

Contribution of ICT to Extension Service Delivery for Horticulture Farmers in Uasin Gishu County, Kenya

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ABSTRACT: Information and Communications Technology (ICT) is important for horticulture development. Lack of access to adequate extension services is a major problem to horticulture productivity. Contribution of ICT to extension service delivery for horticulture farmers in Uasin Gishu County was studied so as to establish the level of utilization of ICT by horticulture farmers and the challenges and opportunities to effective use of ICT. This study was guided by correlation research design. The findings indicate that utilization of ICT by horticulture farmers is still low. It revealed that majority of the farmers still rely on traditional ICTs to get agricultural information. Radio (65%), Television (62.8%) and mobile phone (63%) are widely used by majority of the respondents. The most effective ICT too used by horticulture farmers was the mobile phone (80%). The major challenges include lack of skills (36.8%), cost of ICTs (24%), lack of electricity (21%), language barrier (8.8%) and lack of ICT support services (8.8%). The existing opportunities should be exploited to implement ICT based extension to horticulture farmers. The County government should provide incentive to promote access to and use of ICT, integrate ICT at all levels of education.

Key words: ICT, horticulture, farmers, development.

INTRODUCTION

The use of Information and Communication Technology (ICT) by extensionists has been noted as a crucial part of extension development (Martin, Stewart & Hillison 2001). Extension has been recently defined as a system that facilitates the access of farmers, their organizations and other market actors to knowledge, information and technologies (Christoplos, 2010), a process of working with extension agents, researchers and farmers in order to bring about appropriate technology change in agricultural production and raise rural living standards (Agbamu, 2010). Goode and Elliot (1992) reiterated that for contemporary extension to provide viable educational programmes and opportunities to expanded audiences, the use of new electronic technology, including computers is inevitable. ICT in agricultural extension and rural development is significant high now where it has provided a medium to adequate access to agricultural information (CTA, 2008). Arokoyo (2005) reported that the radio and television have been the major ICTs used in agricultural extension delivery in most African nations. Mwololo (2009) mentioned that Mobile phones are common in Kenya and the numbers of internet users is increasing rapidly. A CCK (2010) report shows that there were over 19.9 million people with mobile phones and 3.9 million internet users by 2009. In Kenya, the agricultural information resources can be the best resources found in internet. Most horticulture farmers who live in villages in the country-side do not have access to information centers or libraries. (Feder et al., 2005).

Horticulture is the most important subsector in the Kenya's agricultural sector, a major foreign exchange earner. It is also key to the livelihood of many Kenyans in food security and nutritional balance (GOK, 2008). In Uasin Gishu County, a number of factors challenge the success of extension delivery system among horticulture farmers. It would be interesting to find out the extent to which extension service providers and horticulture farmers have embraced the use of ICT in extension especially in the field of horticulture. Bertolini (2004) indicated that several ICT tools have been used to improve and strengthen the linkage between extension service providers and farmers. The study, therefore, aimed at filling gaps by specifically examining the impact of ICT on extension service

delivery among horticulture farmers, with the emphasis on the levels of utilization of ICT tools by farmers and challenges and opportunities for effective use of ICT by horticulture farmers.

METHODS AND MATERIALS

The study was conducted in Wareng District (Kapseret and Kesses divisions) of Uasin Gishu County of Kenya; it has an altitude ranging from 1500m-2100m above sea level. Located in a plateau, Uasin Gishu County has a cool and temperate climate. The rain fall in the area is high ranging between 900mm-1200mm per annum. The County is situated between latitude $0^{\circ} 32' 22''$ N of the equator and longitude $35^{\circ} 19' 11''$ E with a total population of 894,179 people covering an area of 3,328 km² with 202,291 households and a population density of 269 people per kilometer square (KNBS, 2009). Uasin Gishu County was purposively chosen because horticulture is intensified in the region and most of the crops are grown for domestic and export markets. Kapseret division is the urban areas while Kesses division is in the rural areas. The County grows a wide range of horticulture produce ranging from fruits, vegetables, spices and cut flowers. Uasin Gishu County borders Nandi, Baringo, Elgeyo Marakwet, Trans Nzoia and Kakamega counties. The County has three districts Eldoret North, Eldoret West and Wareng.

