

FARM RADIO INTERNATIONAL

The new age of radio

How ICTs are changing rural radio in Africa

African Farm Radio
Research Initiative
2011

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Glossary of Terms

AFRRI	African Farm Radio Research Initiative
ALC	Active listening community
AMARC	World Association of Community Radio Broadcasters
AP	Access point
BBC	British Broadcasting Corporation
BMGF	Bill & Melinda Gates Foundation
CBC	Canadian Broadcasting Corporation
CC	Control community
CFA	West African CFA franc (currency)
CPU	Central processing unit
FAO	Food and Agriculture Organization of the United Nations
FLSMS	FrontlineSMS
FRI	Farm Radio International
FRW	Farm Radio Weekly (news service)
GSM	Global system for mobile communication
GRINS	Gramin Radio Inter-Networking System
ICT	Information and communication technology
ISP	Internet service provider
ITU	International Telecommunication Union
IVR	Interactive voice response
KKCR	Kagadi Kibaale Community Radio
KP	Knowledge partner
LIVES	Learning through Interactive Voice Educational System
MIS	Marketing information service
NAC	National Advisory Committee
NGO	Non-governmental organization
NRC	National research coordinator
PAR	Participatory action research
PIWA	Panos Institute of West Africa
PLC	Passive listening community
PRC	Participatory radio campaign
PRC1	The first participatory radio campaign
PRC2	The second participatory radio campaign
PLC	Passive listening communities
PRA	Participatory rural appraisal
QoS	Quality of service
RFI	Radio France International
SIM	Subscriber identity module (SIM card for mobile phone)
SMS	Short message service
TTCL	Tanzania Telecommunications Company Limited
TBC	Tanzania Broadcasting Corporation
UBC	Uganda Broadcasting Corporation
USD	United States dollar
UTL	Uganda Telecom Limited
VSAT	Very small aperture terminal

Executive Summary

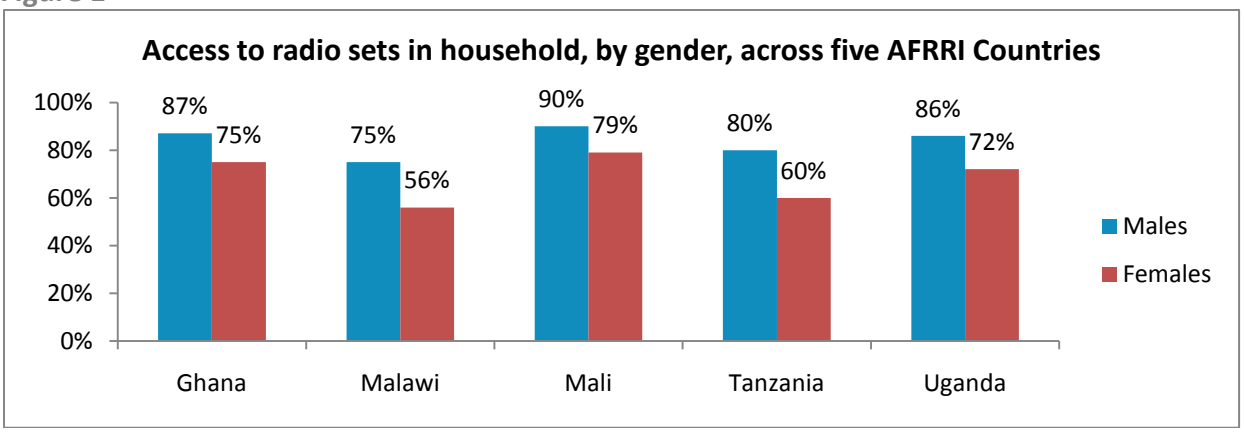
Report highlights: ICT-enhanced radio

- Weekly SMS alerts sent to the phones of listeners 30 minutes prior to a broadcast can boost radio campaign listenership by up to 20%
- Two-thirds of partner broadcasters identified the internet as the most important ICT tool in the production of farm radio programs.
- Farmers who participated in the design and implementation of radio programming with the help of ICTs were four times more likely than those in passive listening communities to adopt agricultural improvements promoted on the radio.
- 61% of extension agents surveyed said the reach and impact of their extension work was substantially improved because they could be heard on radio programs through call-out programs.

Low cost, modern information and communication technologies (ICTs), including mobile phones, multifunction MP3 recorders, and interactive voice response (IVR) can dramatically increase the capacity of rural radio to help farmers improve food security in Sub-Saharan Africa.

Radio is the most widely used medium for disseminating information to rural audiences across Africa. Radio can reach communities at the end of the development road – people who live in areas without phones or electricity. Radio reaches people who cannot read or write. Even in very poor communities, radio penetration is vast. It is estimated there are over 800 million radios in sub-Saharan Africa.

Figure 1



An African Farm Radio Research Initiative (AFRRI) survey[1] of rural listening communities, found that approximately 76% of households own a radio.

Although radio has been an excellent medium for communicating information to farmers, it has had limitations. Traditionally, radio has been a one-way medium that reaches farmers in their homes and their fields; but on its own, radio has had limited means of interacting with listeners. Until now, radio

[1] AFRRI's outcome evaluation was conducted with 4581 households in over 90 rural communities

has also lacked the potential to provide programs on demand – if a program was missed, typically, listeners could not hear it again unless it was rebroadcast.

The African Farm Radio Research Initiative

Despite rapid gains in information and communications technology (ICT) worldwide, radio stations in Africa have largely not had access to integrated mobile phone technology, desktop editing, portable recording, computers, or access to the internet. As part of a 42-month action research program called The African Farm Radio Research Initiative (AFRRI), Farm Radio International (FRI) partnered with 25 radio stations in five African countries to implement a series of ICT packages designed to enhance farm radio programming. In partnership with World University Service of Canada (WUSC) and funding from the Bill & Melinda Gates Foundation, AFRRI's aim was to discover, document, and disseminate best practices for using radio-based communications to enhance food security in Africa.

The research was guided by the following two questions:

1. ***How effective is radio in enabling smallholder farmers in Africa to address food security challenges they face, with a particular focus on increasing/diversifying food production, improving land use management, and reducing post-harvest losses?***

2. ***How can new technologies, such as cell phones and MP3 players, increase the effectiveness of radio as a sustainable, interactive development communications tool?***

There were three key elements to the AFRRI project:

Participatory radio campaigns (PRC)

AFRRI sought to test the effectiveness of a new radio campaign model developed by FRI: the participatory radio campaign (PRC). Working with radio stations in the five partner countries AFRRI created a series of farm radio programs designed to educate farmers, and to enable them to improve their agricultural practices. Farmer listeners were central to the development and implementation of the radio campaigns. AFRRI's PRC model allowed farmers to participate at every level in the process. As a preliminary step, AFRRI identified active listening communities (ALCs) for each of its 25 partner radio stations. Farmers in the ALCs were surveyed about their local agricultural practices and unique needs, as well as their radio listening habits. They then became central players in the design of a series of radio programs geared to address a particular agricultural practice that farmers deemed would help to improve their livelihoods, and ultimately their food security. Passive listening communities (PLCs) – those who listened without participating -- and control communities – those that did not have access to the radio programming – were evaluated following each of the two 16-week campaigns to determine effective the radio programs were in educating farmers about agricultural innovations and encouraging them to take up new agricultural practices that would improve their food security.

Radio-based MIS

Preliminary research in 75 communities indicated that smallholder farmers required and demanded better access to market information in order to enhance their individual food security. Approximately 80 per cent of farmers engaged in early participatory rural appraisals

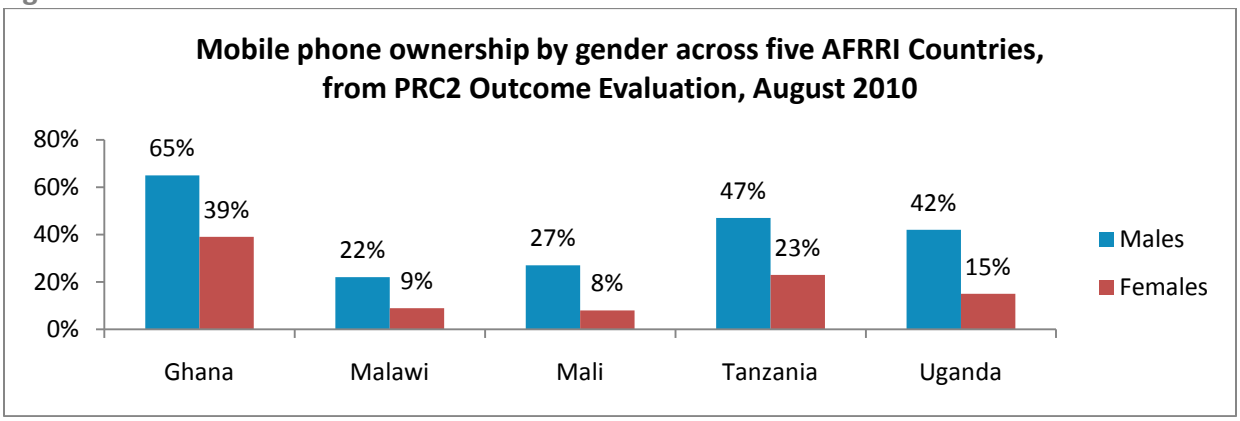
(PRAs) identified MIS as a need. Using the PRC model and with support from the ICT enhancements, AFRRI designed an MIS pilot project to better understand how radio could enhance traditional marketing information service (MIS). The project consisted of individual MIS radio campaigns in Mali, Uganda, Tanzania, and two in Ghana.

ICT-enhanced radio

AFRRI wanted to test how new information and communications technologies (ICTs) could be integrated with radio to provide better two-way communication between radio stations and their farmer listeners. To this end, each partner radio station was equipped with one of eight customized ICT packages to enhance their PRCs and MIS radio programming, which included a mix of communications media becoming increasingly accessible in Africa. Some radio stations were provided with desktop computers and internet access, for example. Other stations were offered portable digital recording and editing equipment which enabled them to interview farmers and agricultural experts on location, rather than in studio. Other technologies included wireless networks, call-in and call-out facilities, and satellite terminals (VSATs).

Putting ICTs in context

Figure 2



Mobile phone ownership has dramatically increased in developing countries in recent years. According to the ITU, two thirds of the world's mobile phone subscriptions are in developing countries, and a quarter of that population is in Africa. In 2000, only 1 in 50 Africans had a mobile phone[2]. AFFRI's household survey in 2010 found that as many as 65% of farmers in some communities own phones. The mobile phone has become the "other" key technology for farmers. With a phone, a farmer can inquire about market prices, coordinate buying inputs and selling produce, as well as maintain contact with other farmers around the country.

The ICT experiment

To better determine how mobile phones and other ICTs could boost listenership of farm radio programs, AFRRI experimented with a variety of ICT packages in partnership with the 25 radio stations participating in the PRC portion of the study. The ICT packages included a combination of the following: computers, MP3 players, internet access, call-in and call-out facilities, and satellite terminals (VSATs), and wireless networks. (The customized packages are detailed in this report). AFRRI evaluated each of these packages for both the radio stations and the farmers in the target listening communities to determine how much

[2] International Telecommunications Union 2000 figures on Mobile cellular subscriptions for African region

of an impact ICTs had on increasing listenership, and ultimately on encouraging farmers to adopt innovative agricultural practices that would improve their food security.

ICTs made radio programming more accurate, timely, and accessible to farmer listeners. ICTs also helped broadcasters and extension officers extend their reach to a broader audience. Using short message service (SMS) to alert farmers in ALCs of upcoming phone calls, for example, increased overall listenership of radio programs. Call-in and call-out capacities allowed farmers to participate in live broadcasts and to shape on-air discussions. Internet access and VSATs allowed radio staff to conduct research from reliable sources, and earn a small profit to sustain this resource. Portable voice recorders allowed radio hosts to go on location, to interview farmers in their fields and in their homes. And MP3-technology gave farmers the ability to listen to previously broadcast programs at their leisure, offering them flexibility with when and where to listen to radio programs.

AFRRI's research indicates there is a strong correlation between farmers listening to episodes of a radio campaign and going forward to adopt a new agricultural practice. ICTs had a notable impact on the increased listenership of farmers. AFRRI's research found that those in ALCs – using varying types of ICT support – listened more frequently to radio programs than those in PLCs, had better knowledge of the agricultural improvement promoted in the PRC, and were more likely to adopt the promoted agricultural practice. Outcome evaluations found that nearly four times as many farmers in ALCs as those in PLCs adopted the agricultural improvements promoted in the PRCs, and 10 times as many as those in control communities.

Figure 3

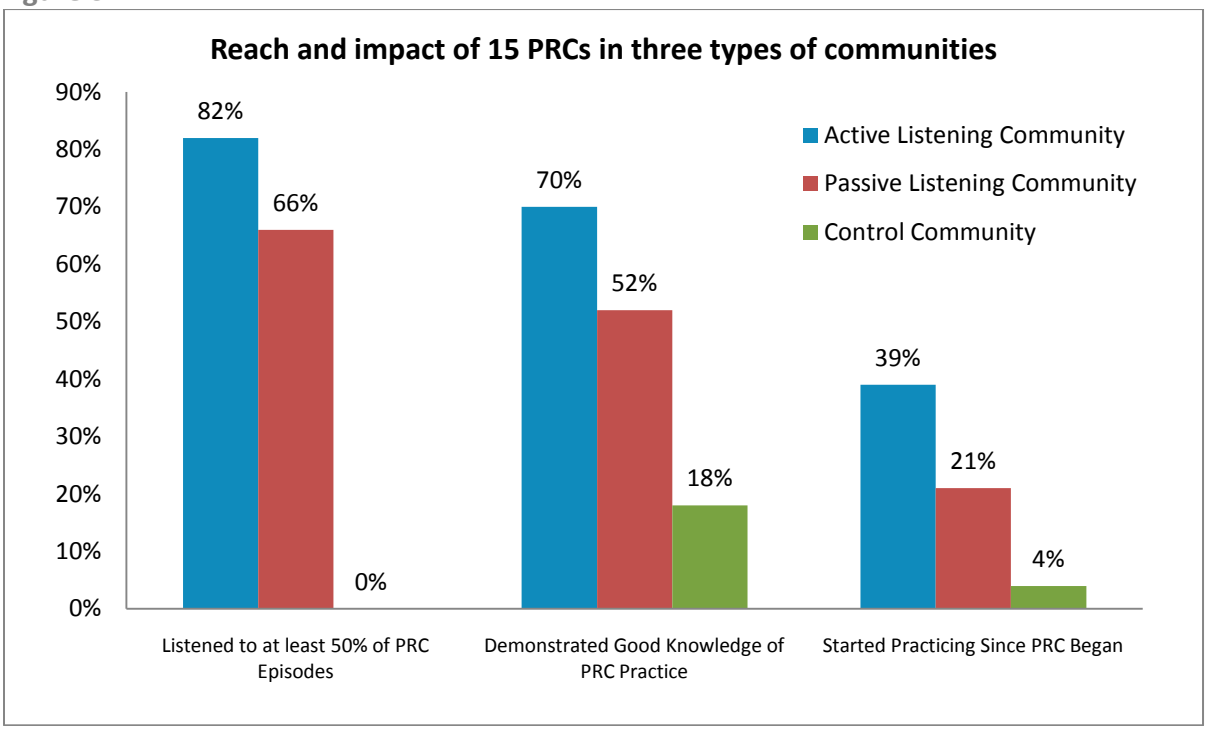
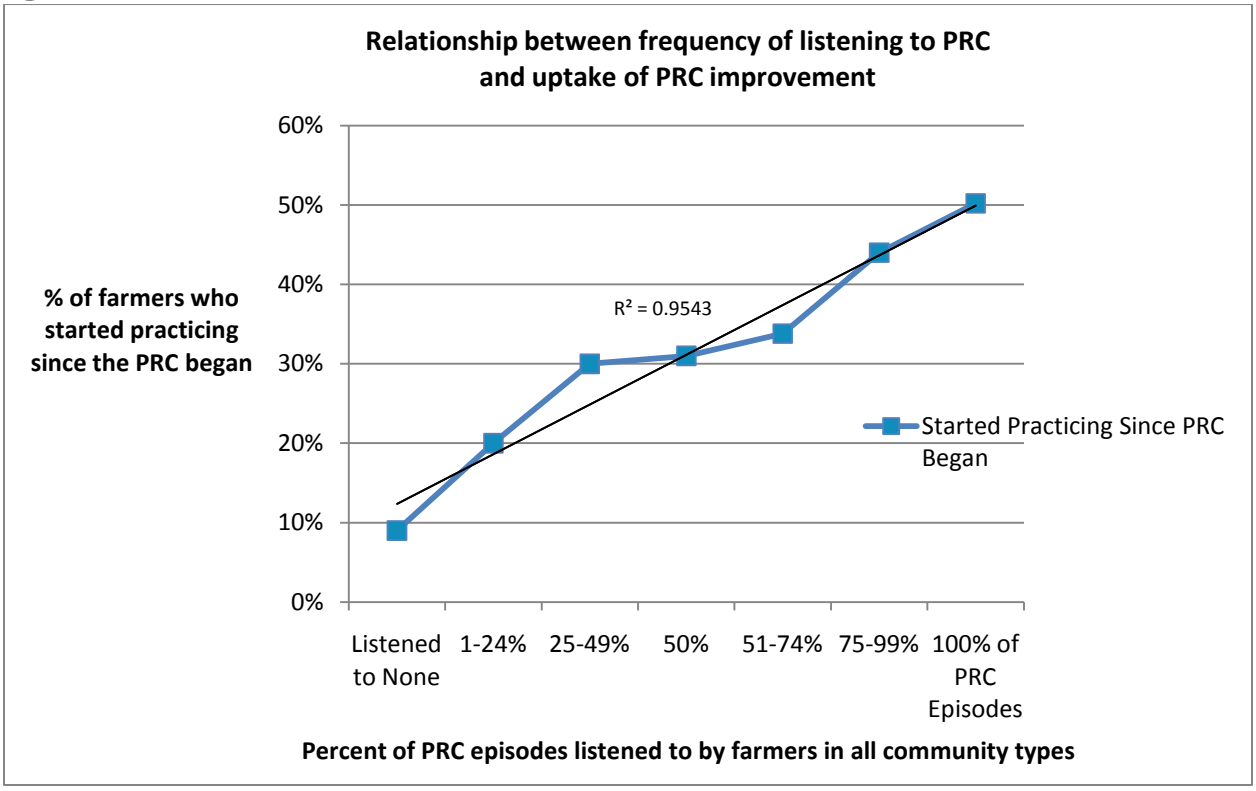


