Is ICT in Agricultural Extension Feasible in Enhancing Marketing of Agricultural Produce in Kenya: A Case of Kiambu District

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Abstract

This paper argues that adopting information and communication technology (ICT) in agricultural extension is crucial in facilitating farmers to access new markets for their produce and acquire information on the current trend in agriculture. Agricultural extension has been the main source of information for small scale farmers but it has been faced with setbacks mainly due to past top down extension approaches and lack of adequate resources for field extension agents at the ground level. The extension system does not have updated and a modern mechanism to acquire and deliver information to farmers before it becomes obsolete. Despite these setbacks, the role of both public and private extension in agricultural and rural development in Kenya cannot be ignored. Public extension system has been offering free services to about 70% of the country's poorest population. This paper, therefore, suggests the need to integrate ICT in agricultural extension to enable producers, extension providers and other stakeholders to access updated information and become competitive.

Keywords: agricultural extension, ICT, Kenya
JEL: R20, Q12, Q13, Q16

1 Introduction

Agriculture is the backbone of Kenya's economy and its performance has a great impact on businesses, trade and livelihood of the population. About 74% of the economically active population in Kenya is employed in agriculture and 80% of the population working in agriculture are small scale farmers (FAO, 2005). Despite its significance, the real value added for the agricultural sector declined by 5.4% in 2008 mainly due to high prices of inputs and adverse weather conditions (ECONOMIC SURVEY, 2009). The contribution of agriculture to Kenya's export is equally significant but not optimal. Kenya's exports are predominantly composed of primary commodities mainly tea, coffee and horticultural products (OGAMBI, 2005). A high percentage of these export crops are produced by small scale farmers. Now that regional integration and bilateral agreements, such as the East Africa Community, the Common Market for

Eastern and Southern Africa (COMESA) and the AGOA initiative, provide Kenya market access to key trading blocks and markets (OGAMBI, 2005), a lot needs to be done for the farmers to optimally utilize this opportunity. To take advantage of these and other markets, small scale farmers require up-to-date information on markets and new technology to increase agricultural productivity and to be competitive in the regional and global markets. They need information to help them acquire and sustain new markets. For many years, since independence, agricultural extension has played the role of information providers for the farmers. As witnessed from different extension approaches, such as whole farm extension, integrated agricultural development and training and visit (T&V) approaches (REPUBLIC OF KENYA, 2008), there is a gap in market information generation and dissemination. Enhancing communication and networking between farmers, agricultural extension agents and other stakeholders in agriculture can minimize or end this gap.

GIRIDHARADAS (2009) argues that being in a network is like living in a village where people share information, and once in a network, as in a village, they are compelled to know each others businesses. Social and professional networking can therefore be instrumental to individual and business development. Using existing information and communication technologies (ICT) can improve business and networking between farmers, buyers and extension agents and also facilitate access to hidden markets. Businesses today cannot survive without ICT. The frequent change in customers' needs, for instance, requires any business to be informed of their local and global customers. Some of the ICT existing in Kenya include radio, mobile phones and internet. Today's farmer has access to the radio and mobile phone. Agricultural extension agents have access to the radio and mobile phone and may also have access to internet depending on their duties and location of their offices. Some agribusinesses have access to internet depending on the type of business and location. This paper argues that although it might be difficult for every farmer to access the internet to find new markets and sell their produce, it is possible to facilitate internet access to extension agents either by providing connection in their offices or by providing them funds to access already existing internet cafés in their region. The extension agents can then use the internet to find new markets and avail this information to farmers by posting them in areas frequently visited by farmers. A national website similar to University of Illinois Marketmaker (http://www.marketmaker.uiuc.edu/) which can be managed by extension agents can also enable farmers and others involved in agribusiness to post information about their products. This paper, therefore, attempts to discuss the significance of integrating ICT in Kenya's agricultural extension system for the benefit of farmers and national growth. In this paper, producer and farmer has been used interchangeably.

2   Objectives

(i)   To establish frequency of diffusion of agricultural information by extension agents and the role of ICT tools in disseminating this information.

