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RESEARCH ARTICLE

Using ICTs to disseminate Agricultural Marketing Information to Small Scale Rural Farmers in Western Uganda

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Abstract:

Although ICT has been extensively used in agriculture in the developed world for agricultural marketing information dissemination, the same cannot be claimed in developing countries. Hence this study sought to explore the extent to which Information and Communication Technologies enhances small scale rural farmer's access to Agricultural marketing information in western Uganda. This is due to the fact that majority of small scale farmers in Uganda have limited access to market information and usually rely on information from traders (middlemen) who usually twist the information in their favor in order to exploit the farmers. A mixed research approach was used in this study for data collection where a total of 280 farmers, 2 sub county agricultural officials and 3 agriculture facilitators in Millennium Villages Project (Ruhira) staff members were purposively selected in this study. The study yielded a 75% response rate and the data collected were analyzed using Statistical Package for Social Sciences (SPSS). It was established that most respondents preferred Radio followed by cell phones as their sources of agricultural marketing information for their produce. Television and computer were the least preferred sources of market information by the respondents. The study also found out that most farmers use agricultural marketing information accessed through ICTs as a base for bargaining with buyers for their farm produce.

Key Words: ICTs, Agriculture, Marketing information, Dissemination, small scale rural farmers

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Introduction

Agriculture is regarded as a development engine in most developing countries in the world. Agricultural development is usually measured in terms of increase in production and productivity, and is often brought about by the adoption of new technologies. Specifically, agriculture is a significant factor in the improvement of the living conditions of the rural people and farmers in particular (Manda, 2002). This is why developing countries are putting more emphasis on shaping the future of agriculture. Thus, growing market opportunities in certain developing countries have been coupled with a shift in production and exports of farm commodities.

In Africa, The agricultural sector remains the mainstay of most African economies and occupies a pivotal role in the development of the continent. The sector accounts for about 60% of the total labor force, 20% of the total exports and 17% of the GDP and provides livelihoods to over 70% of the population (ACACIA, 2006). Agricultural production for local consumption and export in East Africa plays a critical role in national economies, making up 40% of the sub-region's Gross Domestic Product (GDP). It employs nearly 80% of the people who are mostly small-scale farmers and depend on agriculture for their livelihoods. These small scale farmers need to access the information about new technologies before they can consider adopting them and thus look up to research and extension agents as sources of new technologies. However, the traditional approach of providing agricultural information through extension services is overstretched and under-resourced. It is in working with and improving these information and communication systems that ICTs can be used to enhance the delivery of these services (ACACIA, 2006).

Uganda is predominantly a country driven by its rural agriculture sector, demonstrated by the fact that 80% of the population depends on agriculture as their source of livelihood (Okello, 2011). Furthermore, with 86.7% of Ugandans living in rural areas, it is the main income generator for the majority of the country (Rural Poverty in Uganda, 2010). This is largely the result of their strongest export crops comprising coffee, tea, cotton, and tobacco (Uganda Exports, 2011). Within the country's borders, many small-scale and subsistence farmers generate necessary foodstuffs to feed their families and sell in local markets (Uganda, 2011). According to (ACORD, 2010), the agricultural sector has for several years formed the backbone of Uganda's economy contributing approximately 37% of Gross Domestic product (GDP). The sector remains crucial to the Ugandan economy for household and national

food security, income generation, employment creation and foreign exchange earnings among others. Close to 18.8 million or 77% of the Ugandan population depend on agriculture for their livelihoods. According to the Food and Agriculture Organization of the United Nations, Uganda depends heavily on subsistence farming. About 85 percent of its rural population derives income directly or indirectly from agriculture (FAO, 2009).

