices and availability, $p = 0.000$.

This difference in information needs was seen to influence the sources of knowledge commonly used. There were eight main sources of knowledge identified from the study—government extension agents, NGO extension agents¹, Farmer associations, input suppliers, Neighbours, Farmer magazines, Private Companies, and self (tacit) knowledge—and the percentage of farmers using them significantly differs between the two settings (Table 2).

Use of neighbours and one's own (tacit) knowledge as main sources of knowledge is significant in both settings,

TABLE 2 – Percentage of farmers using different sources of knowledge in Dagoretti and Mbooni districts of Kenya

District	Source used most often (%)							
	Government extension agents	NGO extension agents	Farmer associations	Input suppliers	Neighbours	Own knowledge	Farmer magazine	Private companies
Dagoretti	76.7	1.0	4.9	2.9	5.8	7.8	1.0	0.0
Mbooni	28.9	1.0	3.1	10.3	12.4	17.5	0.0	26.8

a finding which emphasizes the importance of face-to-face interaction of individuals in knowledge acquisition and sharing, and further emphasizes the importance of implicit knowledge in agricultural production. Thus, what farmers need in the way of information has a significant influence on the source of knowledge used. These results clearly show that socialisation is a major process through which knowledge is created, shared and converted within the small holder set up, with the main models used for knowledge dissemination involving the face to face interaction between the farmers and the extension agents. The presence of input supply companies indicates that there are advisory services being offered by input supply firms (such as Syngenta), described by Swanson and Rajalati (2010) as “one-on-one advisory services provided by private sector/ input supply firms to farmers who purchase production inputs from these firms.” Swanson and Rajalati also note that this model is dominant in most industrially developed countries due to its win-win arrangement but according to this study, the model is fast picking up in Kenya with Syngenta confirming that they not only work in Mbooni district, but the whole of Eastern region of Kenya.

With respect to ICT use for knowledge acquisition, 71.8% and 68% of farmers in Dagoretti and Mbooni respectively use ICTs to acquire knowledge, with only 28.2% and 32% in Dagoretti and Mbooni respectively saying they do not use ICTs for knowledge acquisition. A cross tabulation of the types of ICTs and number of farmers in each district (Table 3) shows that the most popular type of ICT used as a source of knowledge was the radio, with 87.8% of farmers in Dagoretti saying they rely on radio programs to obtain agricultural knowledge and 90.6% of those in Mbooni saying the same. In Dagoretti, the second most widely used ICT by farmers was the television, with 58.1% of farmers saying they use them to acquire knowledge, followed by the internet used by 25.7% , and lastly mobile phones used by 23%. This was in contrast to Mbooni where the cross tabulation show that the second ICT type used by farmers was mobile phones at 39.1%, followed by television (17.2% of farmers) and internet (4.7% of farmers) respectively.

The use of ICT types was influenced by accessibility of the different technologies and the reasons given by farmers were seen to differ between the two settings (Figure 2).

The results show that even though radio is widely used by most farmers and traditional forms of ICT such as radio have become more prevalent in advisory service provision with more radio stations giving airtime for agricultural programs or information (Nyirenda-Jere, 2010), only a simple majority, 54.4% and 52.2% of farmers in peri-urban and rural setting, respectively have easy access to these programs. This is because of inconsistency

TABLE 3 – Farmers’ use of different ICT types in Dagoretti and Mbooni districts

District		Types of ICT used to acquire knowledge			
		Radio	Television	Mobile phones	Internet
Dagoretti	Count	65	43	17	19
	% within district	87.80	58.10	23.00	25.70
Mbooni	Count	58	11	25	3
	% within district	90.60	17.20	39.10	4.70
Total	Count	123	54	42	22
	% of Total	89.10	39.10	30.40	15.90

and inconvenience in the timing of the programs. With the widespread use of mobile phones, especially in Kenya, voice and short messaging services have gained more popularity and they offer easy accessibility. However, these results show that the mobile-phone based technologies are not easily accessible to most farmers, mainly due to lack of information about these technologies.

Conclusion and recommendations

In conclusion, the study found that the entry of non-government stakeholders in the extension and advisory services sector has increased the farmers’ sources of knowledge because they have several options to consult when in need of information. There is a significant difference in channels used to obtain information in rural and peri-urban settings, and use of different sources of information is influenced by setting and context, based on information needs and accessibility. The study established that use of ICT is influenced by the nature of business with respect to types of crops grown, information needs and infrastructure. However, adoption levels of the ICT-based innovations are still very low and this calls for awareness campaigns, as well as training for farmers and extension workers on ICT usage to promote the adoption of these technologies. At the same time, the Government needs to ensure harmonization or put in place structures for collaboration among different stakeholders in extension service provision in order to facilitate the success of the extension policy. And finally, there is also need to ensure consistency in timing and airing of these programs for maximised uptake and use of the innovations.