Figure 4



These findings stress the importance of discovering strategies to get more people to listen more often. Listeners who are engaged directly by and with broadcasters demonstrate a higher adoption of new agricultural practices than those who are not engaged. It is important to find strategies and technologies that increase engagement, participation and listening opportunities for farmers throughout a campaign. Each of the eight ICT packages implemented as part of the AFRRI project demonstrated the capacity to increase listenership of farm radio programs. Details of the packages and their impact on listenership are as follows:

The ICT packages

1. Electronic resources Good farm radio requires content that is relevant, accurate, reliable and readily accessible to broadcasters for inclusion in their programs. Accessing such content is one of the major constraints to the production of farm radio programs. The advent of desktop computing and internet technology offers broadcasters the potential to find and use a wide range of resources inexpensively. Farm Radio International's script service, for example, is available online, making key resources readily accessible to broadcasters. As part of AFRRI, each partner radio station was provisioned with a desktop computer for their campaign work, and a variety of arrangements were made for them to gain internet access. Training was given to all participating broadcasters on basic computer literacy, internet search skills and virus prevention techniques. In a survey with 51 partner broadcasters over two-thirds identified the internet (68%) as the most important ICT tool in the production of farm radio programs.

2. Digital recording & editing equipment. Multifunction, rechargeable MP3 recorders were provided to all broadcasters participating in AFRRI. These were one of the biggest ICT successes of the initiative, and were incredibly popular amongst broadcasters. Good farm radio depends on capturing good sounds and the voices of a wide range of farmers and experts. Inserting these recordings into radio programs makes

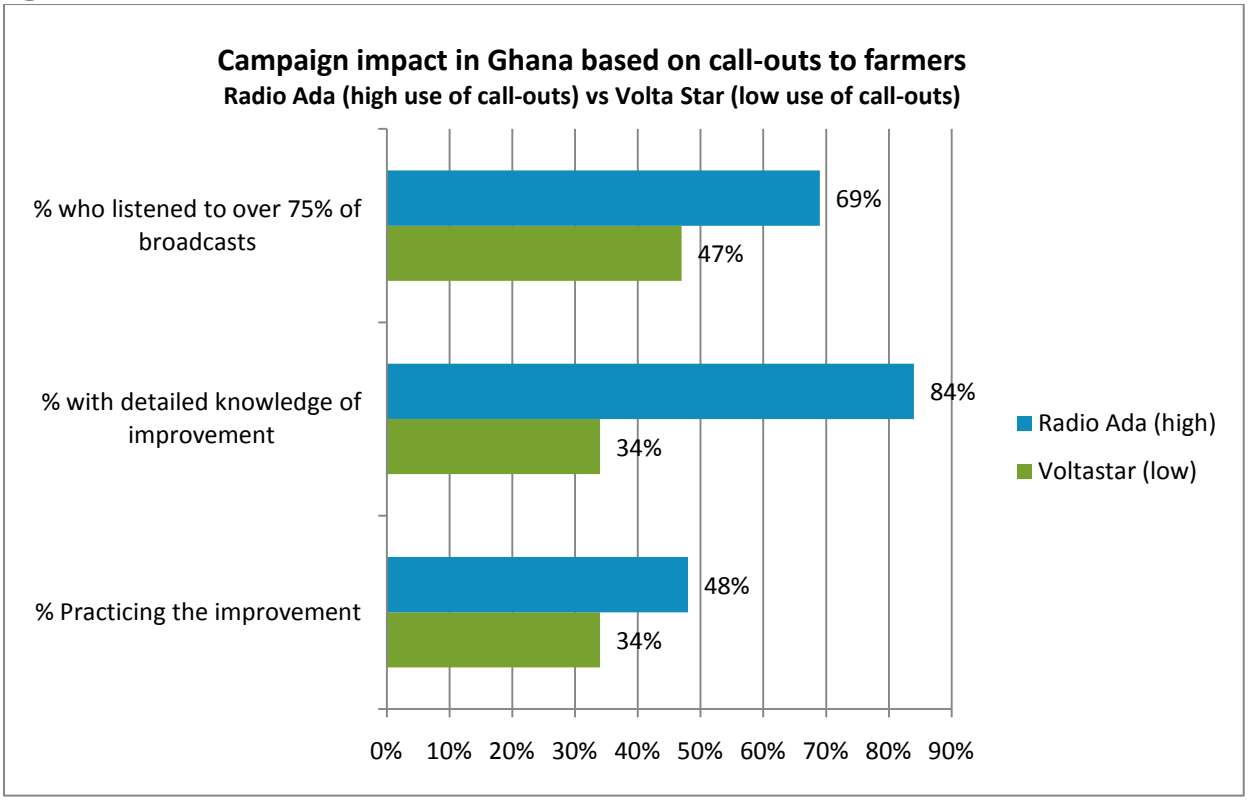
them more engaging and popular. Broadcasters, extension agents and farmers[3] found MP3 players easy to use: as a portable recorder[4] with good audio quality; as a radio that can record live broadcasts for archiving; as a USB flash disk for storing and exchanging data files. Simple mini-USB rechargers give the units enough battery life to operate for many days. The portability of MP3s allowed radio hosts to visit farmers in their fields and in their homes, increasing farmer participation in the radio broadcasts.

3. Phone call-outs to extension agents and experts. Most radio stations in Africa have taken advantage of the spread of mobile phones by hosting call-in shows, in which listeners are invited to call the station and make comments or ask questions. Call-out shows, in which the broadcaster phones pre-identified individuals for interviews and commentary, were almost unheard of before AFRRI. Prior to AFRRI, when broadcasters wanted to interview experts or extension agents, they invited them to the studio and normally had to pay their travel expenses. Call-outs were introduced in most of the stations participating in AFRRI, and proved to be the most affordable and reliable way to consistently feature the voices of experts and extension agents throughout the radio campaigns. By using the phone, experts and extension agents could participate in radio programs without needing to travel to the radio station. In a survey with 41 extension agents, 61% believed that the reach and impact of their extension work was substantially improved because they could be heard on radio programs through call-out programs.

4. Phone call-outs to farmers. Farmers learn from other farmers and especially appreciate a variety of farmers' voices on air. Call-outs enabled broadcasters to facilitate this farmer-to-farmer knowledge-sharing and learning process, on-air. In a typical weekly call-out segment within AFRRI's radio campaigns, broadcasters pre-arranged calls with two or three farmers per episode. Sometimes call-outs were used at the end of a radio program to conduct follow-up discussions on air with listening groups,[5] offering timely reaction from farmer listeners, and giving farmers the opportunity to shape the on-air discussions. AFRRI found that call-outs to farmers can significantly affect farming adoption rate of agricultural improvements, (up to 14%), increase their level of knowledge about the agricultural practice, (up to 50%), and improve their overall listenership (up to 22%), when compared with stations that do not make call-outs to farmers[6]. The cost savings for using call-outs versus travelling to the village to conduct interviews is substantial: The cost of calling three farmers for five minutes each is approximately $8 USD compared with an average of $75 USD in transportation costs to travel to three different villages to capture interviews. In-person field visits by broadcasters to surrounding communities is an essential way to build links between stations and the communities they serve,, so call-outs should not be viewed as a replacement for on-site interviews; rather, they offer an affordable way to include more voices on air between field visits. To ensure that call-outs are done consistently, however, broadcasters need to be provisioned with airtime to make the calls each week.

[3] See "A closer look: The travelling Sansa! Giving voice to farmers with MP3 recorders" in section 9 of this report
[4] See "A closer look: The portable MP3 recorder", section 9
[5] See A closer look: "Qu'en pensez vous?" , section 11.5
[6] For further comparisons see Figure 5

Figure 5



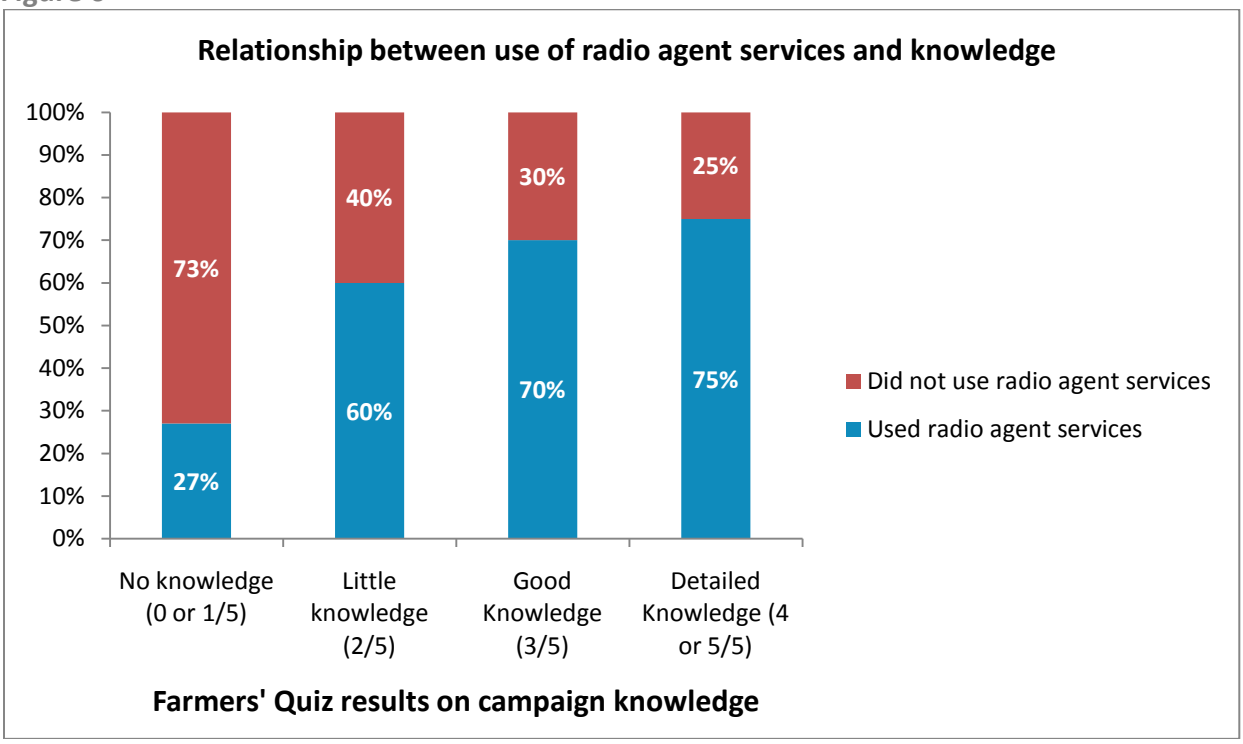
5. SMS alerts from broadcasters. Weekly SMS alerts sent to the phones of listeners 30 minutes prior to a broadcast can boost radio campaign listenership by up to 20%[7]. The more episodes of campaigns farmers listen to, the higher their likelihood of adopting the agricultural practice featured in the radio programs [8]. At a cost of $0.05USD per SMS, a farmer can be reminded throughout the 18 weeks of a radio campaign for under $1USD. To save on costs and bring the system to scale, AFRRI asked those receiving SMS alerts to share the reminder by word of mouth with their neighbours. For every one SMS sent to a phone, two people from different households were alerted verbally[9]. Receiving verbal alerts – as with SMS alerts -- also had an impact on radio campaign listening habits[10]. The SMS alert experiment had some surprising and unintended positive effects: Farmers who received weekly SMS alerts expressed that they felt "special" and connected personally to the radio station and specifically to the radio campaign.

6. Radio agents with solar MP3 radios and mobile phones. A community-nominated "radio agent" can increase the benefits of a participatory radio campaign in the host community. Radio agents host listening sessions during campaign broadcasts, record programs for repeat listening at a later time, and provide access to a mobile phone for communication with the radio station. There is an apparent positive relationship between the use of radio agent services and the degree of knowledge gained in their communities about the promoted agricultural improvements. Farmers that demonstrated the most

[7] See section 12.5, Figure 21: Campaign Listening Habits and SMS Alerts
[8] See Figure 4: Relationship Between Frequency of Listening to PRC and Uptake of PRC Improvement
[9] See section 12.5, Figure 22: Modes of receiving reminder in communities
[10] See section 12.5, Figure 23: Listening Habits of Those Receiving Verbal Reminders

detailed knowledge of the campaign topic were more likely to report that they made use of a radio agent's services.

Figure 6



Radio agents were able to facilitate group listening, which also had an apparent impact on the way people learn through radio: 73% of surveyed farmers reported that group listening helped them better understand the content because they could clarify and discuss the topic as a group; 46% of the same group of farmers stated that listening in a group gave them encouragement to start practicing the agricultural improvement.

7. Freedom Fone – Freedom Fone: Interactive Voice Response (IVR). Two radio stations – Volta Star (Ghana) and Radio Maria (Tanzania) - used an IVR to make pre-broadcast information available to listeners at any time: market prices, weather forecasts, re-caps of previous broadcasts and other pre-recorded audio clips could be accessed by listeners with a single phone call. This service was set up in response to farmers' desire to have information available "on–demand" rather than only at the time of broadcast. The voice mailbox feature of the IVR could also be used to gather feedback, comments and other interactions from listeners. The results of the Freedom Fone IVR experiments revealed that farmers are willing to spend their mobile phone airtime accessing information that is relevant. The information must be concise – the average length of a call is 120 seconds, so callers should be able to get what they want in less than two minutes. The information on the IVR must be kept up-to-date and relevant: Otherwise, farmers will stop calling the service.

The majority of callers to the IVR systems was between 17-25 years old (41% of callers) and had a secondary level education (72%). Price proved to be a barrier for some groups: 35% of women farmers stated they didn't call the IVR service because they couldn't afford it. The early adopter of this

technology profile was most likely to be a young, secondary-educated male. This is consistent with the broader issue of providing mobile phone-based services for a younger generation of farmers who are more comfortable with mobile phones than are older generations.

8. VSAT and radio station as Wireless Internet Service Provider (WISP). AFRRI wanted to explore a sustainable way for a remote radio station to get internet access where VSAT[11] was the only option. Two radio stations, Sibuka FM (Tanzania) and Radio Fanaka (Mali), set up and sold five wireless access points (APs) to local customers, and shared the internet connection for a monthly cost. This cost-sharing mechanism enabled the radio stations to cover the $250USD per month VSATs charge as well as make a modest profit to pay technical staff at the radio station. Radio Fanaka created a functional and financially sustainable cybercafé inside the radio station.

Reliable internet can help a radio station evolve and grow by enabling access to online resources, accessing online training opportunities, and increasing partnerships with NGOs and organizations that require their partner radio stations to have internet. If the radio station has the management capacity to oversee contracts, provide technical support and maintain good client relationships, it can successfully operate as a WISP and generate modest revenue. Radio stations as internet providers are a natural extension of the services stations already provide as information/news providers, especially in rural communities.