(ii) To determine the percentage of farmers in the region who have identified new markets through existing ICT tools.

(iii) To identify the category of farmers who are likely to adopt ICT as a marketing tool and as a tool to acquire new markets and disseminate information.

3   Research Concept

Small scale farmers in Kenya are in desperate need of information on existing and potential markets that would offer good prices for their produce. They also require frequent information on available input and credit markets, especially those that provide affordability and guarantee accessibility. To acquire these markets and ensure sustainability they require frequent and up-to-date information. They need to know who the potential buyers are, where and how to get to them and how to sell their produce at a profit. At present, for small scale farmers, agricultural extension is the main source of this information and it is affordable and accessible to them. Unlike farmers from developed countries who may have access to adequate and current information from several sources including internet sites from reliable organizations, universities and research institutions, most farmers in Kenya rely on extension agents who may not have access to current market information, good farm produce prices etc. In countries such as the USA, extension services are offered by land grant universities. Therefore, any new information and technology is disseminated to the farmers immediately. Universities and other research institutions in Kenya play a minor role in disseminating new technology to farmers. Any new developments are channelled through several ministries offering extension services to farmers such as the Ministries of Agriculture, Fisheries Development, Livestock Development and Ministry of Co-operative Development and Marketing. Developing countries such as Kenya cannot at present compete with the developed nations in the international market in terms of production, quality and exports due to, according to QAMAR (2005) lack of resources, lack of technology, weak rural institutions, and poor infrastructure and communication facilities among others. Information technology can be integrated into the extension system to overcome these limitations to a great extent. Integration of information technology in agricultural extension is not a new concept elsewhere and Kenya could learn lessons from other countries such as Cameroon (FAO, 2005) and Russia (ANANDAJAYASEKERAM et al., 2008).

4   Research Area and Methodology

Based on the resources available to carry out the research, one district in Kenya was purposively selected for the survey. The larger Kiambu District, as per 1999 Kenya Population and Housing Census (KENYA NATIONAL BUREAU OF STATISTICS, 2007, 2008), was selected for the survey. The larger Kiambu District has now been politically split several times but this subdivision was disregarded in this research. Kiambu District is one of the seven districts in Central Province, and is adjacent to the northern borders of Nairobi, the capital city. It is one of the districts with great economic potential with its climatic conditions favouring cash crops as well as horticultural produce (JAETZOLD et al., 2006) and covers an area of 1,323.9 sq Km². The district is divided into seven divisions namely Kiambaa, Limuru, Ndeiya, Githunguri, Kikuyu, Lari and Kiambu Municipality, thirty-seven locations and one hundred and twelve sub-locations (MAKOKHA et al., 2001). The district was selected because of its proximity to the market and technology with an assumption that if utilization of ICT and networking is successful in acquiring new markets in this district, then the concept can be transferred to other regions. This assumption is based on the fact that Kiambu District neighbours Nairobi and other towns like Thika that more structurally and technologically advanced compared to other cities and towns in the country. Therefore, there is a high likelihood that farmers and residents in Kiambu District are more exposed to technology and may have access to the latest development and information compared to other districts. Due to improved road systems, workers from Nairobi are also shifting their residence to Kiambu District bringing along their technological knowhow and this may lead to booming businesses that may include computer, internet and other ICT services. If farmers in Kiambu District successfully adopt ICT and their actions lead to increased sales of their agricultural produce and improved off farm businesses, it would be easier to extend the project to farmers in other districts. A story of success sells itself. Due to the failure of various extension delivery approaches in developing countries (MADUKWE, 2006) including Kenya, farmers may want to see a new concept succeed before adopting it. The idea of introducing a new development as a pilot project has been adopted before in Kenya. In 1982, Training and Visit (T&V) extension approach was introduced as a brief project in two districts. Through National Extension Project, NEP I, it was then expanded to cover 90% of Kenya's arable land in 1983 (GAUTAM, 2000).

A multi-stage sampling procedure was used to select the households for the survey. All the divisions in the district were included in the survey and thirty five locations were then randomly selected from which 66 respondents were randomly selected for the survey.