Information and communication technology (ICTs) comprises of three separate words – information, communication and technology. Information is defined as any kind of message; written, audio, visual or audio-visual through which a person gets knowledge about a new person, place, thing, situation, or environment. Similarly, communication is the way of transferring such message to others which needs a medium, a clear message, and sender and receiver. Information & communication technology is the use of modern technology to aid the capture, processing, storage and retrieval, and communication of information, whether in the form of numerical data, text, sound, or image (Rahman, 2008) and the ICTs infrastructures are defined as the devices which are used for communication and exchange of information. Therefore, both the ICTs and its associated infrastructures help in the creation and dissemination of knowledge. According to Shepherd. A, (2000) ICTs are a key element to consider for the achievement of the Millennium Development Goals (MDGs). According to Islam et al (2006), there are current ICT projects dealing with each of the eight goals (Islam et al., 2006). The aim is that the infusion of ICT within these goals will make them not only more attainable, but also more accessible to a larger portion of the population. The present nature, trend and pace of development around the globe has justified that countries having less information are one of the resource poor countries and so is true for the individuals who lack information. The vast majority of poor people live in rural areas and derive their livelihoods directly or indirectly from agriculture and therefore, support for farming is a high priority for rural development (Harris, 2002). ICTs can deliver useful information to farmers in the form of crop care and animal husbandry, fertilizer and feedstock inputs, drought mitigation, pest control, irrigation, weather forecasting, seed sourcing and market prices. The work by Grameen Foundation in Uganda shows that use of mobile application has given farmers a broad range of information (Gantt & Cantor, 2010). There is a remarkable progress in the use of ICTs in agriculture in developing countries, especially in the area of farmers' access to market information (CTA, 2009). Recent experiences in the application of ICT in extension services in countries like India are examples of the emerging use of the technology to reach rural communities (Anandajayasekeram et al., 2005) including participation and empowerment of farmers and communities, linkages between groups and institutions, innovative learning and communication, and supportive policy environment and political commitment. In most developing countries, ICT applications based on digital technologies still face considerable constraints. The performance of any agricultural industry, be it large scale or small scale farming depends largely on how well and effective it is supported by agricultural marketing information. The marketing information is important to farmers because it will enable them negotiate with traders, know the prevailing prices of their farm produces and decide whether to go to the market or not. At the simplest level, availability of market information can enable farmers to check on the prices they receive, vis-à-vis the prevailing market prices (Shepherd, 1995). It is against this background that this study sought to investigate the ICT tools used to access agricultural marketing information in western Uganda.

Thus, to put our research in context, we looked at the state of art of ICT tools usage in agriculture marketing information dissemination in section 2. In section 3, we describe the research approach followed in order to undertake the study and the findings in section 4 and discussion of findings in section 5. Finally we provide a conclusion and a way forward on future prospects of this research in section 6.

2.0 Access and use of agricultural information

Farmers need to have access to agricultural information if their agricultural efforts are to be realized. In a study in Delta State in Nigeria, (Adomi et al , 2003) found out that farmers need to have access to agricultural information in order to improve their agricultural production. They further contend that farmers need to have access to financial information for their actual performance as well as access to credit. Furthermore, (Irivwieri, 2007) stressed that access to and utilization of appropriate information services by all members of society is a duty of every government. He also said that rural people, who are mainly illiterate, require access to appropriate information to be able to make decisions and participate fully in the national development process, including agriculture. In Nigeria, (Fawole, 2006) also found that the utilization of available information by farmers is very important because it justifies among other factors, efforts by research and related organization to improve farmers' activities and output. (Kalusopa, 2005) focused on small-scale farmers in Zambia confirmed that there is a need for closer relationship between information providers and users. He argues that a closer contact between information providers and end-users enables provision of broad and variety of information. (Okwu et al., 2007) indicate that individual's level of education can affect accessibility, comprehension and adoption of modern agricultural practices. In addition (Ofouoku et al., 2008) argue that the level of education of farmers has significant relationship with information

utilization because educational level influences information utilization. The higher the educational level of farmers, the more they are willing to use information provided.