Beyond the technology

Technology on its own cannot improve farm radio's reach. Introduction of ICTs must be integrated with appropriate training on the use and maintenance of equipment, combined with sustainable ways for broadcasters to fund and own the technology. ICT-enhanced radio can be scaled-up to promote wide use among farm radio broadcasters across Africa to increase listenership, the scope of extension work, and thereby the education of farmer listeners to help them improve their overall food security.

Training: Ensuring that broadcasters, producers, and technical staff at the radio stations are confident in their knowledge of any new ICT is directly linked to the success of those ICTs. There is a tendency at radio stations for technology to stop working. Equipment that is not working is viewed as broken, and can sit untouched for months before any action is taken. Emphasizing training, troubleshooting, and servicing can help minimize equipment downtime.

Ownership: The radio stations that understood and believed the new ICT equipment really belonged to them and their listeners, (and not to FRI), were far more likely to sustain the use of the technology, including maintenance and general upkeep.

Appropriate technology: To maximize the sustainability of any ICT at a radio station, it is important to source equipment that is best suited for a rural radio station in sub-Saharan Africa. It is important, for example, that replacement parts are readily available and that there are technicians who can service the equipment in the area, capital city nearby, or region. There are many cases of new transmitters and expensive CD players that collect dust as expensive door stops because one small hard-to-source component has broken down. Affordability should be a main consideration when choosing an ICT for a station – a new, affordable piece of technology that works well often spreads fast, with surrounding

[11] VSAT is a satellite based internet service

radio stations also looking to invest in the technology. The simplicity of a new ICT should be considered and tested out before a radio station invests – if any broadcaster can use the technology without a lot of instruction or a manual, it will greatly increase the use of the ICT in broadcasts.

Sustainability: AFRRI explored the capacity of the radio stations to sustain these technologies beyond the life of the experiment, both technically and financially. Training, as noted above, is a key factor in sustaining the technologies. Broadcasters and technicians who are comfortable with ICTs will continue to use them.

Some ICTs, including call-outs and SMS alerts, however, proved to be reliant on project funding to sustain. In order for SMS alerts to be scalable and sustainable without project funding, a local SMS gateway that sells in bulk, or a partnership with a mobile phone operator, must be sought to drastically reduce the cost per SMS. Cybercafés located in the station can absorb the operating costs of internet. Virtually hosting IVR services for other community organizations and businesses promises to be a successful means of financing a Freedom Fone deployment[12].

AFRRI's partner radio stations demonstrated innovative ways to leverage ICTs to generate revenue: on-air classified ads -- a system of village radio agents who would call-in announcements over the radio for a fee -- and premium rate SMS charges for reading greetings and prayers over the air were just two of the successful financing options attempted.

Scalability: AFRRI has found that farmers who listen more frequently to rural radio broadcasts have a greater tendency than non-listeners to increase the adoption of new agricultural practices. The project also demonstrated that the interactive techniques described in this report can help to increase listening and learning. While the technologies and outreach strategies in AFRRI were tested at a limited number of radio stations, these partner stations represented a diverse sample: They were located in five different countries, and represented several different models of rural radio broadcasting. With initial training and technical support, the findings of AFRRI's ICT project suggest ICTs could be widely used to enhance the effectiveness of radio for rural development.

Rural extension and ICTs: In surveys, rural extension agents stated that the PRCs specifically, and radio in general, have greatly helped them to get their jobs done. The mobile phones provided through AFRRI, enabled broadcasters to include extension agents in on-air discussions, while they were working in the fields with farmers. With the development of more mobile-based services including IVR, the future collaboration between extension services, ICTs and radio is bright.

Further research: As the convergence of radio with ICTs, the internet and mobile phones continues to grow, exciting new opportunities for research become apparent. Can the recent headway made in speech recognition and automatic generation of audio from text help to improve radio, for example? What impact could this have on automating market prices, weather information, and other agricultural data used by farmers over the phone? Could this be done in different local African languages? Are there other revenue models that can leverage ICTs to help radio stations generate more income to keep the station afloat? Could the ICT and radio techniques covered in this report also be extended to other applications besides agriculture? Could health, community development and some forms of education also benefit from the same techniques?

[12] Especially true when using a four SIM card device like the Office Route, explored in section 14 of this paper

Conclusions and recommendations

1. ***Computers and computer literacy, including the foundations of virus prevention and internet search skills, are essential for the growth of ICTs at radio stations in sub-Saharan Africa.***

Any ICT-specific activities at a radio station should have a dedicated computer or two. AFRRI recommends supporting radio stations to get reliable internet for all staff, especially broadcasters, who require them for conducting research.

2. ***Portable and multifunctional MP3 recorders, combined with audio editing workstations, are the ultimate companion tools in the creation of engaging and entertaining farm radio campaigns.***

Portable MP3 players should be considered a staple broadcaster supply that each broadcaster owns, rather than sharing MP3 players belonging to the radio station.

3. ***On-air call-outs to experts are the most cost-effective way to include a variety of expert voices in a radio campaign.***

AFRRI recommends using this technique to put diverse voices on air that correspond with the message and timing of the radio campaign, rather than the same voice, week-in and week-out. Scheduling calls in advance and planning the content to be discussed ahead of the broadcast are key to effectively using call-outs.

4. ***On-air call-outs to farmers are a highly cost-effective way to include the voices of farmers throughout all stages of a radio campaign.***

Farmers learn from other farmers and the mobile phone is an excellent way to make sure their voices are included in the campaign. By calling out to farmers, they can be reached at their convenience in their homes or fields and the cost of the call is carried by the radio station. It is advised to set aside mobile phone credit for broadcasters to make regular call-outs to a variety of farmers. For an engaging and entertaining radio campaign, it is best to call three to four farmers per broadcast.

5. ***Sending an SMS alert from broadcasters to listeners 30 minutes prior to a broadcast is an excellent way to encourage regular listenership of radio programs.***

AFRRI recommends stations collect databases of farmers' mobile phone numbers and send them SMS alerts as a way to increase listenership and foster a stronger relationship between farmer listeners and radio stations.

6. ***Radio agents equipped with mobile phones and a solar-powered, MP3enabled radios that can record and replay broadcasts, are an effective way to encourage group listening and provide repeat listening opportunities for communities.***

AFRRI recommends finding the right technology and working with existing radio listening groups to maximize on the potential of the radio agent model.

7. ***The use of an IVR, such as the Freedom Fone, to provide voice-based information on demand can be an excellent way for a radio station to make its on-air information available off air for repeat listening through a phone call.***

An IVR for farmers should be regionally relevant (market prices and weather), kept up to date (at least twice per week), and key information should be under 120 seconds in length.

8. ***Helping a radio station acquire a VSAT and establish itself as a small wireless internet service provider (WISP) in the community, can be a sustainable way to provide internet in remote areas where other internet options don't exist.***

Training on the management of the WISP business and technical aspects of networking are crucial to sustaining a profitable VSAT model.

With these recommendations in place, AFRRI's findings indicate that modern ICTs can enhance the effectiveness of radio as a sustainable, interactive, development tool, ultimately improving the food security of small-scale farmers in Africa.

How to use links in this document:

This report is one in a series of publications created from the results of the African Farm Radio Research Initiative. The reports are available electronically via links.

There are two ways to access these other documents:

1. Type in the URL shown

We have provided a short URL which can simply be typed into your web browser.

2. Scan the QR Code



You will notice “QR Codes” throughout this document which will make it easier for you to access these companion pieces. Think of them as barcodes that can easily be scanned by your mobile phone’s camera. There are many free mobile applications available to support this type of function. We recommend “Google Goggles,” which is widely available for iPhone, Blackberry and Android phones. You will then be able to access the PDF version of the report or resource.

Companion reports

Although this paper is written to stand on its own as a research piece about ICTs and radio, it is part of a larger AFRRI study, from which several important reports and papers have been written that explore in more depth the impact of the participatory radio campaign. This paper looks specifically at the role ICTs play in increasing the effectiveness of PRCs; for a more complete picture of the PRC read the following:

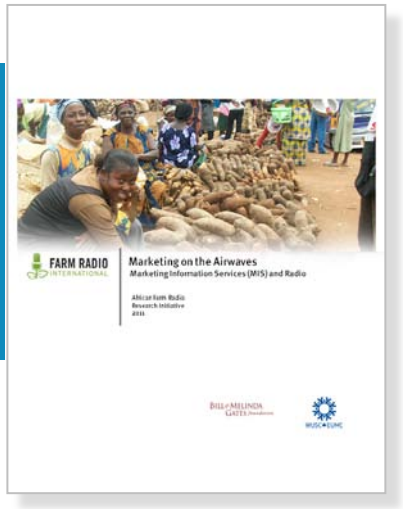
Did you know that Farm Radio has created a companion report on the full findings of AFRRI? *Participatory Radio Campaigns and food security: How radio can help farmers make informed decisions.*

http://bit.ly/farmradioprc



Did you know that Farm Radio conducted a thorough analysis of market information services in each of the AFRRI partner countries? *Marketing on the Airwaves: Marketing Information Services (MIS) and Radio*

http://bit.ly/farmradiomis



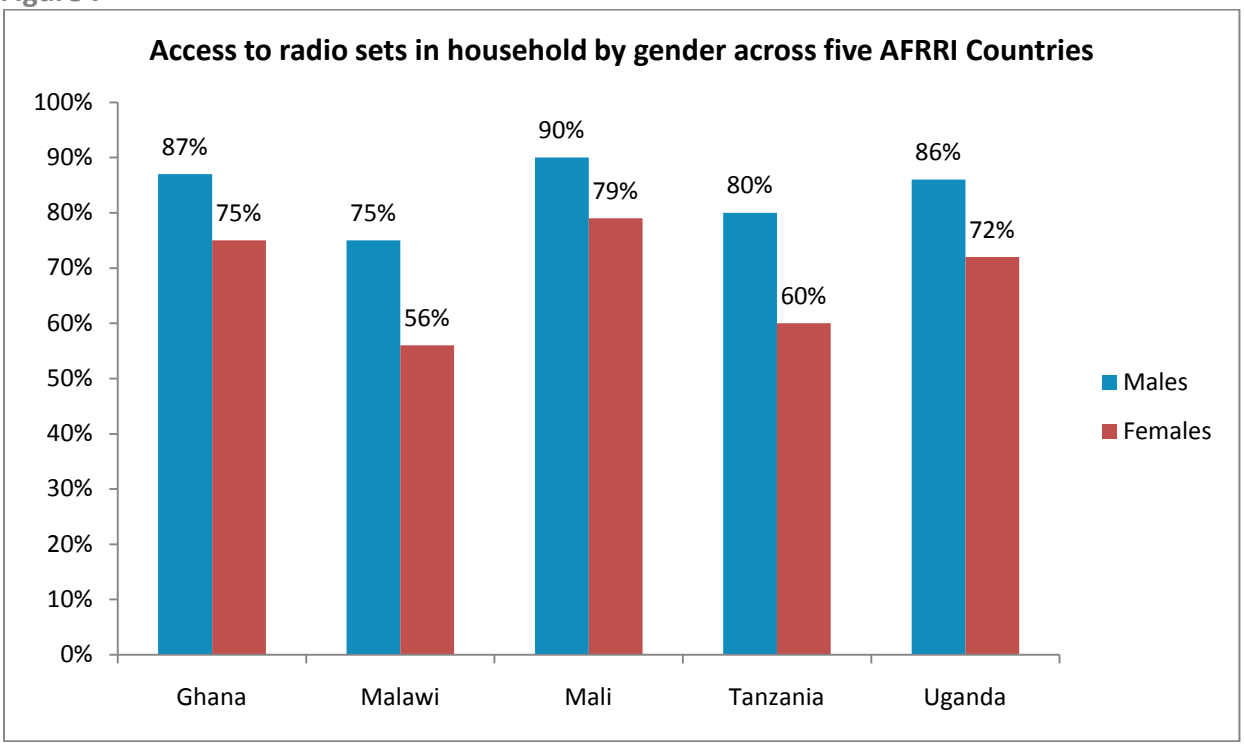
1.0 Introduction

In April 2007, Farm Radio International (FRI), with funding from the Bill & Melinda Gates Foundation and in partnership with World University Service Canada (WUSC), set out to conduct a 42-month action research project – the African Farm Radio Research Initiative (AFRRI). The main objective of AFRRI was to assess the effectiveness of farm radio to meet food security objectives of rural farming households in Africa. Part of AFRRI included integrating new information and communication technologies – such as mobile phones, internet, and portable audio recorders – to enhance the reach and impact of farm radio.

Radio in Africa

Radio is the most widely used medium for disseminating information to rural audiences across Africa. Radio can reach communities at the very end of the development road – people who live in areas without phones or electricity. Radio reaches people who cannot read or write. Even in very poor communities, radio penetration is vast. There are more than 800 million radios in developing countries. An average of one in ten people in Africa have access to a radio[13]; that translates into a major proportion of households that own radios, given that the average household size is 7.2 people. An AFRRI survey of 4581 households in rural listening communities in countries confirmed that approximately 76% of households own a radio.

Figure 7



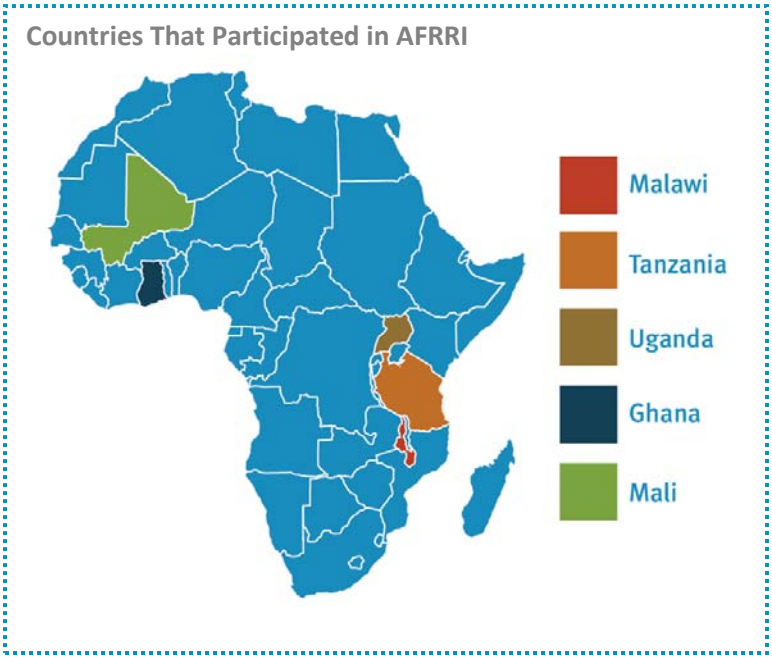
Over the years many development initiatives have demonstrated the power of radio to reach rural audiences, both as an instructional technology, and as a participatory development medium.

[13]Farm Radio International (2007). Our approach – Radio For Development Retrieved from: http://www.farmradio.org/english/donors/about/approach.asp

Radio is the most accessible of all information and knowledge-sharing sources and instruments on the African continent; yet the potential of radio as an effective development tool is often underestimated in policy formulation. For farming communities living on the periphery of information technologies and societies, radio is the only window to global reality.[14]

The African Farm Radio Research Initiative

A participatory, multi-stakeholder program, AFRRI aimed to discover, document and disseminate best practices for using radio-based communications to enhance food security in Africa. AFRRI partnered with 25 radio stations across five countries – Malawi, Tanzania, Uganda, Ghana, and Mali.



AFRRI's research was guided by the following two questions:

1. *How effective is radio in enabling smallholder farmers in Africa to address food security challenges they face, with a particular focus on increasing/diversifying food production, improving land use management, and reducing post-harvest losses?*

2. *How can new technologies, such as cell phones and MP3 players, increase the effectiveness of radio as a sustainable, interactive development communications tool?*

As part of AFRRI, Farm Radio International (FRI) partnered with 25 radio stations in five African countries to implement a series of ICT packages designed to enhance farm radio programming. Despite rapid gains in information and communications technology (ICT) worldwide, radio stations in Africa have largely not had access to integrated mobile phone technology, desktop editing, portable recording, computers, or access to the internet.