Uasin Gishu County enjoys 95% mobile network connectivity due to the presence of Safaricom, Airtel, Telecom and Orange mobile companies. The County is inhabited by diverse ethnic groups. Thus the County is characterized by multiculturalism (GOK, 2007). The study population comprised of horticulture farmers (400), extension service officials from the ministry of agriculture (10), Horticulture Crop Development Authority (5), NGOs (4), and community opinion leaders (12).

Research Design

In this study correlation research design was used. This design assesses the degree of the relationship between the two or more variables namely dependent and independent variables (Mugenda, 2008). The dependent variable is the provision of extension services to horticulture farmer and the independent variable is the ICTs strategies used. The correlation research design was adopted in this study based on the conceptual relationship between the independent variable and the dependent variable. The possible relationships of independent variables in retrospect on the dependent variables were analyzed.

Sampling Strategy

Purposive sampling method was used to select key informants in stakeholder's institutions. A stratified random sample size of (400) was drawn from horticulture farmers of the two divisions. A stratified sampling ensures that observations are picked from each of the strata. To establish the estimation of sample size of farmers for multistage random sampling, the rule of thumb is to obtain as large a sample as possible. The Fisher formula (Mugenda, 2008) was used to determine the sample size. Therefore by taking the proportion of a target population with a certain characteristic as 0.50 and the z-statistic as 1.96 with the desired accuracy at the 0.05 level, then the sample size of farmers is:

$$n = (1.96)^2 (0.50) (0.50) / (0.05)^2 \\ = 384.16 \text{ farmers}$$

However a stratified sample of 400 horticulture farmers was adapted to hedge against loss of respondents from voluntary withdrawal or non response.

Primary data was obtained using questionnaires and personal interviews. Secondary sources included: internet, textbooks, government publications, journals, libraries, archives, and document analysis and government offices among others. In order to meet the objective of the study, the following instruments namely; questionnaires and interview schedules were used to collect the data. The main tools used were Questionnaires that were used to gain a general picture of contribution of ICT to extension service delivery among horticulture farmers in Uasin Gishu County. The questionnaires contained a number of items which primarily solicited for responses pertaining to the research objectives, such as the level of utilization of ICT, socio-economic characteristics and the challenges and opportunities in use of ICT by horticulture farmers in Uasin Gishu County. Personal interview schedule was used to collect information from officials of Horticulture Crop Development Agency, NGOs and the extension officers of the Ministry of Agriculture. Qualitative interviewing tends to be flexible, responding to the direction in which interviewees take the interview and perhaps adjusting the emphasis in the research as a result of significant issues that emerge in the course of interviews (Cooper, 2003). Participants in Focused Group Discussions (FGD) were chosen by quota sampling because they were rich in information as one person does not give conclusive information. The FGD gave data on group perception which were used to double check results to get accurate

answers. The FGD consisted of 8-12 people selected due to a particular knowledge they had and the researcher acted as a facilitator.

Secondary data was gathered from Uasin Gishu County office, Internet, textbooks, government publications, unpublished research work and journals. This account was based on archival research directed mainly at primary documents, both from government and horticulture industry sources.

RESULTS AND DISCUSSION

Computer Literacy

From the study findings, majority of the interviewed farmers (61.8%) which is equivalent to 247 farmers were not computer literate compared to 38.3% (153 farmers) who had computer education. Additionally, it was established from the study that majority of the interviewed farmers from Kapseret division 51.5% (103 farmers) were computer literate compared to their counterparts from Kesses division in which only 25%(50 farmers) were computer literate. It implies that the farmers in Kapseret division would be better able to use ICTs than the farmers in Kesses division. Qamar (2002) and Gurstein (2003) reported that the constraints that severely restrict the use of ICTs in agricultural extension are poor ICT infrastructure, erratic power supply, high illiteracy among information users (farmers) and low computer literacy of information providers (researchers and extensionists). See Figure 1 below