2.1 ICT, market access and its implications for rural farmers

The importance of the role of market information in terms of economic efficiency and performance as well as equity is widely acknowledged. It is observed that accurate and timely market information enhances market performance by improving the knowledge of market actors. An equal balance of knowledge provides a more equal distribution of the gains from efficient market price information (Houston, 2005). Access to ICT can help farmers in a number of ways. Traditional media and new ICT have played a major role in diffusing information to rural communities and now have much more potential. The pre-paid credit has enabled mobile phone users to send relatively cheap SMS text messages across distances that would otherwise take days to travel, hence changing life for the better. By using mobile phones and messaging technology, farmers get access to valuable market data (ZD Net UK, 2005).

In Pakistan, It was found that widely available information on prevailing market prices for seed cotton strengthened farmer's position when bargaining with traders (Hina, 2010). In Indonesia, for example, vegetable farmers fixed prices following the rate that was

being broadcast by their local radios and lower prices than that broadcast were not accepted by these farmers (Shepherd, 2000). The broadcast prices were subsequently used as a starting point in negotiating with traders the following day. In Chile, research shows that an internet network among farmer organizations has dramatically increased farmers' incomes by providing information about crop status, weather, global market prices and training (UNDP, 2001).

In Uganda the Grameen Foundation developed SMS-based comprehensive system to help deliver market information to farmers (Pyramid Research, 2010). Having tested new uses of the Village Phone infrastructure via such programs as Application Laboratory since 2008, the Foundation launched in 2009 a group of mobile phone applications. The technology was developed with Google and MTN Uganda in the Application Lab, and leverages MTN's network of village phones and other operators of shared phones. In addition, the Grameen Foundation trained and established a network of community knowledge workers (CKWs) to become "knowledge hubs" for smallholder farmers in Uganda, giving them advice and information on how to carry out their activities. All the services are SMS based and designed to work with basic mobile phones to reach the broadest possible audience. The new services can be accessed by existing village phone operators, who extend service to people without mobile phones. The customer sends in the query and the answer is returned later (Pyramid Research, 2010). Muto & Yamano, (2009) found that, after the expansion of the mobile phone coverage, the proportion of the farmers who sold banana increased in communities more than 20 miles away from district centers. For maize, which is another staple but less perishable crop, mobile phone coverage did not affect market participation. These results suggest that mobile phone coverage induces the market participation of farmers who are located in remote areas and produce perishable crops. Svensson & Yanagizawa (2008) studied the impact of agricultural price radio broadcast on the spread of market information in Uganda. Exploiting the variation across space between households with and without access to a radio, they found evidence suggesting that better informed farmers managed to bargain for higher farm-gate prices on their surplus production. Agrinet in Uganda provides market intelligence and brokerage services. It uses SMS linked to physical information boards, strategically located in markets, to collect and disseminate market intelligence. The intelligence collected and disseminated by Agrinet's agent network is then used to broker deals, where a commission is earned for each brokered deal (Muto & Yamano, 2009).

2.2 ICT tools for agricultural information dissemination

Irfan et al., (2006) indicated that the available technologies, if adopted by farmers, can enhance agricultural production considerably. This study sought to find out which medium, technology or channels were appropriate to disseminate agricultural information to farmers. Such ICT include: radio, television, computer, cell phone and Print Media. These are discussed below.

2.2.1 Radio

Radio is one of the most widespread and popular tools of communication in Africa. Chapman et al., (2003) argue that the strength of radio as an extension tool is widely praised for its ability to reach illiterate farmers and provide them with information related to all aspects of agricultural production in a language they understand and that Radio is a powerful mechanism for linking old and new technologies, providing information resources cheaply to those who need to improve their livelihoods. Furthermore, Okwu et al., (2007) also indicates that radio is one broadcast medium which almost all experts have found to be the most appropriate medium of mass communication in the rural population. He further maintains that radio is favored as a medium of communication in rural communities because of the advantage of demanding less intellectual effort than the print media messages and also because it is able to reach remote areas, even where there are no extension agents, as long as there is a good reception. However, Tshabalala, (2003) indicates that although radio cost is affordable and is very cheap to maintain, unfortunately in

most developing countries, agricultural information programs are not determined along national information dissemination policy; messages are usually not tailored to the agricultural information needs and the rural farmer and population have limited access due to poor reception and limited area coverage. Radio plays the most significant role of any communication technology in the transfer of information in African countries since spoken word on broadcast radio is the principal means of information transfer where literacy rates are low (CTA, 2006).