The ICT packages were one of the following three key elements of AFRRI:

Participatory radio campaigns (PRCs)
Working with 25 partner radio stations in the five African countries, AFRRI created a series of farm radio programs were designed to educate farmers, and to enable them to improve their agricultural practices. Farmer listeners were central to the development and implementation of the radio campaigns. AFRRI's new participatory radio campaign (PRC) model allowed farmers to participate at every level in the process. As a preliminary step, AFRRI identified active listening communities (ALCs) for each of its 25 partner radio stations. Farmers in the ALCs were surveyed about their local agricultural practices and

[14]Manyozo, L. (2007). *Communicating with Radio: What Do AFRRI Know?* Farm Radio International.

unique needs, as well as their radio listening habits. They then became central players in the design of a series of radio programs geared to address a particular agricultural practice that farmers deemed would help to improve their livelihoods, and ultimately their food security. Farmers in ALCs, passive listening communities (PLCs) – those who listened without participating -- and control communities – those that did not have access to the radio programming – were evaluated following each of the two 16-week campaigns to determine how effective the radio programs were in educating farmers about agricultural innovations and encouraging them to take up new agricultural practices that would improve their food security.

Marketing information service (MIS)
Five partner radio stations were selected to simultaneously participate in a pilot project using radio to enhance existing marketing information service (MIS). Marketing information service, which helps farmers to understand prices, markets, and supply-and-demand, is essential to farmer security in Africa. Traditionally, MIS has been implemented as a suite of projects financed by external donors and administered through national governments. AFFRI sought to create a radio-based MIS with the capacity to reach and influence a vast number of farmers, and could be sustained by the partner radio station in the wake of the formal project. Preliminary research suggested farmers required more than just commodity prices to make MIS effective. Farmers also require context. AFRRI's MIS project included regular discussions about market issues, and engaged radio stations, farmer listeners and extension experts on changes in local, district, national and international markets, and how these changes affect what farmers grow and how they distribute goods.

Information and communication technology (ICT)
AFRRI wanted to test how new information and communications technologies (ICTs) could be integrated with radio to provide better two-way communication between radio stations and their farmer listeners. To this end, each partner radio station was equipped with one of eight customized ICT packages to enhance their PRCs, which included a mix of communications media becoming increasingly accessible in Africa. Some radio stations were provided with desktop computers and internet access, for example. Other stations were offered portable digital recording and editing equipment which enabled them to interview farmers and agricultural experts on location, rather than in studio. Other technologies included wireless networks, call-in and call-out facilities, and satellite terminals (VSATs).

ICT-enhanced farm radio

Limitations of Radio
Although radio has been an excellent medium for communicating information to farmers, it has had limitations. Traditionally, radio has been a one-way medium with the capacity to read farmers in their homes and their fields; but on its own, radio has had limited means of interacting with listeners. Until now, radio has also lacked the potential to provide programs on demand – if a program was missed, typically, listeners could not hear it again unless it was rebroadcast. There are still many radio stations in Africa that rely on tape recorders, large expensive batteries, and often broadcast direct-to-air. They lack editing equipment, and the skills to produce and prepare shows in advance of a broadcast. These processes limit the ability of radio stations to produce good farm radio programs for their listeners.

Radio and ICTs
There is a spectrum of affordable, modern ICTs that show great promise for convergence with radio to create an even more powerful and interactive communication medium. The mobile phone is at the top

of this list. Like a typical radio set, a mobile phone is battery-powered and can be carried anywhere. Mobile phones operate on radio frequencies, (GSM), and can get reception in remote areas. At its most basic level of operation, a mobile phone only requires the user to know how to speak and how to listen.

The advent of the Short Message Service (SMS) presents fresh possibilities for interactions between radio and listeners. Radio stations around the world make use of SMS to receive comments in real time from their listeners, to conduct quick listenership polls on topics of interest, and to collect news from listeners, which can be passed onto the broader listening audience. SMS can also be used by radio stations to communicate messages to listeners' phones – opening another communication channel to complement the radio.

Interactive Voice Response (IVR), a system that has typically been used by customer service departments to automate the answering of incoming calls, presents new opportunities for radio stations to serve their listeners. IVR can be designed to allow callers to listen at their convenience to previously-broadcast information. IVR can also be used to gather audio recordings from listeners, and to enhance the overall interactivity of radio programs.

The explosion of affordable, multifunction MP3 recorders on the market presents radio stations with the opportunity to better equip more broadcasters to "go digital." With recorders that can fit in the palm of your hand, and rechargeable batteries that can last for days, many of the obstacles of old analogue technology have been overcome.

The cornerstone tool for ICTs in radio stations is the desktop computer. In addition to being a digital audio workstation for editing interviews and producing programs, the computer is a gateway to the internet. With a reliable internet connection, a radio station can stream audio, maintain a website, conduct research, and collaborate with broadcasters all over the world.

The ICT experiments

AFRRI developed a series of eight experiments carried out with the 25 radio stations across Ghana, Malawi, Mali, Tanzania and Uganda. As part of AFRRI two separate sets of participatory radio campaigns (PRCs)[15] were carried out with partner radio stations: The first round of campaigns (PRC1) ran between January and May of 2009. The follow-up round of campaigns (PRC2), conducted between September 2009 and March 2010, built upon the agricultural topics and successes of PRC1, while making some changes – notably by introducing ICT packages to the radio stations. These packages formed the basis for the eight ICT experiments explored fully in this paper.

[15] Farm Radio International has a report on the full findings of the PRCs available for download at: http://bit.ly/farmradioprc

A closer look: A bus ride to remember

The founding of Farm Radio International's script service

In 1977, Canadian broadcaster George Atkins was riding a bus in Zambia full of farm radio broadcasters. In a short conversation with broadcasters from Zambia and Nigeria beside him, George asked: "And what will your next program be about when you get home?"



George Atkins, founder of Farm Radio International and former broadcaster at the Canadian Broadcasting Corporation (CBC), in the studio.

"How to maintain the sparkplugs in tractors," his Nigerian colleague replied.

"But how many of your listeners have tractors?" George asked.

"About one percent."

"I see, and what do the rest of the farmers who don't have tractors use?"

"Well, that's easy," his colleague replied, "they use oxen!"

"So do you ever do programs about how to breed, how to buy, and how to keep oxen healthy, topics like that?" George asked.

"Well no, unfortunately we don't have that kind of information."

"How about when I get home to Canada, I will send you some information and scripts about those topics for you to use on the radio?"

Two years later, George Atkins created Developing Countries Farm Radio Network and mailed the first "batch" of scripts to broadcasters in developing countries. This conversation illustrates not only the genesis of what became Farm Radio International, but also the importance of having relevant agricultural resources available in a format ready for broadcasters to share with their listeners over the air. This paper continues in this tradition by outlining how modern ICTs can continue to support farm radio broadcasters in their work.

2.0 Background and context

Food insecurity in Africa

Africa is in a food security crisis. The Food and Agriculture Organization of the United Nations (FAO) defines food security as follows:

> *…when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life. Household food security is the application of this concept to the family level, with individuals within households as the focus of concern.*[16]

Food insecurity is when people do not have access to food as above. According to FAO's latest statistics, 239 million people in sub-Saharan Africa are hungry. Three quarters of those people live in rural areas and overwhelmingly depend on agriculture for their food. Half are farming families "surviving off marginal lands prone to natural disasters like drought or flood"[17]. Table 1, below, profiles the five AFRRI partner countries and summarizes several key indicators.

Table 1 – Key indicators for countries in this project[18]

	Ghana	Malawi	Mali	Tanzania	Uganda
Population (2010)	24.3 million	14.9 million	15.3 million	45 million	33.7 million
Official languages	English	English and Chichewa	French	English and Swahili	English and Swahili
Region	West Africa	Southern Africa	West Africa	East Africa	East Africa
% of Population Living in Rural Areas (2009)	49%	81%	67%	74%	87%
Literacy (2009)	67%	74%	26%	73%	73%
% of Land Under Agricultural Use (2008)	69%	58%	33%	40%	66%
% of People Living Below National Rural Poverty Line (2006)	39%	56%	58%	37%	27%
# of Mobile Phone Users (out of 100) (2009)	63	16	29	40	29

AFRRI and the Participatory Radio Campaign

AFRRI tested the effectiveness of a particular approach to farm radio called "the participatory radio campaign," or PRC. The PRC method was created by Farm Radio International (FRI). Drawing on elements of adult learning and the theory of participatory communication for development, PRCs build a

[16] (2003)Trade Reforms and Food Security: Conceptualizing the linkages. FAO
[17] (2011) Hunger: Who are the hungry. World Food Programme
[18] Taken from http://data.worldbank.org

coherent, multi-month series of programs that feature farmers' voices, follow a dramatic progression, and use the best features of radio and related ICTs to engage farmers. Each PRC focuses on a single, farmer-selected "improvement" or innovative agricultural practice deemed to have the capacity to help farmers achieve their food security goals. The improvement becomes the central feature of a weekly series of radio programs that extend over a period of four to six months.

FRI chose to work in Ghana, Malawi, Mali, Tanzania and Uganda for a variety of reasons. It was important to have a combination of French and English speaking African countries, particularly when looking at scalability. The countries were also representative of a variety of regions, including at least one country from East, West and Southern Africa. Finally, the countries were chosen as priority countries in the context of food security in Africa.

Each partner radio station conducted two sets of PRCs, known as PRC1 and PRC2. Based on outcome evaluations conducted in June 2009, at the end of PRC1, radio partners sought to build upon and improve their reach and impact in PRC2 -- notably by introducing ICT packages to the radio stations.

Agricultural themes

The campaigns focused on contributing to three important elements of smallholder food security: diversification of production by introducing new crops, varieties, or livestock; improving soil health; and reducing post-harvest losses. These food security themes are reflected in the campaign topics chosen by radio stations and their listening communities, indicated in Table 2, below.

Table 2 (next page), profiles 15 of the partner radio stations featured in AFFRI's research. They are categorized by the typology of radio station (public/national, private or community), the major language groups served, the districts served/reached by transmissions and the campaign topics broadcast during PRC2[19].

[19] For a more detailed report about the PRCs and AFRRI see Farm Radio International. (2011) Participatory Radio Campaigns and Food Security: How radio can help farmers make informed decisions http://bit.ly/farmradioprc

Table 2 – 15 partner radio stations and their campaign topics

Country	Station name	Typology	Language(s)	Region/District [20]	Campaign topics
Ghana	Classic FM	Commercial	Akan (Twi)	Brong Ahafo	Use of mulch
	Radio Ada	Community	Dangme	Greater Accra	Manure & mulching
	Volta Star	Public	Eww/Akan(Twi)	Volta	Mulching & min tillage
Malawi	Nkhotakota	Community	Chichewa	Nkhotakota	1 to 1 maize planting
	Mudziwathu	Community		Mchinji	Use of inputs for Maize
	Zodiak	Commercial		Nationwide	Timely use of manure
Mali	Banjo Kayes	Commercial	Bamanankan	Kayes	Compost (Marie Noko)
	Radio Fanaka	Community		Greater Bamako	Compost (Seydou Noko)
	Radio Jigiya	Community		Sikasso	Modernized Shea butter
Tanzania	Radio Maria	Religious	Swahili	Nationwide	Improved local chickens
	Sibuka FM	Private		Shinyanga	Use of Manure
	TBC	Public		Dodoma	Group Marketing
Uganda	KKCR	Community	Rugiga	Kabaale	Use of compost
	UBC	Public	Sabiny	Kapchorwa	Highland Irish Potatoes
	Mega	Community	Acholi	Gulu	Fruit trees for honey

About the listeners[21]

The radio station's listening communities that participated in the research are profiled below in Figures 8, 9 and 10.

Figure 8 shows that the majority of farmers surveyed were between 20 and 40 years old. This is consistent across all countries. Figure 9 shows the gender difference between farmers surveyed. With the exception of Ghana and Uganda (59% male), the sampling was close to half female and half male. Figure 10 shows the average number of people living in a household per country. Mali indicates a much higher average number, mostly due to the differences in marital status and cultural definition of family size.

[20] Some countries had a nationwide campaign where a single language is spoken by almost everyone (Malawi & Tanzania)

[21] The decision to not measure income levels of farmers in the household survey was made due to the challenge of identifying a wealth proxy like mobile phone, land or livestock ownership that could be applied across all countries and communities.