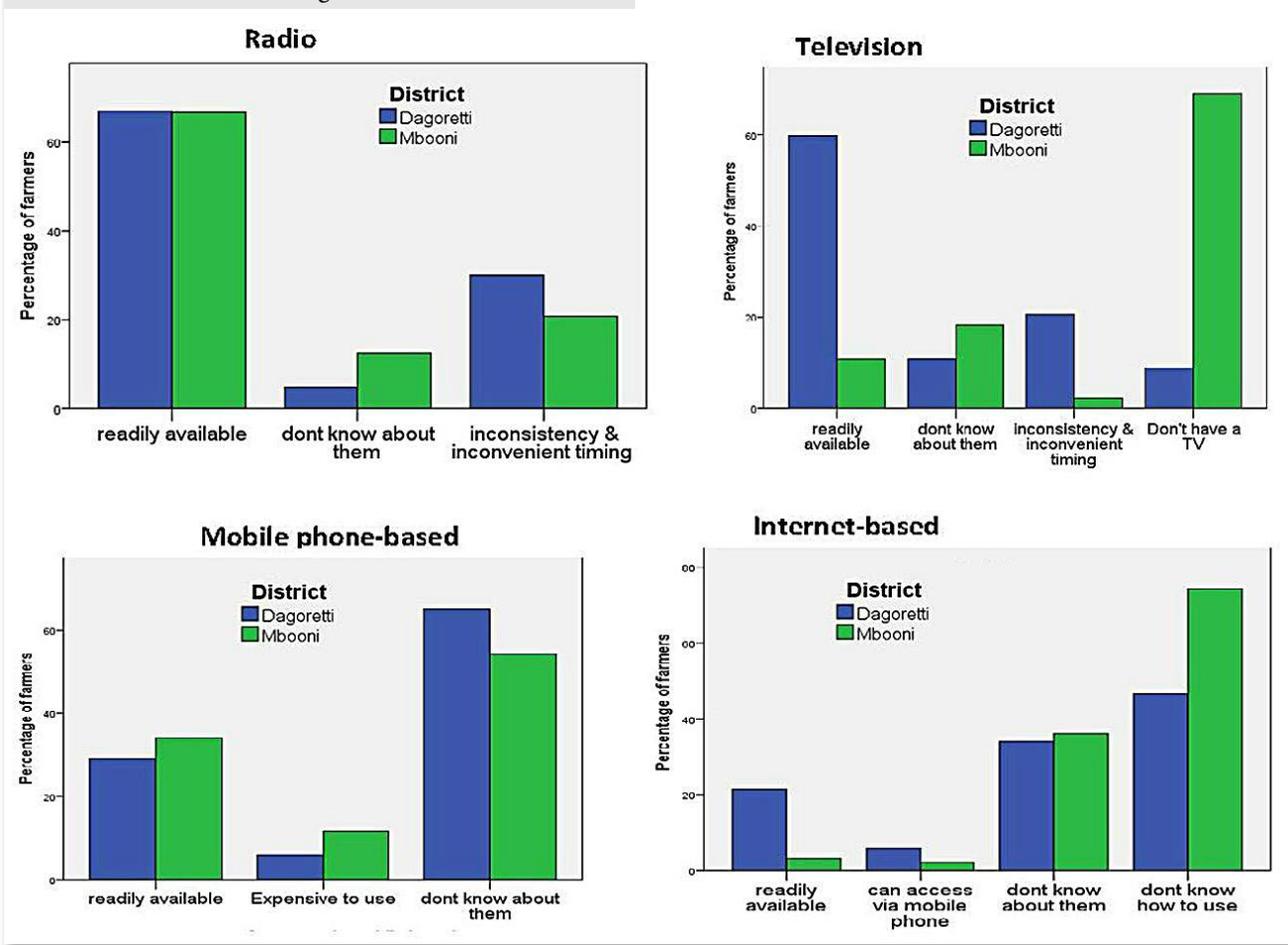
Note

1. NGO extension agents were considered in the study to include all nongovernmental organisations that offer extension and advisory services to the farmers including faith based organisations, but excluding private profit making companies.

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FIGURE 2 – Reasons influencing farmers’ accessibility of ICT-based innovations in Dagoretti and Mbooni districts



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