2.2.2 Television

Irfan et al., (2006) stress that television is used to reach large number of people quickly and serves an important and valuable function in stimulating farmers' interest in new ideas. However, Tshabalala, (2003) argues that although television is a powerful medium, many people cannot afford it in most developing countries. Furthermore, Kari, (2007) also found out that to some farmers, television is not seen as a source of obtaining information, but rather as entertainment media.

2.2.3 Cell phones

In modern times, cell phones have strengthened the farmers' bargaining power, as they now have access to real time marketing information alternatives (Shaibu & Powell, 2008).

Agricultural Marketing Information Centre (ECAMIC) project of the SEND foundation in Ghana started using mobile phones to improve market access for rural farming communities (Shaibu & Powell, 2008). He also observed that farmers in Ghana are now able to demonstrate their knowledge and awareness of current market trends to traders at the major market centers, and this is proving to be a very useful asset in the bargaining process. Chisenga (2007) also posit that BusyLabs in Accra has launched Tradenet as a media channel that allows anyone anywhere to affordably share market information via mobile phones. Further, Cell phones were distributed to three cooperatives women's farming groups in different agroecological zones in Maseru district (IRIN, 2009).found that cell phone has transformed the women farmers' lives completely. They are able to market their produce, access information on prices, and it has made them so confident. The pilot also took a step further to prove that not only are illiterate people able to handle technology, but they also benefit from improved communications, both in terms of their farming activities and the reduced time and cost of staying in touch with each other. (Kari, 2007) stated that in hundred more years to come, the mobile phone will remain the technology most able to make a difference to peoples' lives. However, most of the communities lack access to electricity and many send their phones to town for recharging.

2.2.4 Computers

The use of computers and the number of Internet Service Providers (ISPs) as well as Internet users is increasing day by day in the world. Agricultural information technology systems are being developed now based on web technology. Better connection between the IT and research bodies is now needed for generation, compilation, dissemination and exchange of agricultural information (Zaman, 2002). Similarly, Ha et al., (2008) contend that Internet use has become a new skill that farmers have realized can be useful for them to find agricultural information they need. According to Kiplang'at & Ocholla, (2005) in a study conducted in Kenya stated that the rapid development and application of the Internet and other forms of ICTs in the agricultural sector have presented a whole new dimension in the transfer and access of agricultural information and showed that these technologies had improved the provision of agricultural information among agricultural researchers, extension workers and other actors. However, Brake & Chasenga (2003) posit that in most countries in Sub-Saharan Africa, the cost of computers is too high for many to afford, monthly Internet access rates are very high, and the charges for satellite television are unaffordable for most people.

2.2.5 Print media

Print has qualities that make it a suitable medium for information diffusion in rural areas because print messages need relatively simple and cheap technology to produce. (Morris & Stilwell, 2003) contend that print media allows for greater accuracy of content and precision of expression than other media where the message depends on oral transmission and the receivers' memory. He also emphasize that print is still a primary medium whereby agricultural information is recorded, stored and transmitted, despite other medium made by electronic media. However Tshabalala (2003) argues that although many information centers in developing countries still use print media even though it is costly, such media is not very effective especially in addressing the information needs of rural farmers because majority of them are illiterate.

3.0 Research Design

A mixed research design was adopted for this research where a case study of Millennium Villages Project (Ruhira) in Nyakitunda sub-county, Isingero district western Uganda was used for data collection. From the case, a sample size of 40 farmers from each of the seven focus groups in Nyakitunda sub-county, 2 sub county agricultural officials, and 3 agriculture facilitators in Millennium villages project (Ruhira) were purposively selected. Purposive sampling is "a nonrandom sampling technique in which the researcher solicits persons with specific characteristics

to participate in a research study” (Johnson & Christensen, 2008). This sample was in line with Roscoe’s (1975) rule of thumb which states that a sample size between 30 and 500 is sufficient. Data was collected through a questionnaire that was administered to the respondents selected. The data was later quantitatively analyzed using descriptive statistics and results presented in the next section using tables and graphs.