Figure 8

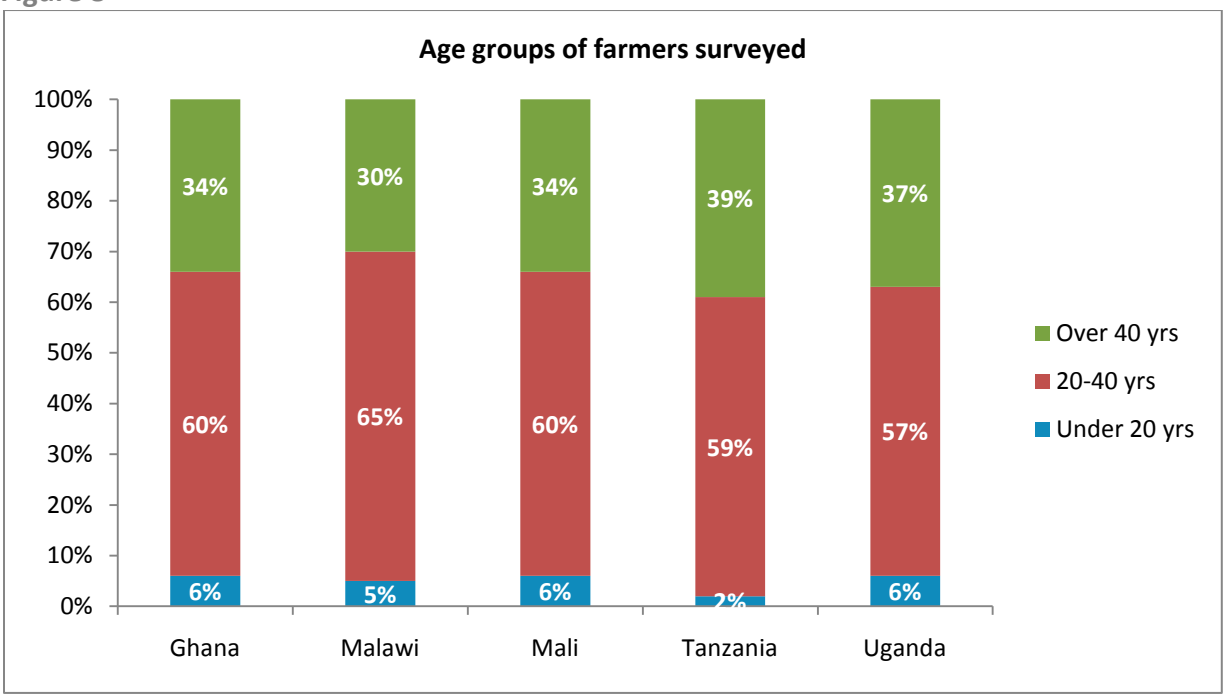


Figure 9

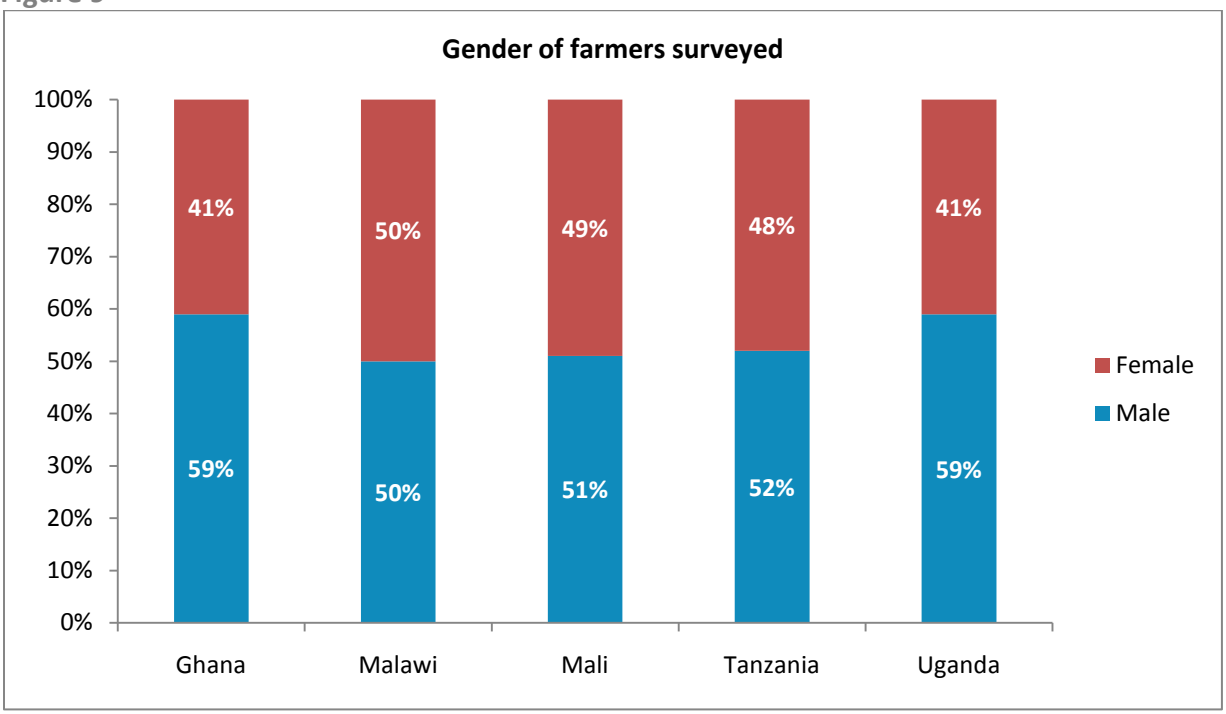
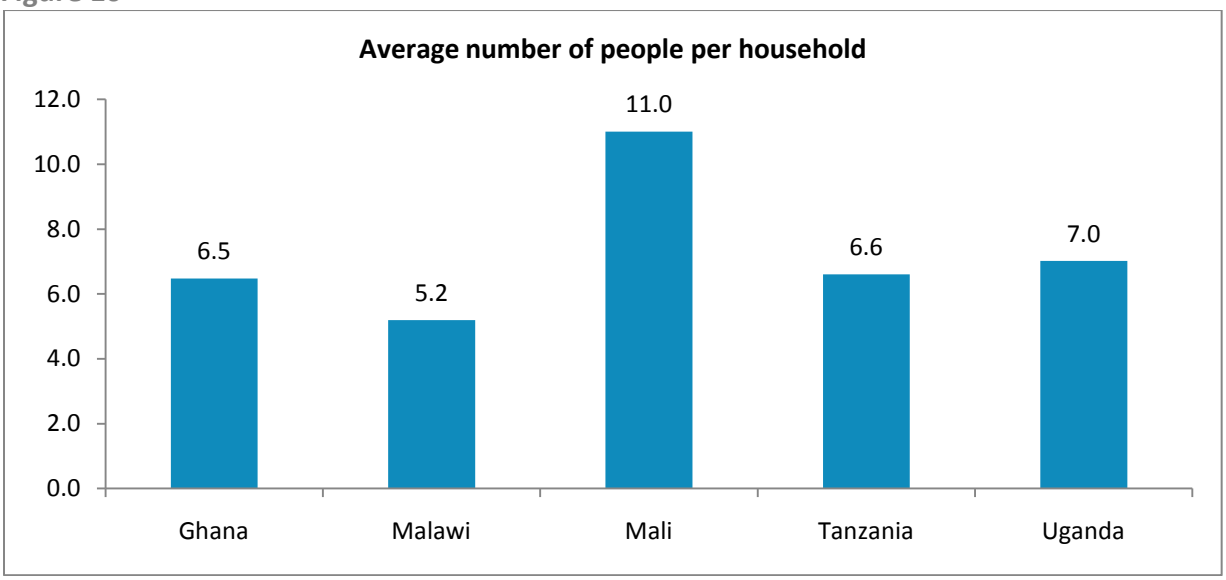


Figure 10



About the broadcasters

The broadcasters played a pivotal role in this research and report. They were behind the research, design, recording, production and broadcasting of the radio campaigns, as well as being the users of the ICT tools at the radio station.

AFRRI surveyed broadcasters about the furthest level of education and training they had completed. Figure 11 shows that in Ghana and Malawi, the majority of broadcasters had completed a secondary-level education. By contrast, in Tanzania and Uganda, the majority of broadcasters had completed a diploma-level education.

Figure 11

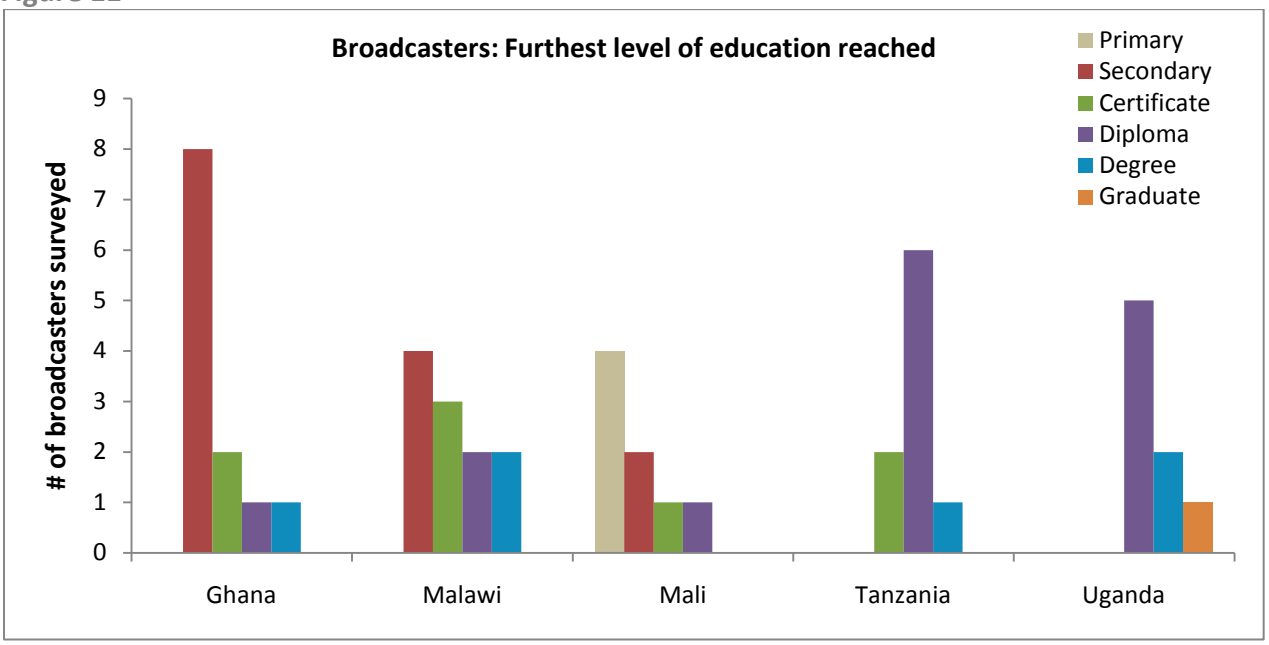


Figure 12 shows that in Ghana, Malawi, Mali and Uganda – the majority of broadcasters who participated in the survey were men[22]. Tanzania was the country with the highest percentage of female broadcasters in the five project countries.

Figure 12

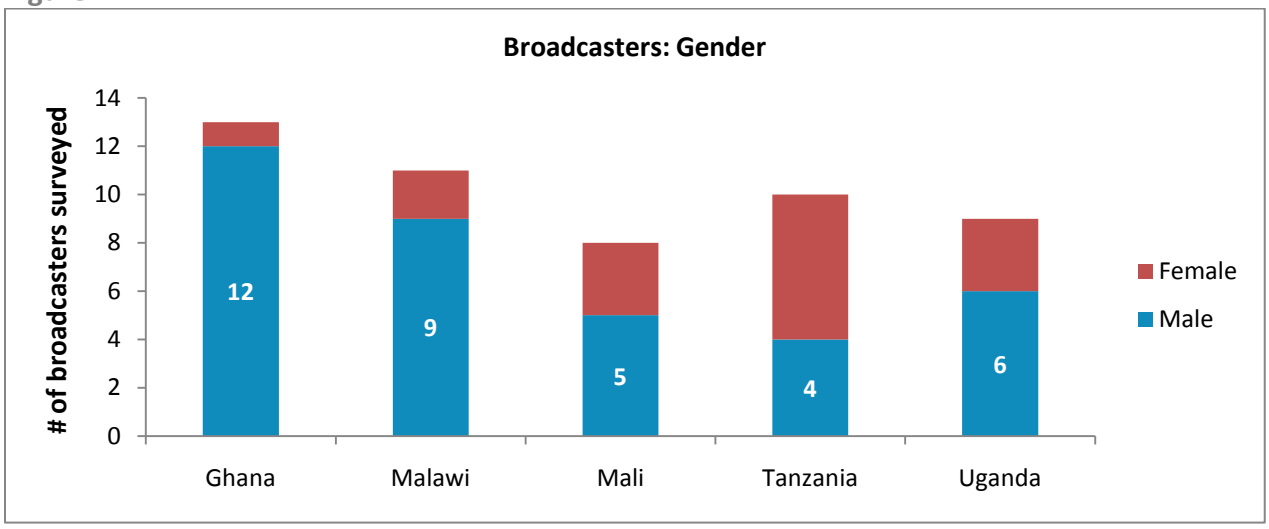
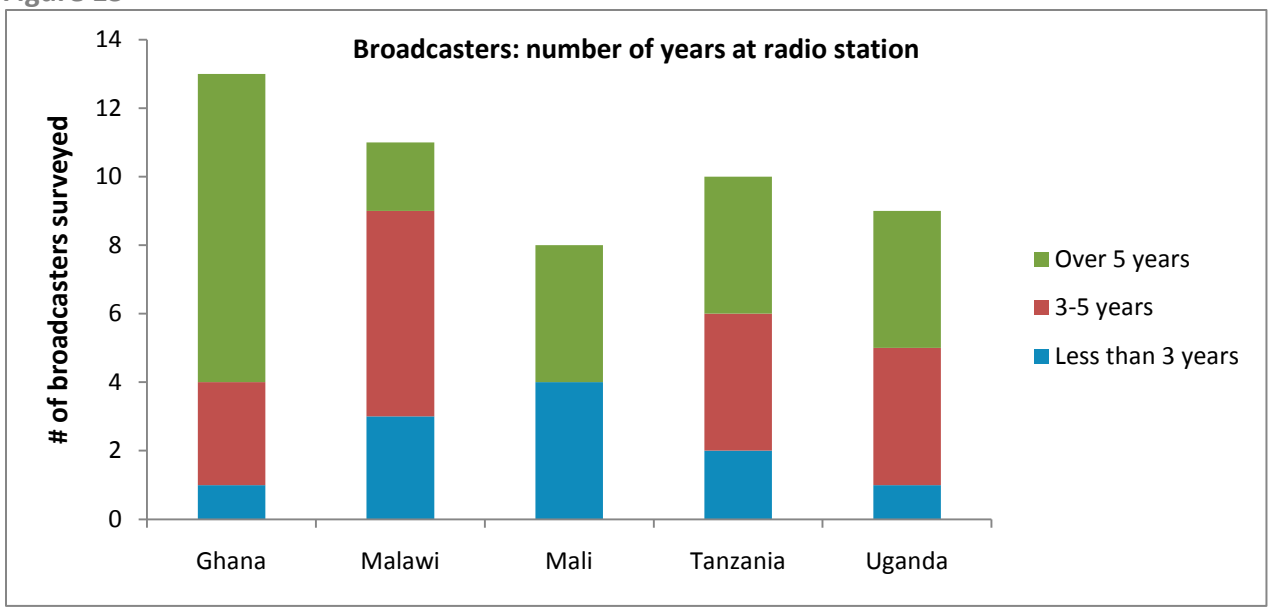


Figure 13 shows the number of years each broadcaster who participated in the survey has spent working or volunteering at their respective radio stations where the AFRRI project was implemented. Broadcasters in Ghana had the highest level of experience, whereas those in Mali showed the lowest number of years at the AFRRI partner station.

Figure 13



[22] This sample accurately represents the more than 50 broadcasters who participated in AFRRI

Existing research on radio & ICTs

Questions about the linkages between ICTs and radio, and the potential of modern ICTs to improve existing radio services have been discussed for over a decade.

In 2001, the Food and Agriculture Organization of the United Nations (FAO organized a conference in Rome for 50 participants from around the world. *Information and Communication Technologies Servicing Rural Radio: New Contents, New Partnerships* was designed to share collective experiences and open a global discussion on the role of ICTs and radio. Much of the conference and the subsequent book, *The one to watch: Radio, New ICTS and Interactivity,*[23] (edited by Bruce Girard), captured the excitement of the rapidly developing World Wide Web and the possibilities it presented for radio. Discussions evolved around the potential of online streaming, websites and the power of accessing the internet in-studio. By the end of the conference, the group came to the following conclusion:

> *"Sometimes looked down upon as the 'poor relation' of television, and certainly considered old-fashioned compared to the internet, radio, today, has become the one to watch."*[24]

In early 2008, the Panos Institute of West Africa (PIWA) conducted a survey on ICT usage and internet connectivity with 220 radio stations across seven West African countries. The study focused largely on internet access and web presence at radio stations, but also included information on the use of digital equipment in radio studios, staff training levels, and some innovative examples of using mobile phones and other ICTs in radio. The study highlights strengthening human resource capacity as the first step to growing the role of ICTs at African radio stations and strengthening the linkages between innovative ICTs and radio: *"The limitations are often due to the lack of awareness of the possibilities offered by ICTs, as well as a skill gap in the staff able to deliver expected services."*[25] This is the focus of AFRRI's ICT project – working with radio stations to experiment on innovative use of ICTs to enhance radio.

Girard's book and the PIWA survey of West African radio stations both emphasized the role of innovation, capacity development and better infrastructure in supporting radio stations to improve ICT uptake. One of the first exciting, software-based ICT innovations took shape in India. In 2009, the Gram Vaani Community Media Collective in India won a Knight News Challenge grant to develop an open source software console called GRINS (Gramin Inter-Networking System), designed specifically for community radio stations[26]: "GRINS goes beyond other systems by providing a platform to build new applications for community radio stations, integrated telephony capabilities, flexibility of deployment over several machines, diagnostics to help overcome lack of technical expertise at rural radio stations and the ability to operate on low end machines."[27] In other words, GRINS was the first attempt to make a software suite for community radio that integrated mobile phone technology, while remaining easy to use and affordable.

In 2009, another Knight News Challenge winner was working on something equally exciting, this time in Zimbabwe. Kubatana Trust designed an open source Interactive Voice Response (IVR) system called Freedom Fone. Originally called "Dialup Radio," the system overcame the political environments in

[23] Girard, B et al (2003) The one to watch – Radio, New ICTs and Interactivity, FAO Rome
[24] Girard, Preface vi
[25] Ndiaye M et al (2008) Radio and ICT in West Africa: Connectivity and use. Dakar: Panos Institute West Africa.
[26] Gram Vaani (2011) About us, retrieved from <http://gramvaani.org/aboutus/>
[27] Aditeshwar S (2009) Understanding and Meeting the ICT needs of Community Radio Stations, New Delhi: IIT Delhi

Zimbabwe, which outlawed free access to information, by making information available over mobile phones: "We took the fastest growing tool for around-the-clock personal access to information – the mobile phone – and married it with interactive audio programming."[28] When Freedom Fone was introduced to the global community radio movement at the AMARC 10 conference in Argentina[29], the ICT innovation was received with excitement, and it continues to develop. One of the mini-experiments conducted as part of AFRRI examines Freedom Fone's first deployment in support of farm radio programming with radio stations in Ghana and Tanzania.

Mobileactive.org is a website that connects people, organizations, and resources using mobile technology for social change. In July 2010, an article was published on the site entitled *Mobile Tech in Community Radio – Still Ad hoc and One-Off. A State-of-Mobile Report*[30].The article, which features an overview of some of the most well known ICT and radio projects to date, concludes that, "…the integration of SMS and mobile technology with community radio seems to be at a nascent yet promising stage, ripe for proper documentation and development of global tools and processes. For now, integration remains an ad-hoc and highly individual enterprise."[31]

Most recently, AFRRI's ICT-enhanced radio campaigns demonstrate in detail the impact that new technologies can have on the reach and influence of farm radio programs to increase the food security of small-scale farmers in Africa.

Defining ICTs

The term ICT is a widely accepted acronym for information and communication technology. The integration of ICTs into everyday life, however, has not been universally defined. The UK has streamlined ICT learning modules into their national primary education curricula. The Government of Kenya has an ICT policy, established by its National ICT Board, for guiding the future direction of the country in terms of ICT. The Government of Uganda has a fully-developed Ministry of ICT, established in January 2006, to nationalize the importance of ICTs. There is an entire area of development work called ICT4Dev, which currently yields almost 100,000 hits in a typical Google search. These examples illustrate the importance of having a term – or set of terms -- that can capture the constantly evolving nature of the relationship between technology, communication and the people who use it.