5   Data Analysis and Models

Objective One

To establish frequency of diffusion of agricultural information by extension agents, the farmers were presented with a series of questions on information received through extension agents within the last 2 years. They answered 'yes' or 'no' to the questions. The information was analyzed descriptively and reported in tables. The 'no' answers revealed a gap between existing and expected market information. To establish the role of ICT tools in disseminating this information the farmers were asked if they owned a mobile phone. A mobile phone is a more popular ICT tool that may be available to at least one member of a household in this region especially due to the introduction of MPESA, a service that allows people to send money through the phone to any part of the country.

Objective Two

To establish how many farmers had acquired a new market through any existing ICT tool, the farmers were asked whether they have identified a new market for their produce within the last 5 years. This information was analyzed descriptively

Objective Three

Without predetermined choices, the farmers were asked the different markets they sell their agricultural produce. They were also asked if they sell their produce as a group or individually. A group market in this study is defined as one where a group of farmers sell in the same market such as co-operatives, out-grower factories and under contracts. A non-group market is one that farmers sell individually such as farm gate, local market, hotels and restaurants, middlemen, etc. The purpose is to find out which category of farmers (in a group or non-group market) is more likely to adopt ICT as a marketing tool and as a tool to acquire and disseminate information. This information was analyzed descriptively and presented in tables and graphs. Point bi-serial correlation and cross tabulation were used to carry out correlation analyses between the group marketing and predictor variables. A logistic regression analysis was used to establish the relationship between group market and predictor variables which include income, age of household head, literacy level, ownership of means of transportation, land size under food and livestock production, off-farm business, gender of household head. A positive relationship between age of household head and group marketing is hypothesized. Younger farmers are more likely to prefer individual marketing because they understand modern technology and how to use it. A positive or negative relationship between group marketing and literacy may be expected. Younger farmers are more likely to have a higher level of education and thus prefer individual marketing.

However, they may also lean towards group marketing depending on what they produce in their farms.

6   Results

6.1 Role of ICT in Dissemination of Information

Farmers receive extension from diverse sources depending on their farm activities. Farmers keeping livestock are likely to receive extension services from public and co-operative agents. Results in table 1 indicate that 47% of the farmers had not received extension services within the last two years.

Table 1.   Percentage of farmers who have received extension services within the last two years, Kiambu District, Kenya (2009)

Source of extension services	Percentage of farmers (n=66)
Public (Government)	12.1
Private	6.1
Both public and private	13.6
Farmer co-operative	4.5
Public, private and co-operative	4.5
Public and co-operative	9.1
Private and co-operative	3.0
Not receive extension services	47

Source: 2009 household survey, Kiambu District, Kenya

About 53% have, however, received market or other types of information from at least one extension system in the region. None of this information was delivered through ICT tools, such as mobile phone or computer (internet). It was delivered face to face through farm visits by extension agents, farmers' meetings and trainings and from farmers' co-operatives. This is despite the fact that about 90% of the farmers interviewed had access to some form of an ICT tool, in this case a mobile phone. This renders them "electronically" accessible. This implies that if a mechanism is put in place, extension agents and the farmers would exchange information on current market and technology using mobile phones. Although adopting mobile phones as ICT tools may not be fast due to remoteness of some homesteads and few field extension agents at ground level, use of this kind of technology has proved to be effective in the long run in countries like Lao People's Democratic Republic, Viet Nam and Mali (QAMAR, 2005). Similarly, extension agents frequently use contact farmers to disseminate

information to other farmers. The concept of contact farmers was mostly common during the Training and Visit (T&V) extension program in the 1990s (REPUBLIC OF KENYA, 2008, and HANYANI-MLAMBO, 1995, 2002). Contact farmers are influential farmers with more resources and contact with other farmers. Although none of the farmers interviewed had computers and internet in their homes, contact farmers living within proximity of cities may have access to internet and may interact with extension agents to exchange information which can then be transmitted to other farmers through other means such as boards in shopping centres. Previous extension approaches, NEP I and NEP II used contact farmers as a point of interaction with the farming community (GAUTAM, 2000). Extension agents delivered advisory information to the contact farmers who then extended the same to the other farmers in their region. Most contact farmers tend to have other activities other than farming which can give them access to internet and other technologies.