4.0 Findings

The findings from the field studies were guided by the main research question; What ICT tools do farmers use to access agricultural marketing information in western Uganda?

4.1 Sample Characteristics

A total of 285 farmers were randomly sampled and surveyed from a population of 1500 farmers; while 2 sub county agricultural officials and 3 agriculture facilitators in Millennium villages project (Ruhira) staff members were also purposively selected. The study yielded a response rate of 75%.

Table 1: Gender of respondents

Gender	Frequency	Percentage (%)
Male	134	62.3
Female	81	37.7
Total	215	100

From the table above, majority of the respondents 62.3% were male while 37.7% were females. We furthered our study by inquiring about the respondents’ age and the results are presented in table 2 below.

Table 2: Respondents’ Age

Age range	Frequency	Percentage (%)
20 - 29	26	12.1
30 - 39	130	60.5
Above 40	59	27.4
Total	215	100

Results from table 2 above, shows that most of the respondents (60.5%) were in the age bracket of 30 – 39, 27.4% were above 40 years and only 12.1% were in the age bracket of 20 – 29 of the total respondents. This indicates that few youth are involved in agriculture activities. To be able to use ICT tools in agriculture, the level of education is crucial hence the need to find out the level of education for our respondents as presented in table 3 below.

Table 3: Education levels of Respondents

Education level	Frequency	Percentage (%)
None	21	9.8
Primary	109	50.7
Secondary	56	26
University/College	29	13.5
Total	215	100

Results in Table 3 above show that 50.7% of respondents had finished primary education, followed by 26% of respondents who had finished secondary education, and only 13.5% were University/College graduates, while 9.8% of respondents had not attained any formal education.

4.2 Agriculture activities

We desired to know the various agricultural activities in which our respondents were involved and table 4 below presents the results.

Table 4: Agricultural activities

Agricultural Activity	Frequency	Percentage (%)
Crops grown		

Banana	152	70.7
Maize	4	1.9
Cassava	1	0.5
Soy bean	0	0
Sugar cane	2	0.9
Others	15	6.9
Livestock		
Poultry	3	1.4
Pigs	1	0.5
Cow/cattle	6	2.8
Goats	11	5.1
Others	1	0.5
Both crop and livestock	19	8.8
Total	215	100

From the table above, we establish that 70.7% of respondents grow banana as their main agricultural activity, followed by 8.8% of respondents involved in both crops and livestock. There were no respondents involved in soya beans growing and only 1% of respondents were involved in cassava and piggery.

4.3: ICT tools used to access agricultural marketing information

We asked the respondents about ICT tools they use in accessing agricultural marketing information and the results are presented in the figure below.