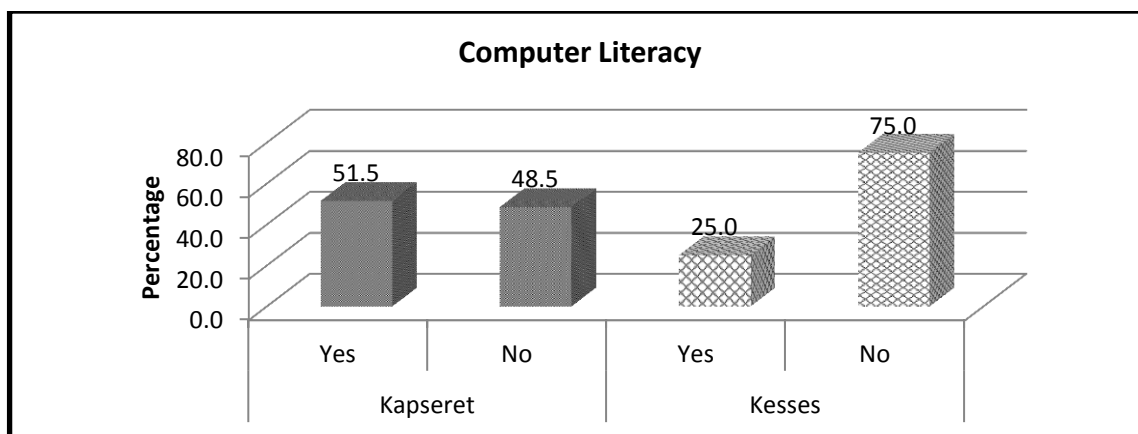


Figure 1. Computer literacy

Utilization of ICT tools

The horticulture farmers were asked if they had ever heard about ICT tools in agricultural extension services. Study findings show that majority of the interviewed farmers from both the study divisions; Kapseret 92.5% (185 farmers) and Kesses 94% (188) were aware of ICT tools in agricultural extension; thus indicating that there was much awareness on the existence of ICT tools in agricultural extension services.

On the ICT tools available to farmers in the study area, table 1 below shows which tools are available to them; 98% (391) mentioned radio whereas majority of the respondents 86% (344) mentioned television. Availability of radios can be greatly attributed to the fact that radios are relatively cheap, and understandable than other means of communication. Furthermore, 41% (163 farmers) acknowledged the availability of mobile phones and 18% (71 farmers) said that internet services were available to them. However, it was established during the field visit that internet services were available to farmers through their mobile phones. Notable was that all the interviewed farmers (100%) mentioned that computers were not available, this can be attributed to factors including cost, computer literacy levels, availability of electricity and lack of skills in using it amongst other factors.

Table 1. Distribution of respondents according to availability of ICT tools

Variable Availability of ICT tools	Available		Not Available	
	Frequency	%	Frequency	%
Radio	391	97.8	9	2.3
Television	344	86	56	14
Mobile phones	163	40.8	237	59.3
Internet	71	17.8	329	82.3
Computer	0		400	100

Source: Field survey data, 2013

Usage, effectiveness in receiving extension messages and Level of utilization of ICT

On the effectiveness in receiving extension messages, level of utilization in horticulture, and whether use of ICT has facilitated communication, various like items were utilized as shown in Table 2; majority of the interviewed farmers (80%) mentioned mobile phone as the most effective tool. This was followed by radio, and television. This is in agreement with Feder et, al. (2005) who recorded that there has been an upsurge in the use of mobile phone for agricultural information in the recent past in Sub-Saharan Africa due to its effectiveness in passing information. This view is also supported by ITU (2010) who observes that pre-paid mobile services offer more flexible payment systems that are suitable for low- income users, including marginalized people in remote rural areas who may not afford to buy computers and pay for internet charges.

Table 2. Effectiveness in receiving extension messages and utilization of ICT

source	Effectiveness in receiving extension messages:			
	Not effective	Less effective	Effective	Very effective
Radio	4.8	6.3	76.5	12.5
Television	0	10.8	75.8	13.5
Mobile phone	1.8	5.8	79.8	12.8
Internet	1.5	98.5	0	0
Computer	4.5	91	0.8	3.8
Whether use of ICT has facilitated communication	Strongly Disagree 3.8	Disagree 37.8	Agree 13	Strongly Agree 7.3
Level of utilization of ICT in horticulture	No utilization 14.3	Low utilization 77.5	Moderate Utilization 5.3	High Utilization 3

Source: Field survey data, 2013

It was noted that the effectiveness of any ICT tool depends on the information to be disseminated and the intended client. For example, internet may not be effective in disseminating information to farmers who may lack access and skills to use. Additionally, 13% of the interviewed respondents agreed that the use of ICT tools has facilitated communication.