In table 2, we present the different types of information that the farmers had received from extension. The farmers were presented a list of different types of information to choose from. At least 42% of them indicated they had received information related to agricultural production from extension agents.

Table 2. **Percentage of farmers who have received different extension information, Kiambu District, Kenya (2009)**

Type of information	Percentage of farmers (n=66)
Where to buy agricultural inputs and products	42.4
Where to buy agricultural produce	21.2
About a buyer interested in your produce	15.2
On product planning	30.3
On current prices of agricultural produce	13.6
On current cost of agricultural inputs	10.6
On forecast of market trends	15.2
On sales timing e.g. to avoid market flood	19.7
On best production practices	43.9
On consumer taste	30.3
On how to add value to your produce	31.8
On post harvest handling techniques	34.8
On group marketing	28.8
On transporters of agricultural produce	16.7
On the credit market	30.3

Source: 2009 household survey, Kiambu District, Kenya

However, less than 35% of the farmers indicated having received information related to any type of market. None of this information was delivered through any ICT tool in the market. Unlike extension agents in developed countries, extension agents at district and divisional levels in Kenya may not have access to current market information. They require internet access and other technologies that would enable them to acquire necessary local, national or global market information. Using ICT to link the agents to other stakeholders would also facilitate faster information generation and dissemination. Although table 2 indicated that extension agents had provided the farmers with significant market information, table 3, however, indicates that the agents played no role in acquisition of new markets for their produce within the last 5 years. This signifies the importance of enhancing the extension system in Kenya and empowering the extension agents by providing them with a mechanism to acquire market information nationally and internationally and with a mechanism to disseminate that information to the producers. With access to internet, extension agents can access significant information that can be useful to farmers and influence their production and marketing decisions.

Table 3.   Percentage of farmers who have identified a new market within the last 5 years, Kiambu District, Kenya (2009)

Item	Farmer (%)	Item	Farmer (%)
Identified new market		**Location of new market**	
Yes	30.3	Within the district	15.2
No	69.7	Outside the district	7.6
		No response	7.5
		Not identified new market	69.7
New market		**How farmer identified the market**	
Different middlemen	1.5	On my own	12.1
Farmer co-operative	3.0	Through a neighbour or relative	12.1
Local market	12.1	Public awareness	3.0
City	6.1	Through mobile phone or internet	0.0
Supermarket	1.5	No response	3.1
No response	6.1	Not identified new market	69.7
Not identified new market	69.7		

Source: 2009 household survey, Kiambu District, Kenya

In table 3, the farmers were presented with a list of different agricultural markets. However, they were free to include markets they have identified but not on the list. The purpose was to establish how many farmers had acquired a new market through a phone call from an extension agent or through the internet. The highest percentage of those who had identified new markets (12.1%) acquired local markets which mainly

included the village open market, village eating places, neighbours and other areas that do not include farmer's co-operative and supermarkets within the district. Only 7.6% acquired a market outside the district and none of the farmers acquired an international market. The highest percentage had identified new markets on their own (12.1%) or through a neighbour or friend (12.1%) and none of them acquired a market through any existing ICT tool.

The study assumes that farmers who sell their produce in a group are more likely to share information and may, therefore, adopt existing ICT tools to improve dissemination of information and marketing of their produce. It is cheaper for a group to own a computer and connect internet than each farmer owning their own computer. Correlation between group marketing and predictor variables is presented in table 4. There is a moderate relationship (0.410, p=0.001) between group marketing and receipt of information about current prices of agricultural produce from extension agents. It is easier for an extension agent to deliver information on current prices to a group of farmers than through individual farm visits. Similarly, when one farmer in a group gets information from any source, he is likely to disseminate to members in his group rather than to those not in the group. The relationship between group marketing and keeping livestock is also moderate and significant at 5% significance level. Farmers keeping livestock lean towards selling their milk in a group, such as a farmer's co-operative, than individually. They may, therefore, adopt the use of ICT tools to communicate and acquire information on new market trends.