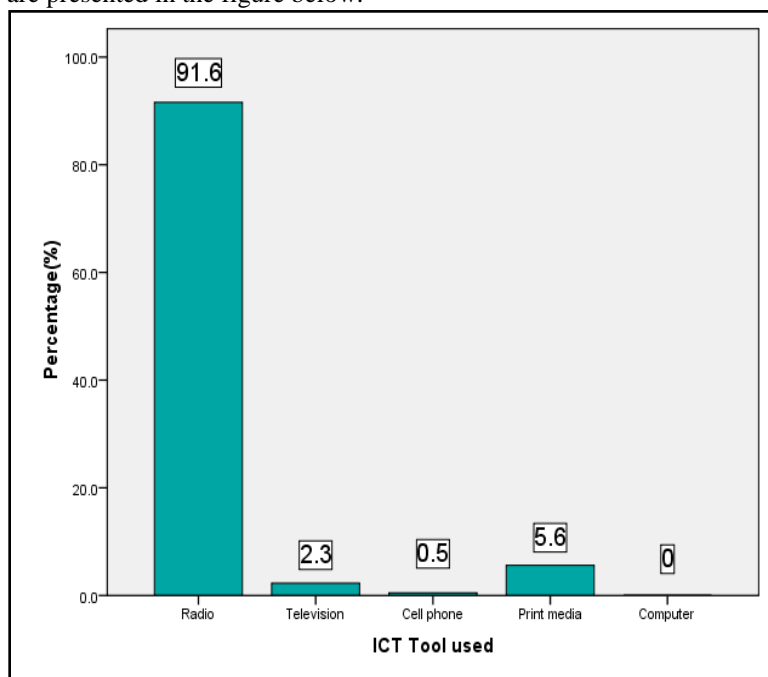


Figure 1: ICT tools for agricultural marketing information

Results in figure 1 show that the biggest number of respondents 91.6% use radios to access agricultural marketing information. A few respondents 5.6% use print media and 2.3% of farmers were using television. Only 0.5% of respondents were using cell phones to access agriculture marketing information. There were no respondents registered using computers to access agricultural marketing information.

Table 5: Quality of agricultural marketing information accessed through ICTs

Quality of marketing information	Frequency	Percentage (%)					
			Very poor	poor	Fair	Good	Very good
Accuracy	31					14.4	
Reliability	47					21.9	
Completeness	3			1.4			
Timeliness	51					23.7	
Relevance	39				18.1		
No response	44	20.5					
Total	215						

Results in table 5 above show that 23.7% of respondents ranked the current agricultural marketing information as Good in terms of timeliness since they are able to access the information on a daily basis, while 21.9% of respondents ranked the information reliability as Good, 18.1% ranked Relevance as Fair, 14.4% ranked accuracy as Good, while 1.4% ranked completeness as Poor and 20.5% of respondents did not respond to this question. Over 60% of respondents found current agricultural marketing information accessed through ICTs to be in fair to Good range which indicates that farmers in rural areas need agricultural marketing information to improve their agriculture productivity.

5.0 Discussion of Findings

Majority of the respondents were male amounting to 62.3% while females accounted for only 37.7% as presented in table 1. This is in agreement with..... The study revealed that respondents aged between 30 – 39 accounted 60.5%, as it is shown in table 2. It further showed that younger generation aged 20 – 29 with 12.1% were not much involved in agriculture than older generation aged 30 years and above. This is in agreement with.....Majority of the respondents 50.7% in table 3, had attained primary education. This is not surprising in developing countries where the levels of illiteracy are still very high. (Reference) and the least portion of respondents did not go to school with 9.8%. The main agricultural produce in our case study was bananas (70.7%). This is in agreement with another study of Problems Facing Small Scale Farmers in Isingiro District that concluded that close to 70% of the rural population in Isingiro area entirely dependent on bananas as their sole economic activity (ACORD, 2010).

According to the respondents radio (67.4%) was the main ICT tool used to access agricultural marketing information. This was attributed to the fact that there is a wide coverage of radio waves and infrastructure throughout the study area and radio can be carried anywhere even when going to the farm. This is in agreement with another study that Radio plays the most significant role of any communication technology in the transfer of market information in African countries (CTA, 2006). Respondents use agricultural marketing information accessed through ICTs as a base for bargaining with buyers for their farm produce and as a result buyers' do not twist the market information in their favor in order to exploit farmers. Farmers get higher selling prices hence increased productivity.

6.0 Conclusion

The use of ICT tools further calls for good ICT infrastructure, adequate ICT skills, good and affordable connectivity, and appropriate ICT policies. However, the study also revealed that there is low capacity and usage of most ICTs and ICT infrastructure in rural areas. The study shows that about 54.4% of respondents use agricultural marketing

information accessed through ICTs as a base for bargaining with buyers for their farm produce and as a result buyers' do not twist the market information in their favor in order to exploit farmers. Farmers get higher selling prices hence increased productivity.

Over 60% of respondents found current agricultural marketing information accessed through ICTs to be in "fairly to Good" range which indicates that farmers in rural areas need agricultural marketing information to improve their agriculture productivity.