On the level of utilization of ICT in horticulture, it was rated low by majority of the interviewed respondents (77.5%). These results are in agreement with research done by CTA (2008) which established among others the underutilization of existing technologies due to lack of awareness, infrastructure problems, poor connectivity to global networks and high taxes. More education and awareness is required to improve the level of utilization of ICTs by horticulture farmers. There is also need for the county to overcome some of these challenges in order to harness meaningful ICT utilization.

Challenges and opportunities to effective use of ICT by horticulture farmers

Challenges in using ICT

Challenges and opportunities for effective use of ICT by horticulture farmers in accessing extension services were also looked into. The challenges militating against the use of ICTs by horticultural farmers in Uasin Gishu County to access extension services are outline in Table 3

Table 3. Major problems/obstacles in using ICTs in horticultural farming

Most limiting factor	Kapsaret		Kesses	
	Frequency	Percentage	Frequency	Percentage
Lack of electricity	44	22	41	20.5
ICT tools are expensive	51	25.5	47	23.5
No skills/knowledge in using ICT	70	35	77	38.5
Language problem	19	9.5	16	8
Lack of ICT support service	16	8.0	19	9.5

Lack of skills/knowledge in using ICT tools was rated the highest by 39% (77 farmers) in Kapsaret division and 35% (70 farmers) in Kesses division. Other constraints following the order of magnitude are high price of ICT tools, lack of electricity, language problem and lack of ICT support services. This implies that majority of the horticulture farmers don't use ICTs due to lack of skills. Kiri et, al. (2006) established among other things underutilization of ICTs in sub-Saharan Africa and observes that this was due to lack of requisite skills and expensive ICTs among other constraints. This confirms the report by Munyua (2009) which states that training and capacity building is an integral part of ICT use. Thus, despite the fact that ICT has immense potential in disseminating agricultural knowledge and information, the above mentioned challenges are believed to have

hindered the use of ICT. As a result, research-extension-farmer linkages are weak and costly as such linkages have to be fostered through physical contact such as training, field demonstration, field day and visits.

Opportunities in using ICT

Uasin Gishu County has some ICT related opportunities that can be utilized in the dissemination of agricultural knowledge and information to horticulture farmers represented in table 4

Table 4. Opportunities for use of ICTs in horticultural farming

Variable	Kapseret		Kesses	
	Frequency	Percentage	Frequency	Percentage
Convergence in communication	44	22	41	20.5
Availability of optic fiber cable	51	25.5	47	23.5
Efficient delivery of information	70	35	77	38.5
Reduced transaction cost	35	17.5	35	17.5

Efficient delivery of information was rated the highest by 36.8% (147 farmers) and 24.5% (98 farmers) admitted that the availability of optic fiber cable if extended to the sub counties can enable them to have internet connection which will enhance the flow of agricultural information. 21.2% (85 farmers) said convergence in communication and computing technologies and 17.5% (70 farmers) said that reduced transaction cost in comparison to other communication choices. These results are in agreement with research done by Uguru (2007), which established that ICTs have presented a new dimension to agriculture enabling effective and efficient transfer and access to scientific, technical and market information which were previously difficult and often expensive to obtain. The most notable opportunity is the availability of fiber optic cable that can be extended to reach most of the sub counties. The presence of such modern ICT initiative can be considered to be a good opportunity to enhance the flow of agricultural extension services. Furthermore, since 90 percent of the households mentioned having a radio and radio transmission covers over 90 percent of the county, this can be a good opportunity that needs to be utilized to enhance extension service delivery to horticulture farmers.

CONCLUSIONS

The following conclusions drawn were based on the above findings from the study on the contribution of ICT to extension services.

The utilization of ICT tools by horticulture farmers in Uasin Gishu County is low. The most available ICT tool is the radio and computers were not available at all. However the most efficient ICT tool was the mobile phone. Among the main challenges affecting the utilization of ICT by horticulture farmers are lack of skills, high cost of ICT, lack of electricity, lack of ICT support services and language barrier. The available opportunities are efficient delivery of information, availability of optic fiber cable, convergence in communication and reduced transaction costs. The research findings and interpretation reveal that measures need to be taken to ensure that ICT integration in extension service delivery for horticulture farmers reaches its full utilization and achieves its maximum potential. For these to succeed, there is need for provision of incentives to promote access to and use of ICT. Since mobile phone is one of the most effective tools used, the county government should provide horticultural information through the mobile phone. And address barriers to the use of ICT and the existing opportunities should be exploited to implement ICT based extension.