At one time, traditional FM radio would have been considered an ICT for its technical capacity to carry and communicate messages. For the purposes of this document, however, AFRRI defines ICTs as a set of modern technologies that are digital in nature: MP3 players, computers connected to the internet, and mobile phones, for example. When the term ICT is used in this paper, therefore, it does not refer to radio, but to the modern ICTs, which can be used to enhance radio.

[28]Freedom Fone (2011) Taken from http://www.freedomfone.org
[29]World Association of Community Radio Broadcasters - AMARC 10 is the tenth international conference
[30]Ulbricht M (2010) Mobile Tech In Community Radio. Taken from http://www.mobileactive.org/state-SMS-and-mobile-technology-community-radio-stations
[31]Ulbricht M (2010) ibid

PRC1 – the first set of campaigns

Between January and May 2009, AFRRI designed, planned, launched and evaluated 25 PRCs at 25 partner radio stations. The emphasis in the first round of radio campaigns was on radio stations and stakeholders learning the PRC methodology. This included developing relationships with farmers in the ALCs, as well as working alongside extension agents to incorporate their work into the campaigns. AFRRI published a set of case studies examining the impact of this first round of PRCs.

The Effect of Participatory Radio Campaigns on Agricultural Improvement Uptake: A preliminary case study assessment.

http://bit.ly/farmradiocasestudy



3.0 Research Questions

As part of the action research process following the first round of AFRRI's radio campaigns, (PRC1), farmers in the listening communities, and broadcasters in the radio stations were asked about any challenges they experienced during the first radio campaign.[32] The following reflects some of the most frequently cited challenges:

- Listeners sometimes forget to tune into broadcasts
- Listeners want to re-listen to important messages
- Listeners want to hear more farmers' voices on the radio
- Listeners appreciate the voices of a variety of experts
- Listeners want more opportunities to interact with radio
- Broadcasters want more access to relevant resources

These responses provoked AFRRI to ask questions about the potential of ICTs to meet those challenges, forming the basis of AFRRI's experiments integrating ICTs and radio.

[32] Farm Radio International. (2011) Participatory Radio Campaigns and Food Security: How radio can help farmers make informed decisions http://bit.ly/farmradioprc

To design the experiments and research questions around these challenges, AFRRI began by asking the 25 partner radio stations to rate their level of ICT use during PRC1. They conducted self-assessments on their station's ICT strengths, weaknesses, and the areas they were most interested in developing further. The self-assessment generally indicated that, while radio stations were interested in integrating new ICTs, they lacked the technical know-how, the equipment and the resources to successfully launch new services.

A menu of **"**ICT packages" was crafted and shaped into experiments - each experiment designed to answer several research questions. The stations were asked to choose one or two of the packages. AFRRI considered the differing range of ICT capacities among stations and designed some packages to be adoptable by all stations. Some stations that exhibited a higher level of ICT experience and capacity had the option of choosing packages that were more technically advanced.

Table 3 - ICT packages and the research questions the package seeks to answer

No.	Package name	Research questions
1	**Electronic resources for broadcasters**	Can radio broadcasters improve the quality of their programs if they have access to relevant electronic resources and are provided with basic online search skills?
2	**Digital recording and editing equipment**	Can MP3 recorders and training in audio editing software help broadcasters increase the quantity and variety of farmers' voices featured in campaign programs?
3	**On-air phone call-outs to extension agents and other experts**	Can call-outs to extension agents and other experts from a broadcaster increase the number and variety of experts featured in a campaign in a cost-effective way?
4	**On-air phone call-outs to farmers and listeners**	Can regular call-outs to farmers to increase the presence of farmers' voices in a campaign? What impact will the call-outs have on listenership, knowledge of campaign topics and practice of agricultural improvements?
5	**SMS alerts from broadcasters**	Can SMS alerts, delivered 30 minutes before a broadcast, influence the listening habits of farmers? What other impact can the reminders have on the relationship between the listener and radio station?
6	**Radio agents**	Can establishing a "radio agent" in listening communities, to provide a communal radio listening station, affordable access to a mobile phone, and the opportunity to listen to repeat broadcasts on demand impact farmers' campaign listening habits and knowledge of campaigns?
7	**Freedom Fone: Playback on demand**	Can radio stations design and maintain an Interactive Voice Response (IVR) system to support a radio campaign by making key information available via phone call? Will farmers use the service? Which types of information would be most in-demand? Can voicemail be used as a feedback channel between farmers and broadcasters?
8	**VSAT + Wireless Internet Service Provider (WISP)**	Can equipping a radio station with a VSAT internet connection and a series of wireless access points enable a radio station to run a small business as a wireless internet service provider in the local community? What impact will this have on the station and its broadcasters?

4.0 Installation and training

Matching stations and packages

As part of the assessment of stations' ICT capacities, the following criteria were used to determine which stations could implement some of the more technical packages:

- The availability of technical support staff
- The infrastructure at the station (backup power generator, reliable internet, phone signal strength)
- Proximity to an AFRRI in-country office (some packages required many on-site visits);
- Overall ICT capacity and knowledge
- The willingness of the station to cooperate in research activities during PRC1.

Because this was a research initiative as well as a development project to improve the ICT capacities of radio stations, a balance was struck between the desires of the radio management to expand their station's ICT equipment, and the AFRRI research team's ability to successfully carry out the experiments. This process was largely negotiated between AFRRI's National Research Coordinators (NRCs)[33] and radio station management.

Table 4 - Matrix of ICT packages to radio stations during PRC2

	Tanzania					Uganda					Mali					Ghana					Malawi				
	Sibuka	TBC	ORS	FADECO	Radio Maria	KKCR	Mega FM	CBS	UBC	VOTE	Jigiya	Banjo	ORTM	Fanaka	Bandiagara	Classic FM	Simli	Volta Star	Radio Ada	Rap FM	Zodiak	Dzimwe	MBC	Nkotakota	Mudziwathu
Pkg 1: Electronic resources	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Pkg 2: Recording equipmt	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Pkg 3: Call-outs to experts				■	■	■	■		■			■		■				■	■			■			
Pkg 4: Call outs to farmers	■	■			■	■	■				■	■	■	■								■		■	
Pkg 5: SMS alerts				■	■	■	■					■		■		■	■		■	■			■		
Pkg 6: Radio Agents		■								■						■			■					■	
Pkg 7: Freedomfone plybk					■													■							
Pkg 8: WISP (VSAT+Wifi)	■													■											

Table 4, above, shows certain radio stations received more than one package. Computers, internet connection, and MP3 recorders (components of package 1 and 2) were offered to all stations. These ICT components were the foundation of AFRRI's work, upon which all other ICT packages relied. Packages 3, 4 and 5 were provided to about two-thirds of the stations, while packages 6, 7 and 8 required a higher level of ICT capacity at the station, and were offered to less than one-third of the stations. Each ICT package/experiment is explored in detail later in this paper.

ICT officers

ICT officers were hired on contract in each of the five countries to help the radio stations implement the ICT packages. They worked hand in hand with the regional ICT and radio specialist based in Dar es Salaam, Tanzania, to conduct training and install the ICT equipment in each country. Throughout the

[33] NRCs were Farm Radio International staff members who coordinated the AFRRI activities in each of the five countries

campaign, the ICT officers provided technical support, gathered log sheets, and distributed airtime and other resources needed to keep the ICT experiments running.

Installation

The process for installing the ICT packages and training the broadcasters was similar in each country. The regional ICT and radio specialist installed and trained radio staff at one station, together with the in-country ICT officer. The ICT officer carried out subsequent installations at the four remaining stations. Where possible, the technical staff at the radio stations was involved to ensure they had a grasp when technical and troubleshooting issues arose.

Community Training

Some of the ICT packages involved engaging a community member as a radio/ICT agent. The agent had a multi-faceted role: a) to facilitate interaction between listeners and the radio station using a dedicated mobile phone; and b) to provide opportunities for "playback-on-demand," by recording and re-playing episodes from the radio campaign for groups of listeners. Once a radio agent was nominated and identified in a village meeting, he or she attended training at the radio station on using the equipment and completing the log sheets.

Online ICT journal

Throughout the course of these experiments, the regional ICT officer[34] recorded an online field journal. Several times a week, Bartholomew Sullivan would post a new entry – reflecting on the process including the challenges and successes along the way.



Get more insight into our work on ICTs in AFRRI. Read the online field journal from our *Radio and ICT Specialist,* Bartholomew Sullivan.

http://bit.ly/farmradioictjournal





Provision of equipment

The equipment required for the ICT packages was bought locally, where possible, and handed over to the radio stations. A detailed description of the equipment involved in each package is provided later in the document, as each package is examined.

Troubleshooting

Each ICT officer was in weekly contact with their radio stations. This helped anticipate and pre-empt any technical problems that could have derailed the experiments. Historically, many radio stations had been known to stop using a technology due to lack of knowledge to fix it. Often, the technical issue could be

[34] There was only one regional ICT officer who was responsible for work in all five countries, with support from ICT officers in each country

resolved over the phone, but if the problem persisted, the ICT officers would travel to the radio station to get things back on track. For particularly persistent problems, the ICT officers consulted with the regional ICT and radio specialist. Through these consultations and training, a defeatist attitude about technical constraints was largely overcome, and most stations adopted a more “can do” approach to maintaining equipment. Challenges related to each ICT package are discussed in detail in their respective sections later in this document.

5.0 Methodology

Experiment duration

The radio stations agreed to integrate the ICT packages into their weekly programs for the duration of the second AFRRI radio campaign (PRC2), which was approximately 18 weeks (4.5 months) long. A 12-week period of intensive ICT use was implemented at the start of the campaign, during which time the broadcasters were asked to capture data through a number of collection tools.

Data collection tools

AFRRI used a variety of data collection and monitoring and evaluation tools for each of the ICT experiments. The goal was to gather as complete a picture as possible of the impact the ICT package had at the radio station and in the listening communities. The following is a comprehensive list of the tools used and a description:

- **ICT log sheets** – to capture the frequency and nature of ICT usage on a daily basis
- **Call log sheets** – to capture the number of calls to the station and call-outs made by the station
- **Software statistics** – usage stats captured automatically by software used in the ICT packages
- **Radio agent log sheets x 4** – to capture community usage of radio agent ICTs services
- **ICT Officer observations x 5** – in-country ICT specialists' observations from station visits, trainings and communications with station staff
- **Regional ICT manager observations x 1** – ICT managers' observations through station visits, trainings and communications with station staff/farmers and ICT officers
- **National Research Coordinators (NRC) observations x 5** – AFRRI coordinators' observations; coordinators at the country level had daily interaction with broadcasters and radio station staff
- **Broadcaster online survey x 51** – an end of project online survey conducted, using Survey Monkey, with 51 broadcasters from the 25 AFRRI partner radio stations
- **Station manage online survey x 15** – Survey Monkey conducted with 15 station managers
- **Follow up surveys** – monitoring and evaluation of experiments conducted over the phone
- **Farmers household survey x 4500+** – PRC2 final evaluation, conducted with a mobile phone-based survey tool, (Mobile Researcher)
- **Extension agents survey x 41** – PRC2 final evaluation with extension agents conducted with Mobile Researcher.

Log Sheets

Broadcasters were given a log sheet as part of each ICT package. The log sheet was designed to capture the way the package was actually used. Custom log sheets for each ICT package were printed, bound and made available in the on-air booth for broadcasters to complete throughout the campaign. Special log sheets were also created for community radio agents and extension officers, where applicable. The following is a list of the types of information captured on the log sheets:

- Date and time of call/SMS
- Gender/age of caller
- Phone number of caller/SMS
- Call-in or call-out?
- Length of call
- Name of farmer/expert

- Topic of call
- Was a local farmer mentioned in the conversation?
- Would the broadcaster normally have had to travel for this interview?
- Extra comments or observations
- Successfully recorded broadcast for repeat
- Date/time/name/gander of repeat listener
- Topic of repeat listen
- Comments/questions on repeat listen

Mobile phone airtime and Clickatell SMS credit, (SMS alerts in broadcaster package five), were offered as incentives to radio stations to submit completed log sheets. This agreement turned out to be one of the best and most reliable ways to ensure that completed ICT log sheets were regularly received.

Follow up phone surveys

Many of the ICT packages implemented by the stations were new not only to the stations and AFRRI researchers, but also to the listeners. In an effort to refine ICT packages in a way that best served the listeners, periodic follow-up phone surveys were conducted with a select group of listeners with phones, who were using the packages in one way or another. Examples of follow up questions included the following: “Did you receive an SMS alert? Did it affect if you listened to the show?”; “What information did you access when you called the Farmers’ Fone? Was it useful?” In addition to some bio-data from the listeners and regular log sheet information from the broadcasters, this feedback helped inform discussions and decisions about ways to improve the ICT packages in the middle of AFRRI’s radio campaign.

Mobile Researcher: Using ICTs to evaluate

For the final outcome evaluation – household surveys -- AFRRI used a mobile phone-based survey tool from South Africa called Mobile Researcher[35]. The survey was created using a web-based interface, from which point surveys were assigned and sent to enumerators’ phones in all five of the AFRRI countries, using links in an SMS message. The technology allowed enumerators to conduct surveys even when outside of mobile network coverage, (as was the case in many villages). When the enumerator returned to network coverage, the survey results were uploaded and sent to a central database. From this web-based console, researchers could login, monitor the process of the household surveys, make corrections and modifications to the surveys along the way, and see trends forming over time.

[35] Now known as Mobenzi Researcher

A closer look: Monitoring with mobiles

Using mobile phones as a convenient and cost-effective survey tool

How do you collect 4,500 household surveys across five countries in under a month and be certain that all the data ends up in one location? For Farm Radio International, the solution was Mobile Researcher – an application that lives on a basic Nokia mobile phone and can help conduct surveys face to face with farmers.
http://www.populi.net/mobileresearcher/



Souleymane Doumbia, an enumerator, conducts a survey with a farmer from the Zegoua region of Mali

In less than one month, the African Farm Radio Research Initiative (AFRRI) was able to measure the impact of its four-month-long participatory radio campaigns (PRCs) by using approximately 40, low end, Nokia mobile phones and 40 different enumerators/fieldworkers across five countries. During the month-long evaluation of the radio campaigns, the Mobile Researcher software was used to design, customize and install the surveys in each country through one website. The website features an intuitive set of online tools which also allow detailed monitoring of each phone/enumerator's progress, as well as analysis of results - all in one central, online location.

"The tool is an efficient and reliable means for research and development organizations to collect information from remote areas, in a timely and non-intrusive manner, with a built-in monitoring system for fieldwork. It has changed the way we, at Farm Radio International, conduct our surveys" says Sheila Huggins-Rao, Program Coordinator for AFRRI.

Previous studies had been conducted using paper-based tools and administered face to face. It would take several weeks to collect the data, to translate the answers from the local languages to English and then several more weeks to process and analyze the findings. Also, if there were challenges in the field -- with inputting the data, the enumerators understanding the question, or not finding enough respondents -- it was difficult to address the challenges immediately. Often, such challenges were not shared until field reports had already been submitted.

With Mobile Researcher, troubleshooting was ongoing throughout the fieldwork so any minor glitches in the technology or the survey could be corrected and simply updated through the phone in real-time.

What does this mean for the future work of research for development initiatives? More input from development and research beneficiaries can be included in all aspects of project design, implementation and monitoring. Rural farming communities will have fewer disruptions, and may be more willing to participate in surveys that do not take as much time. Research and development organizations will be able to collect information from their partners prior to, during, and after projects are delivered. This will, over time, create more innovative research, more collaborative initiatives for African farmers, and ultimately more effective ways of working together globally.

6.0 Findings

Mobile Phones: The "other" key technology for farmers

Farmers' modern ICT of choice is the mobile phone. For small-scale farmers in rural sub-Saharan Africa, direct access to computers and the internet is very rare, even where telecentres or other similar services are available. The massive explosion of mobile phone use in Africa since the 1990s has been analyzed in ICT literature and will not be addressed in depth in this report. In order to understand how farmers interact with radio programs using this medium, however, a general overview of the use of newer ICTs among farmers is necessary.

AFRRI's research collected information about mobile phone ownership. Figures 14 and 15 show a breakdown of mobile phone ownership across the five AFRRI partner countries. Like radio sets, mobile phones are often shared between family members and sometimes friends. This sharing extends mobile phone usage beyond the ownership indicated in this survey.



Communications like these between farmer and broadcaster have been made possible by the expanding availability of affordable mobile phones

Ghana shows by far the most phone ownership, with people under 20 years of age most likely to own phones. In Tanzania and Uganda, farmers between 20 and 40 years of age show the highest levels of ownership. Malawi and Mali show the lowest levels of overall phone ownership, which was anticipated given their lower relative incomes per capita.