References

ACACIA. (2006). ACACIA Prospectus 2006-2011. .

ACORD.(2010). Problems Facing Small Scale Farmers in Isingiro District, Uganda: Focus on Bananas

Adomi, E. E., Monday, O., Ogbomo & Inoni, O. E. (2003). Gender factor in crop farmer's access to agricultural information in rural areas of Delta State, Nigeria. *Library Review*, 52(8), 388–393.

ANANDAJAYASEKERAM, P., DIJKMAN, J., HOEKSTRA, D. & WORKNEH, S. (2005). Past, present and future of extension services. Paper presented at extension training workshop organized by the Improving Productivity and Market Success (IPMS) of Ethiopian Farmers project. ILRI (International Livestock Research Institute), Addis Ababa, Ethiopia.

Shepherd, A.W. (2000). Marketing and rural finance farm radio as a medium for market information dissemination. First International Workshop on Farm Radio Broadcasting. .

Chapman, R., Roger Blench, Gordana Kranjac-Berisavl, & Zakariah A. B. T. (2003). Rural radio in agricultural extension: The example of vernacular radio programmes on soil and water conservation in Ghana. *Agricultural Research and Extension Network*, 127

CTA. (2009) E-agriculture- smart marketing. Sharing knowledge, improve rural livelihoods. CTA Spore Magazine No 140. April 2009. Wageningen, the Netherlands

CTA - Technical Centre for Agricultural and Rural Cooperation ACP-EU (2006). Annual Report 2006. D. H. Neun. Wageningen, The Netherlands, CTA.

Fawole, P. O. (2006). Poultry farmers' utilization of information in Lagelu Local Government Area Oyo State of Nigeria. *International Journal of Poultry Science*, 5(5), 499–501.

GANTT, W. & CANTOR, E. (2010). Direct Data Demand. Mobile apps deliver a broad range information to Uganda farmers. CTA ICT update Issue 53: February 2010. [Online] Available: [http://ictupdate.cta.int/en/ Feature-Articles/Direct-data-on-demand](http://ictupdate.cta.int/en/Feature-Articles/Direct-data-on-demand).

Ha, L., Okigbo, N., & Igboak, P. (2008). Knowledge creation and dissemination in Sub Saharan Africa. *Management Decision*, 46(3), 392–405.

Harris, R. (2002). A Framework for Poverty Alleviation with ICTs [Internet] Roger Harris Associates, Hong Kong, December. P. 3-64.

[Available:http://www.tanzaniagateway.org/docs/framework_for_poverty_alleviation_with ICTs.pdf]

Irfan, A. A., Mahommad, S., Khan, G. A., & Asif, M. (2006). Role of mass media in the Dissemination of agricultural technologies among farmers. *International Journal of Agriculture and Biology*, 8(3), 417–419. Available at. www.fspublishers.org/ijab/past-issue/IJABVOL8no3/27-pdf.

IRIN. (2009). Lesotho: Women farmers get mobile phones know-how. Available at.

C:\Documents and Settings\kagiso\My Documents\Cell Phone Lesotho.mht.

Iriwieri, J. W. (2007). Information needs of illiterate female farmers in Ethiopia East Local Government Area of Delta State. *Library Hi Tech News*, 9/10, 38–42.

Islam, M. A., Mrelli, E., Noronha, F., & Rahman, H. (2006). Capacity Development Initiatives for Marginal Communities: A Few Case Studies. In H. Rahman, *Empowering Marginal Communities with Information Networking* (pp. 318-351). Hershey: Idea Group Publishing.

Kalusopa, T. (2005). The challenges of utilizing information communication technologies (ICTs) for small-scale farmers in Zambia. *Library Hi Tech*, 23(3), 196–204.

Kiplang'at, & Ocholla. (2005). Diffusion of (ICTs) in the communication of agricultural Information among agricultural resources and extension workers in Kenya; *South African Journal of Libraries and Information Science*, 17(3), 234–242

Kari, H. K. (2007). Availability and accessibility of ICT in the rural communities of Nigeria. *The Electronic Library*, 25(3), 363–372.