Table 4.   **Correlation between group marketing and predictor variables, Kiambu District (2009)**

Predictor variables	Correlation
Age of household head (AGEHH)	-0.096* (0.444)
Farmer gets information on current produce price (1)Yes (0) Otherwise) (EXT5)	0.410** (0.001)
Land size under food production (ACREFOOD)	-0.232* (0.061)
Average income per annum in Kenya shillings (AVGINC)	-0.035* (0.778)
Whether the farmer has off farm business (1) Yes (0) Otherwise (OFFBUSI)	-0.172** (0.162)
Whether the farmer have own means of transport (1) Yes (0) Otherwise (CAR)	-0.144** (0.242)
Education of HH (1) Completed primary school and above (0) Otherwise (EDU2)	-0.094** (0.445)
Sex of household head (1) Male (0) Female (GENDER)	0.070** (0.570)
Whether the farmers keeps livestock (1) Yes (0) Otherwise (LIVESTOC)	0.261** (0.034)
Land size under livestock production (ACRELIV)	-0.063* (0.617)

Outcome variable: Group marketing - 1 if the farmer sells in group market, 0 if the farmer sells in non group markets

* Point bi-serial correlation   ** Phi value   Figures in parenthesis are significance values.

Source: 2009 household survey, Kiambu District, Kenya

The estimates and model summary of group marketing are presented in table 5. The chi-square statistics (p<0.001) imply that the predictor variables contribute signify-cantly as a group to group marketing. The goodness-of-fit test statistic (Hosmer & Lemeshow R^2) is 0.993. The coefficient of gender of household head is positive indicating that the male household heads are more likely to sell their produce in group markets and therefore more likely to adopt ICT as a marketing tool. The coefficient of age of household head is negative indicating the younger farmers are more likely to sell their produce individually than in groups. Younger farmers are more exposed to modern technology. They are more likely to make direct telephone calls to buyers or surf the internet to search for new markets or to understand the current market trends. The coefficient of education of household head is positive indicating that as a household head acquires a higher level of education, he is more likely to choose group markets. Selling agricultural produce in groups, such as in farmers' co-operatives and other organized groups, ensures stable and reliable markets than individual selling. Farmers are more likely to pull their resources together and have a common computer to search or monitor the market. An example of this kind of group marketing in Kenya includes dairy and coffee co-operatives, and the Kenya Tea Development Agency that are involved in selling agricultural produce for small scale farmers. These organiza-tions own at least one computer and some have internet and are in a position to monitor changes in the market.

Table 5.   Estimates of group marketing, Kiambu District, Kenya (2009)

	Coefficients	SE	Odds ratio
Constant	21.732**	8.927	274168830
AGEHH	-0.327**	0.133	0.721
EDU2	7.861**	3.276	2593.575
CAR	1.591	1.472	4.911
ACRELIV	0.696*	0.419	2.006
EXT5	-11.161**	4.227	0.000
OFFBUSI	2.367*	1.356	10.665
ACREFOOD	-0.427	0.528	0.653
GENDER	0.970	1.560	2.660
AVGINC	0.000*	0.000	1.000
LIVESTOC	-7.751**	2.983	0.000
Model X2	42.514***		
Chi-square (Hosmer & Lemeshow) test of goodness of fit			0.993
Nagelkerke's R2			0.713

Note: * P < 0.10, ** P < 0.05, *** P < 0.01

Source: 2009 household survey, Kiambu District, Kenya

7 Conclusion

Public extension services remain significant to small scale farmers but results point towards a need to strengthen this institution to provide up-to-date market information. The study has shown there is a need to use information and communication technology in identifying new markets and in dissemination of information to agricultural producers. Results indicated that any information delivered to farmers by extension agents was not through any ICT tools in the market. More educated farmers are more likely to adopt use of information and communication technology. They, therefore, have the ability to search for new markets locally and globally. The study concludes that facilitating agricultural extension agents with mechanism to acquire new markets for farmers and to disseminate up-to-date information is crucial for development of the farming community.

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