Broken down by gender, males consistently have at least double the rate of phone ownership compared with women. However, phone ownership levels for women are still significant, with 8% (Mali) to 39% (Ghana) of surveyed females reporting that they own a mobile phone.

AFRRI's research found that there is a discrepancy between farmers in terms of ICT literacy. Some farmers are comfortable using SMS and others are not. Generally, more people use SMS in Ghana and Uganda than in Mali, Tanzania and Malawi, a reflection of written literacy rates, which informed the creation of some of the ICT experiments conducted by AFRRI. The power of SMS is clearly visible, but in terms of reaching the largest group of farmers, voice-based services on mobile phones offer a more accessible medium. Leading from this finding AFRRI experimented with the use of Freedom Fone as a voice-based message system (see section 14.0).

Figure 14

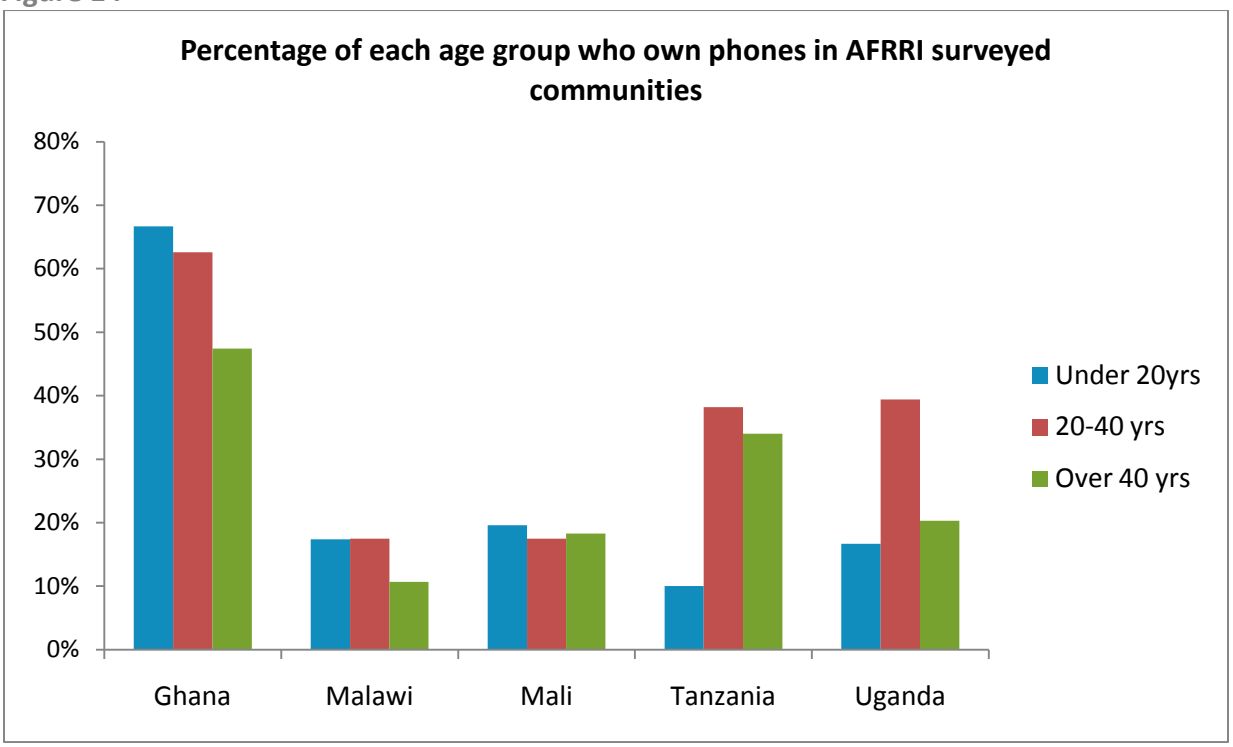
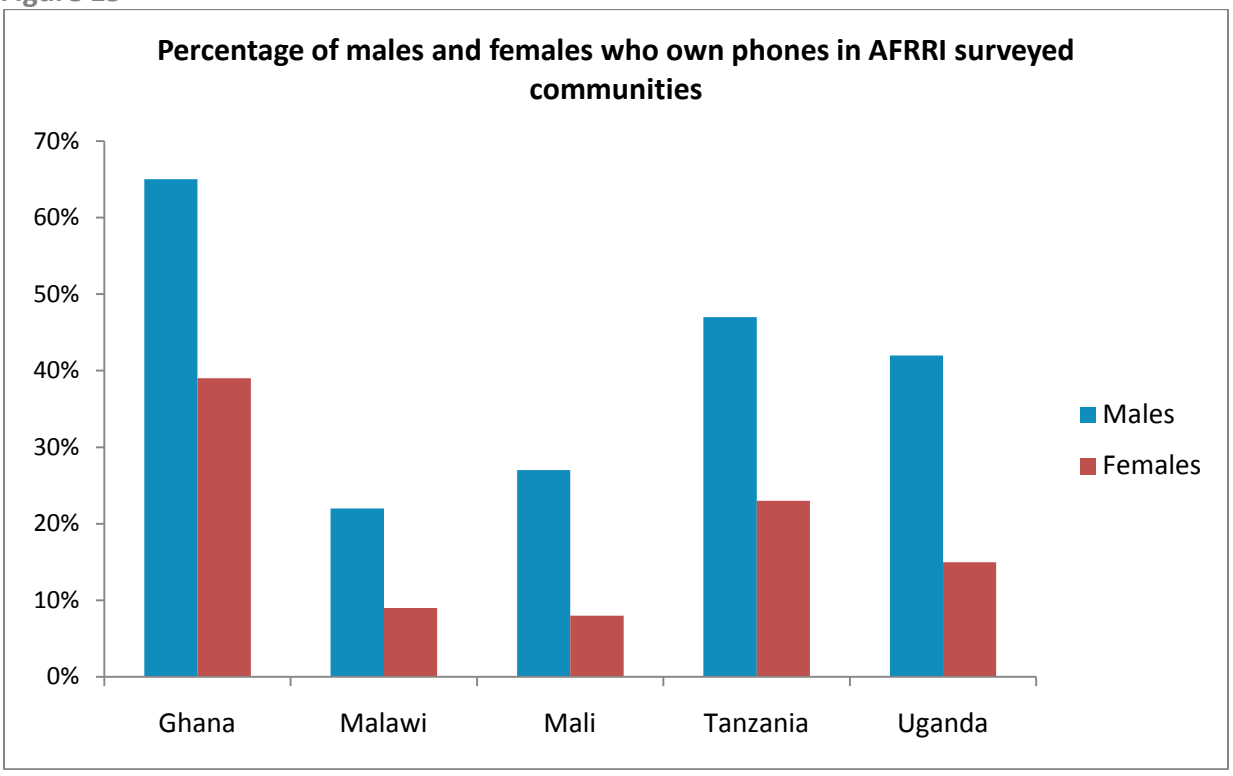


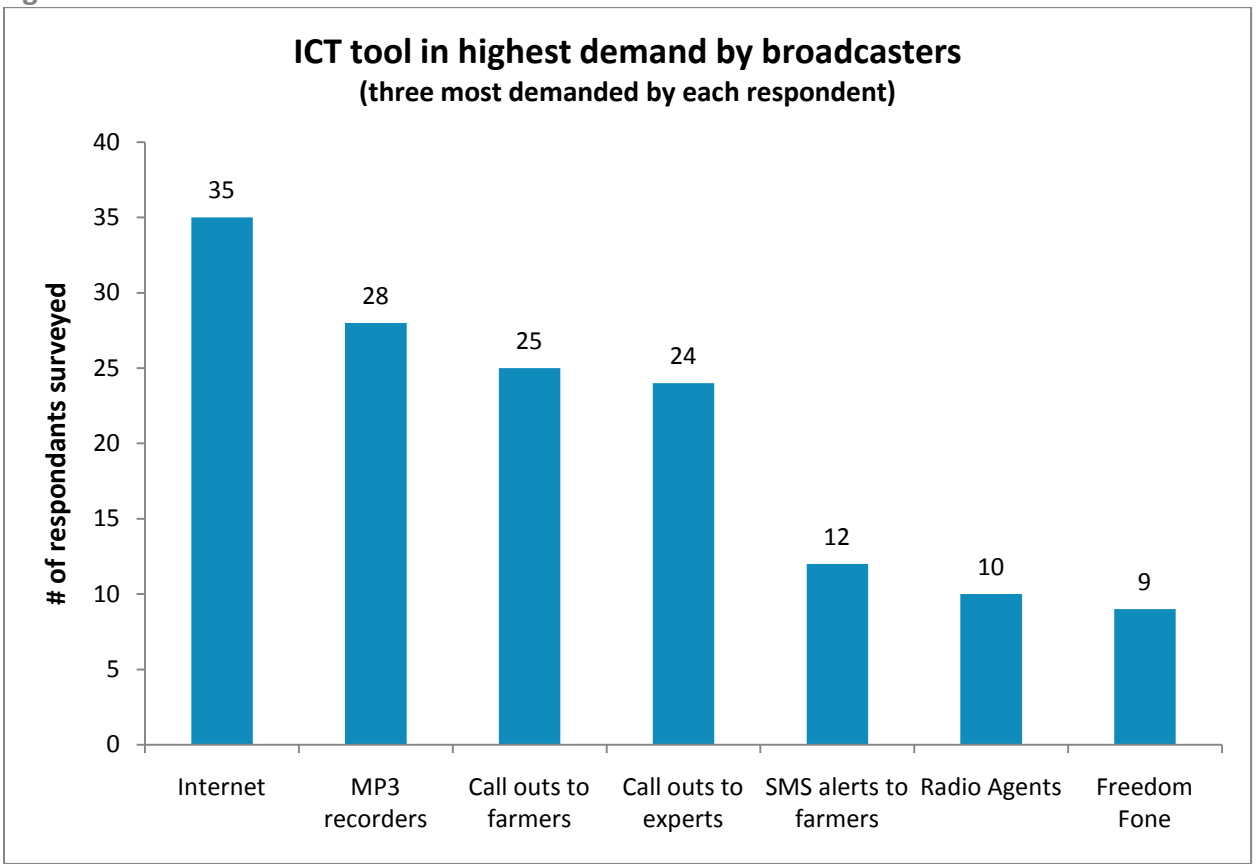
Figure 15



Internet and MP3 recorders: Key technologies for broadcasters

AFRRI conducted an online broadcaster survey with 51 broadcasters in five countries using Survey Monkey. That the survey found most broadcasters rated the internet as the ICT tool they most want to use more of in the future. Internet access at radio stations varies, depending on the country and type of radio station. The fact that broadcasters see the internet as an important tool lends credence to making investments in providing reliable and accurate farm radio resources online. This finding is in line with the Panos Institute West Africa's finding from their paper in 2008. Based on their survey in West Africa, only 52% of radio stations had access to the internet. As to be expected, there was a higher level of connectivity in commercial stations and much lower in community and public stations.[36] The study identified internet access to be the largest constraint in the use of ICTs by community radio stations.[37]

Figure 16



For recording interviews, (field or otherwise), broadcasters use a variety of tools. Audiocassette recorders, Minidisc players, Dictaphone and digital audio (MP3, WAV) recorders are all used, to varying degrees, by radio staff. From field visits to all 25 AFRRI partner stations it was observed that one major constraint was getting recorders into the hands of field reporters. Often the number of devices was limited to only one or two. These devices were frequently inaccessible to field-level staff for use in the field. Digital editing is common at almost all stations and a variety of software is used for this purpose (Adobe Audition/Cool Edit, Audacity etc.).

[36] Ndiaye M et al 65
[37] Ndiaye M et al 68

Call-in shows have been very common but live call-outs are relatively new to stations. This is the same for voice-based services such as Interactive Voice Response, which was not used widely across Africa prior to the AFRRI study. “Flashing” is quite common at most stations as a way to get station staff to call back listeners. This is the same for the “Please Call Me” functionality on mobile phones.[38]

Few stations have an official system for handling incoming SMS messages from farmers. Sometimes presenters will receive feedback on their own personal phones but there has been no system dedicated to handling SMS contacts and incoming messages, as well as sending out consistent reminders to listeners of upcoming broadcasts via SMS.

[38] “Flashing” refers to calling a mobile phone, letting it ring once then hanging up, signifying that the person wants you to call them back (therefore saving the call initiator on credit). “Please Call Me” is a functionality to serve the same purpose that is officially offered by phone companies.

7.0 Packages and case studies

The following part of this document describes and analyses the eight ICT packages that were set up as experiments during AFRRI's second radio campaign (PRC2), to test the overall research question in multiple ways. Each ICT package/experiment is treated in its own section and has the following structure:

a) **What AFRRI Wanted to Learn** – The research question/hypothesis explored by this package

b) **Background** – Why and how the ICT package was developed?

c) **The Challenge** – The specific challenge(s) the ICT package set out to address

d) **The Experiment** – A description of the equipment, the costs, and the training required for setting up the ICT package to run the experiment

e) **What AFRRI Learned** – An analysis of the data collected and major findings and a discussion about the challenges and successes related to this package

f) **Conclusions and recommendations**– AFRRI's recommendations for going forward with each ICT package

For each package, a story is presented, (called "A closer look"), to illustrate the experiences of a radio station, farmer or extension officer as they implemented the ICT packages.

8.0 Package 1: Electronic Resources for Broadcasters



At A Glance…

Equipment:	Computer and internet connection
Annual Costs	**1x** Multimedia desktop computer suite ($324) **1x** USB modem ($16.60) Monthly internet airtime ($30 x 12 = $360) **TOTAL: $700 (USD)**
Cost per radio show:	**$13.50 USD**[39]
Challenge:	Bridge gap between broadcasters and electronic resources available online
Experiment:	CD-ROMs with radio scripts, internet connections and training workshops

Best Used For: Improving information access for broadcasters.

[39] Based on weekly shows with costs divided over average lifetime of equipment



"The internet has helped us a lot because that is the source in which we communicate with the AFRRI office and also get some of the information we broadcast. It also helps us to get our daily news and any information concerning the program we are doing."

Abukari Abdul-Fatawu,
Simli Radio, Ghana

8.1 What AFRRI Wanted to Learn

It was anticipated that radio broadcasters with access to electronic resources would use the material to improve the quality of their radio broadcasts. In addition to the electronic resources, broadcasters given basic training in conducting online searches would be more able to locate resources online themselves. By introducing and evaluating the use of this package, AFRRI wanted to answer this question: *"How can providing African broadcasters with access to electronic resources improve the quality of their participatory radio campaigns?"*

8.2 Background

The importance of, and need for, relevant, reliable, accurate and accessible content for farm radio broadcasters is the reason Farm Radio International[40] (FRI) was founded. For more than 30 years, FRI has been providing radio script packages, consisting of scripts and *Voices*, its newsletter for partners, several times a year, and mailing them to its 370 plus partners in sub-Saharan Africa. Most of these script packages are now available in digital formats (pdf) for download on the Farm Radio website at http://www.farmradio.org/english/radio-scripts/. Recently FRI started a weekly electronic news service for African farm radio broadcasters called Farm Radio Weekly (FRW). These two services represent just a few of the growing number of digital resources available to FRI's partners (most of whom are radio broadcasters), via email and internet download.

[40] See section 1.0, "A closer look: A bus ride to remember" for the story



Bartholomew Sullivan, Regional ICT Officer for AFRRI, helps broadcasters login to their online learning course during the 2008 capacity building workshop for broadcasters in Monkey Bay, Malawi.

8.3 The Challenge

There are a number of challenges in providing African farm radio broadcasters with the content resources they need. Paper-based packages arriving in the mail are useful, but, if they are to retain their value over time, they must be sorted and archived in an accessible and searchable filing system. The arrival of desktop computers and internet access allows for these resources to be searched, located, and used in a matter of minutes. Broadcasters can use the internet to do further background research. Providing these content resources to broadcasters has involved a number of challenges: lack of quality computers that can be used by producers and broadcasters (computers often stay on the managers' desks), lack of reliable and affordable internet access, and lack of knowledge and understanding required to access the resources. The following are some specific problems which hinder broadcasters' access to digital resources:

- **Computers:** Those that are functional are in high demand. In a radio station, browsing electronic resources typically takes lower priority than editing/producing and on-air activities.
- **Awareness of resources:** While resources exist on www.farmradio.org, many broadcasters are not aware of them or don't know how to find them.
- **Internet for broadcasters:** Even though 70% of the 25 partner radio stations involved in AFRRI claimed to have internet access at their stations, broadcasters have difficulty getting online. Internet use is often controlled through lock and key by station management and reserved only for certain staff members.

- **Computer/internet skills:** For many broadcasters AFRRI worked with, computers were a new tool; they lack computer and internet search skills.