Manda, P. (2002). Information and agricultural development in Tanzania: A critic. *Information Development*, 18(3), 181–189.

Morris, C. D. & Stilwell, C. (2003). Getting the written message right: Review of Guidelines for producing readable print agricultural information materials. *South Africa Journal of Library and Information Science*, 69(1), 71–83.

Muto, M. & Yamano, T. (2009). The Impact of Mobile Phone Coverage Expansion on Market Participation: Panel Data Evidence from Uganda, *World Development*, 37(12): 1887- 1896.

Ofoouku, A. U., Emah, G. N. & Itedjere, B. E. (2008). Information utilization among rural fish farmers in central agricultural zone of Delta State, Nigeria. *World*

Journal of Agricultural Science, 4(5), 558–564. Available at [www.idosi.org/wjas/wjas4\(5\)/7](http://www.idosi.org/wjas/wjas4(5)/7).

Okello, D. (2010). E-Agriculture for Rural Women Farmers: The WOUGNET Experience. Retrieved September 13, 2011, from E-Agriculture: <http://www.e-agriculture.org/blog/e-agriculture-rural-women-farmers-wougnet-experience>

Okwu, O., Kuku, A. A. & Aba, J. L. (2007). An assessment of use of radio in agricultural information dissemination: A case study of radio Benue in Nigeria. *African Journal of Agricultural Research*, 2(1), 014–018

Pyramid Research. (2010). The Impact of Mobile Services in Nigeria: How Mobile Technologies Are Transforming Economic and Social Activities. <http://www.pyramidresearch.com/documents/IMPACTofMobileServicesInNIGERIA.pdf>

Rahman, M. A. (2008). Role of Information & Communication Technology (ICT) in Rural Poverty Alleviation. A Dissertation submitted to the BRAC Development Institute, BRAC University. [Available at: <http://dspace.bracu.ac.bd/bitstream/10361/28/1/Role%20of%20information%20%26%20communication%20technology%20%28ICT%29%20in%20rural%20poverty%20alleviation.PDF>]

Rural Poverty in Uganda. (2010). Retrieved March 2, 2012, from Rural Poverty Portal IFAD: <http://www.ruralpovertyportal.org/web/guest/country/statistics/tags/uganda>

Shepherd, A.W. (1997). Market information services: Theory and Practice. Food and Agriculture Organization of the United Nations, Rome. pp58

Shaibu, & Powell. (2008). Role of ICTs in India's rural community information systems. *International Journal of Science*, 6(4), 261–269.

Svensson, J. & Yanagizawa, D. (2008). Getting prices right: The impact of market Information services in Uganda. Paper prepared for the 23rd conference of the European Economic Association, IIES, Stockholm University.

Tshabalala, B. V. (2003). Agricultural information needs and resources available to Agriculturalists and farmers in developing countries with special reference to Lesotho. Available at. <http://etd.rau.ac.za/thisis/>.

Uganda Exports (2011) Retrieved March 5, 2012, from Uganda Export Promotion Board: <http://www.ugandaexportsonline.com/exports.htm>

United Nations. (2009), The Millennium Development Goals Report, united Nations New York 2009, <http://www.un.org/millenniumgoals/pdf/MDG%20Report%202009%20ENG.pdf>

Hina (2010) Final thesis www.gii.ncr.vt.edu/docs/Hina_thesis_final-21-12-2010_revised.pdf

Brakel. V & Chasenga, J. (2003). Impact of ICT-based distance learning: The African story. *Electronic Library*, 21(5), 476–486.

Zaman, M. A. (2002). Present status of agricultural information technology system and service in Bangladesh. Available at. <http://zoushoku.narc.affrc.go.jp/ADR/AFITA/afita/afita-conf/2002/part1/p075>.

ZD Net UK; 2005. T Halett. SMS boom to continue. Available at:<http://news.zdnet.co.uk/communications/wireless/0,39020348,39216536,0.htm>