REFERENCES

Agbamu, J. U. (2010). Agricultural research-extension linkage systems: An international perspective. Odi Agricultural Research and Extension Network, Network paper No.106, 2010.

Arokoyo ,T. (2005). ICTs application in agricultural extension services delivery. In: SF Adedoyin (Ed): Agricultural Extension in Nigeria. Ilorin: Agricultural Extension Society of Nigeria. pp. 245-251

Bertolini, R. 2004. Making Information and Communication Technologies Work for Food Security in Africa. Washington DC.

Christoplos, I. (2010). Mobilizing the Potential of Rural and Agricultural Extension. Rome: Food and Agriculture Organization of the United Nations (FAO) and the Global Forum for Rural Advisory Services (GFRAS).

Cooper, S. (2003). Decision in research process. London: McGraw Hill

CTA -Technical Centre for Agricultural and Rural Cooperation. (2008). ICTs – Transforming Agricultural Extension An e-discussion. 20th- August-29th September 2008.

Feder, G. R., Just, A., Zilberman, D. (2005) Adoption of agricultural innovations in developing countries: A survey. Economic Development and Cultural Change, 33 (2): 255-298. Retrieved May12, from <http://www.jstor.org/stable/1153228> .html

Gender and Information revolution in Africa. IDRCIECA pp. 85-123.

- GOK, (2007). Wareng district development plan (WDDP) (2008 – 2012). Government Press, Nairobi, Kenya
- GOK, (2008). Economic Review of Agriculture. Ministry of Agriculture. The central Planning and project Monitoring Unit. Government printers Nairobi, Kenya.
- GOK, 2008 National Farmer's Information Service
- GOK, (2010). Communication Commission of Kenya (CCK). Annual report 2010. Nairobi
- Goode, D. Z., & Elliot, G.E. (1992) Who's responsible for computer competence? *Journal of Extension*, 30 (4), (Winter) www.joe.org/joe/1992Winter/a6.html.
- Gurstein, M. (2003) Effective use: A community informatics strategy beyond the Digital Divide. *First Monday*, 8 (12) *International Journal of Basic & Applied Sciences* Available: <http://firstmonday.org/issues/issue> (Accessed: 2012/08/20)
- International Telecommunications Union (ITU) 2010: ICT regulatory trends 2010: available at www.itu.int/icteye.html accessed on (4/10/2012)
- Kiri, K. and Menon, D. (2006) For Profit Rural Kiosks in India: Achievements and Challenges. Retrieved June 28, 2012 from www.i4donline.net/articles/current-article.asp.html
- KNBS (2009) . Kenya National Bureau of Statistics (2009) population and housing census of Kenya. Nairobi, Government printers, Kenya.
- Martin, B.L, Stewart, D. & Hillison, J. (2001). Computer anxiety levels of Virginia Extension personnel. *Journal of Extension*, 39 (1) 7-16. Retrieved February 25, 2012 from [www.joe.org/joe/ article.html](http://www.joe.org/joe/article.html)
- Mugenda, Abel Gitau (2008). *Social Science Research*; Nairobi; Applied research and Training Services, 2008. Pp180-193
- Munyua, H. (2000). Application of information communication technologies in the
- Mwololo, W.T. (2009). A brief history of the development of an ICT policy in Kenya "in the Cross roads: ICT making in East Africa. IDRC
- Qamar, M.K. (2002) .Global trends in agricultural extension: Challenges facing Asia and the Pacific region. FAO regional expert consultation on agricultural extension, Research-Extension-Farmer Interface and Technology Transfer. Retrieved July 24, 2012 from www.fao.org/sd/cddirect/cdre0055b.htm
- Uguru, F. N. (2007). Information technology access, capabilities and use among administrators Eastern Nigeria. PhD Thesis, Department of Agricultural Extension, University of Nigeria, Nsukka.