These problems combined to present a challenge for AFRRI. How could the provision of ICTs bridge the gap between broadcasters who strive to serve their farming listeners and the wealth of relevant resources available digitally through www.farmradio.org and other locations on the web?

> ***"The computer was very helpful in the sense that we used it to store all the recordings we did in the field, the SMS feedback, and contacts for farmers, finished programs; in short, all information was stored in the computer. It was very crucial to have [a] special computer, because normally we have journalists/producers sharing computers for news writing and program production, but in this case, we had more freedom and time to spend on the computer as it was specially being used for AFRRI productions."***
>
> **George Kalungwe,**
> **ZBS Malawi**

8.4 The Experiment

The first three steps in bridging the gap were clear: provide computer equipment, enhance internet access, and provide training.

Equipment:

Each of the 25 partner radio stations that participated in AFRRI was equipped with an Intel, dual core, Windows-based Dell computer (350GB HD, 2 GB RAM). Although the computer was given to the station with the explicit understanding that AFRRI-related tasks for the campaigns be given priority (editing/scripts/log sheets), it was made clear that the computer was also available for general use at the radio station.

Table 5: Package 1 Equipment and cost analysis

Item	Price (USD)	Average lifespan	Cost per year	Cost per show[41]
Desktop computer system with UPS	$900	3 years[42]	$300	$5.75
Service & Parts (8%)	$72	3 years	$24	$0.46
USB dongle/modem	$50	3 years	$16.60	$0.32
Airtime for internet connection[43]	$30 per month	-	$360	$6.92
Total			$700.60	$13.45

Enhanced Internet Access:
Prior to AFRRI, 28% of partner radio stations already had some form of internet available at the station. The goal of this package, therefore, was to find an affordable way to get all 25 radio stations online so that broadcasters could participate in the following online activities:

- **Subscribe to Farm Radio Weekly via email** – FRW is a collection of news stories and resources related to African agriculture. The news stories are ready to share on the radio, (rip and read).
- **Browse radio scripts online** - Farm Radio International and CTA both have a repository of scripts, browsable by topic and date (from 1992 to present[44]).
- **Search the web** – do background research for farm radio stories.
- **Conduct Skype chat/phone calls** – make use of internet telephony to conduct interviews and coordinate with the AFRRI office and partner radio stations.
- **Write emails** – including correspondence with AFRRI coordinators.
- **Online learning** – participate in online courses for farm radio broadcasters[45].
- **Submit log sheets** – send electronic versions of log sheets used for ICTs and other in-station data collection.

Training and resources:
Prior to the start of PRC1, AFRRI's first radio campaign, a face-to-face training followed by an online learning course[46] called "Building Broadcaster Capacity" was conducted. Approximately 25 partner

[41] Assuming a weekly show over the lifetime of the equipment.
[42] On-air and production computers at radio stations are typically under heavy use and experience power surges, dust and other environmental factors. Therefore 3 years is a conservative average lifespan.
[43] Internet airtime was usually a mobile data package from a mobile phone company such as Airtel, Vodacom or MTN. In some cases where radio stations already had an internet service provider, this was a contribution
[44] CTA's Radio resource Packs stopped being produced sometime in 2009
[45] Online learners use www.farmradiotraining.org .

AFRRI broadcasters and extension agents in each of the five AFRRI countries participated (125 participants total). The goal was to provide broadcasters with skills to create good farm radio programs and campaigns for their listeners. A significant portion of this seven-day, face-to-face workshop was dedicated to developing technical and ICT related skills. One day was applied to developing the web-related skills mentioned in the section above. In addition a set of technical skills required for recording and editing were developed through the week-long training program.

Online modules:
As a means of supporting the broadcasters in their learning, an online training module was developed using the Moodle platform[47]. The online course started three weeks before meeting face-to-face as a way of introducing the material and to begin socialization. The online training continued for another five weeks after the face-to-face training in order to provide support as they implemented their PRCs at their radio stations.

Software and resources:
Finally, each broadcaster that participated in the training was given a series of CD-ROMs and DVDs loaded with resources. They were encouraged to take these back to their radio stations and make use of them. The resources included the following:

- **Offline version of all radio scripts** – a CD-ROM containing a database, browsable by topic, of the 534+ farm radio scripts available [48]on http://www.farmradio.org/english/radio-scripts/
- **Offline version of the online course** – with bandwidth intensive learning materials (videos and audio) this offline CD-ROM helped broadcasters continue the course with slow/expensive/non-existent internet connections.
- **Software compilation** – a compilation of over 50 commonly used open source and shareware software, useful in a radio environment: Audacity (audio editor), Skype (audio conferencing), Avira (antivirus), Firefox (web browser), and more.
- **Basic internet research** – FRI wrote a guide and provided it to broadcasters to help them with their online research skills.

[46] Sandberg, O. (2009) Building Broadcaster Capacity Online: Summary report of the second phase of AFRRI's broadcaster training. Ottawa: Farm Radio International.
[47] http://www.moodle.org
[48] Number of scripts available in October 2008.

A closer look: On a virus crusade!

The challenge of computer virus infections at radio stations

Country: Malawi

ICT Officer: Scott Muocha

Radio stations: Mudziwathu, Dzimwe and Nkhotakota community radio stations



"Help – our computers are down! Viruses!" – The same call came from three of the community radio stations in Malawi. Viruses had worked their way so far into the AFRRI computers that not even the mouse or keyboard could function without getting a loud "ping" through the CPUs internal speakers. Numerous windows were popping up advertising the latest dubious social networking websites. Scott Muocha hopped in his car one warm Sunday night in December and departed from Lilongwe armed with an arsenal of virus-battling tools in his CD-ROM wallet.

Upon arriving at each radio station he learned that due to the virus problems, the broadcasters had been virtually locked out of their computers and unable to produce their farm radio programs. He set to work conducting virus exorcisms and crusades, sometimes late into the night, until each computer was finally liberated and restored to its original state – the lucky ones were able to recover the valuable audio data previously saved on the machines.

Before leaving, Scott installed a free version of the powerful anti-virus software called Avira on each machine (note: AFRRI has since learned that commercial anti-virus programs expire and stop working after a trial or without an internet connection and are often unhelpful). The staff at the radio stations begged him to also install the software on the other computers at the radio station. Where possible, he taught the most technically-inclined staff how to do the work on their own next time. Finally and most importantly, he conducted a small impromptu workshop for all staff to demonstrate that prevention is the best way to win the war against viruses. He explained how viruses are transmitted: downloading dubious links, using a flash disk at the local cybercafé and putting your flash disk in an infected computer, for example. He showed people how to scan a flash disk for viruses before opening it on the desktop.

Virus crusades similar to Scott's were carried out by AFRRI ICT officers in all five countries at nearly every radio station, (often more than once). Computer viruses are one of the biggest hindrances to African radio broadcasters getting their work done.

As a result of the prevalence of viruses, especially on mission-critical computers like on-air and production computers, a number of radio stations have explored the use of Linux-based operating systems. Linux is immune to viruses and is generally more stable, (as opposed to Windows which is most commonly used). Many stations, however, are not willing to make the switch because it means they will need to learn a new operating system. Commonly used software such as Microsoft Word and Adobe Audition do not work on Linux, although variants can be found, (OpenOffice and Audacity,) and with adequate training, stations are saying the switch is worthwhile.

8.5 What AFRRI Learned

Computers were at the centre of all work the broadcasters did, including the other ICT packages they used. This included communicating by email, writing reports, importing digital audio for editing, editing programs, using frontline SMS, using Freedom Fone, and researching topics online

Radio broadcasters were impressed by the usefulness of FRI's online scripts when first introduced to them during the face-to-face training. Many broadcasters, however, are not comfortable in English or French -- the two languages of FRI scripts -- and therefore cannot easily use them in their broadcasts.

Many broadcasters did not know the basics of internet searching and were confused about things such as what a web address (URL) is, how to type a URL into a browser, how to use Google to search online, and how to assess what is useful/reliable information. These skills, often taken for granted, form the foundation for making good use of the internet as a resource.

Based on the observations of FRI staff and testimonials from broadcasters, good computers, internet access, and electronic resources can make an important contribution to the quality of farm radio broadcasts. There are a few indicators of the importance of these assets:

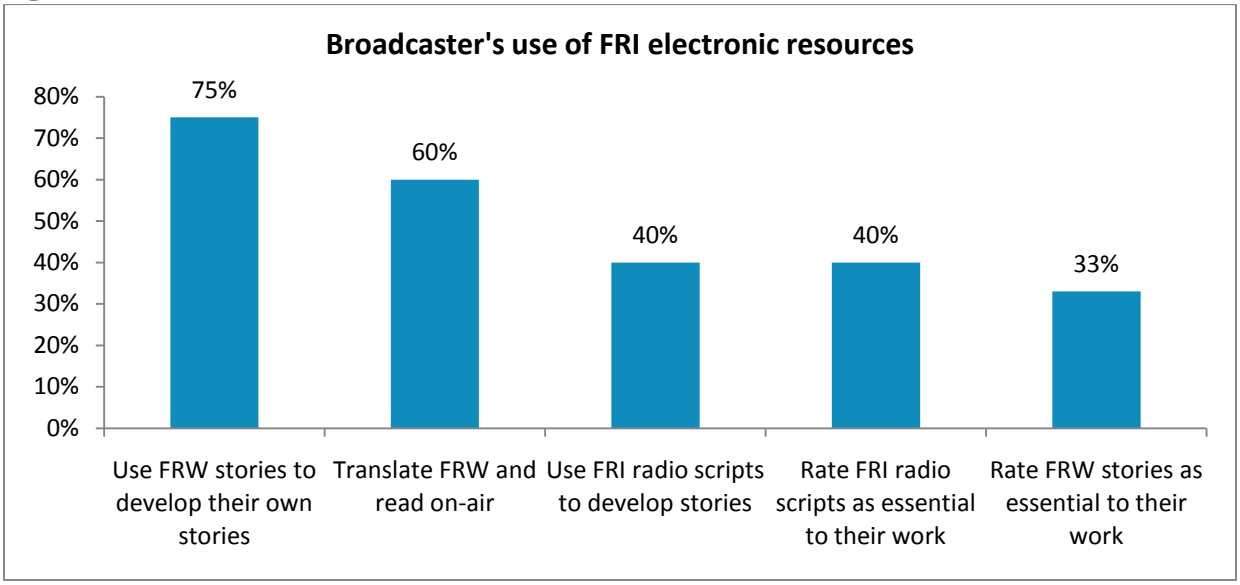
a) When computers stopped working due to viruses, FRI staff received calls from panicked broadcasters, asking for immediate assistance in restoring the computers. While the viruses had crippled their computers, they were unable to produce programs for the radio campaigns. The computers provided by AFRRI were always found at the workstation of AFRRI producers and broadcasters, (rather than station managers), and were clearly being used heavily.
b) AFRRI broadcasters subscribed to FRW and FRI's script service and, as the survey showed, (details below), made good use of them.
c) Radio stations were often willing to share the cost of internet access and, in most cases, have continued the service, even after AFRRI removed the subsidy.

An online survey[49] was conducted with 51 broadcasters in August 2010 after the completion of PRC2. This survey confirmed the value of a computer with internet connection and access to electronic resources to broadcasters' work:

- Computers with internet access enable broadcasters to use more FRI materials including Farm Radio Weekly and online scripts.

[49] Service for conducting online surveys: http://www.surveymonkey.com

Figure 17



8.6 Conclusions and recommendations

Computers are essential: Computers are at the heart of ICTs in the radio station and are essential for accessing digital resources. This topic is explored more thoroughly in the following section (Package 2: Digital Recording and Recording equipment). More stations are moving to a Linux[50]-based operating system on their production and on-air computers, due to its resilience against viruses and malware, which typically cripples computers where USB drives are frequently used.

Mobile content delivery presents new possibilities: FRI has begun to experiment with providing broadcasters Android smart phones that cost less than USD$100. In addition to being devices that can access electronic resources (scripts, audio and video) via the internet, the phones can be used for recording interviews and sharing files.

Internet is a priority for broadcasters: Reliable internet access is the most demanded ICT support by our partner radio broadcasters. Through the internet, broadcasters can network with one another, gain access to news sites, find sometimes scarce content in local languages, download and share audio content and interact more easily with organizations, including funding partners.

Good farm radio depends on quality content: Content needs to be relevant, accurate, reliable, and readily accessible to the broadcaster. Traditionally, quality content was a major constraint to the production of quality farm radio programs. FRI's script service has made an important contribution to overcoming this constraint. Paper-based resources, however, need to be organized, labeled and archived in a way that makes them easy to search, extract, use and restore. Desktop computers with internet are a powerful solution, giving almost instant access to a wide range of electronic resources on a large variety of topics.

[50] Ubuntu is an example of a Linux based operating system.

Language of content is a challenge: While the internet is a powerful medium for sharing and accessing information across the world, it is not in itself sufficient for local broadcasters without relevant content in their local languages. Although FRI provides radio scripts and FRW in English and French (with plans to provide scripts in Hausa and Swahili), many broadcasters are not very familiar with these languages and cannot make use of the materials. FRI has designed an online community for rural broadcasters in Africa called "Barza." Among other things, "Barza" will encourage broadcasters to contribute their own scripts in their own languages for sharing and exchange.

Broadcasters can act as an internet intermediary: Efforts to provide farmers with direct access to the internet are full of challenges: The lack of content in languages farmers can read and understand, the challenge of finding sustainable models for providing computers and training farmers to use them and the logistical challenges of providing stable electricity and internet are just some of the obstacles. These and other challenges facing the Telecentre movement have been well documented in numerous papers[51][52]. One way to help farmers benefit from the world of information available on the Internet (without directly providing connectivity) is to continue to ensure broadcasters have access. With access, broadcasters can access essential information to then share with farmers over the airwaves. In some countries these broadcasters are called "Internet operators". Typically broadcasters, who are comfortable in English and French and can translate quickly into their local language, can browse major news sites like BBC or RFI, using their mobile phones or computers in the studio, and share the latest international news with their listeners.

Improving broadcaster computer literacy is an opportunity: Investments in computer literacy, virus prevention strategies, and web search skills can help broadcasters take advantage of a greater number of electronic resources, and in turn, improve the quality of their farm radio programs.



Farm radio presenters at Boma Hai Radio near Kilimanjaro, Tanzania.

[51] Roman, R. ; Colle, R.D. (2002) Themes and issues in telecentre sustainability. UK, Manchester University
[52] Gurstein, Mike (2011) Telecentres are not "Sustainable": get over it. ICTWorks

9.0 Package 2: Digital Recording and Editing Equipment



The introduction of computers and digital recorders to the modern radio station has completely changed the way radio programs are produced.

At A Glance…

Equipment:	Computer, editing software, Sansa and Marantz MP3 Recorders
Annual Costs	**1x** Multimedia desktop computer system ($324) **1x** Sansa Clip MP3 recorder ($180) **1x** Marantz PMD660 MP3 recorder ($50) **TOTAL: $554 USD**
Cost per week:	**$10.57 USD** per radio show
Challenge:	Increase the capacity of radio stations to produce quality radio programs that feature the voices of farmers and experts.
Experiment:	Equip radio stations with digital recording equipment.

Best Used For: Creating engaging and interactive radio content featuring voices from the field.



Grace Amito (Mega FM) and Bernard Mumbere (KKCR), practicing their interview techniques with a beekeeper during a training exercise, using the Sansa recorder.
Photo credit: Bartholomew Sullivan

9.1 What AFRRI Wanted to Learn

With this package, AFRRI expected that MP3 recorders would allow broadcasters to more easily record field interviews featuring the voices of farmers. Given farmers' general affinity for broadcasts that feature local farmers' voices, AFRRI anticipated that the increased use of such interviews on air would result in better quality broadcasts while also increasing listenership. The testing and assessment of this package aimed to answer the following question: *How can providing African broadcasters with computers, digital recorders and training in editing improve the quality, popularity and interactivity of their participatory radio campaigns?*

9.2 Background

The introduction of computers and digital recorders to radio stations has completely changed the way radio programs are produced. Almost gone are the days of reel-to-reel and tape splicing. Now, instead of splicing tape, the producer uses the copy and paste functions on the computer; instead of piles of tape reels stored in boxes, digital audio is stored on a pocket-sized hard drive; and in place of expensive and cumbersome tape-to-tape field recorders with huge microphones, MP3 recorders that fit in the palm of a hand -- with batteries that last for days -- are the new standard.

9.3 The Challenge

Although the shift from analogue to digital has already happened in most radio stations in the developed world, many of AFRRI's partner radio stations were still catching up with the revolution.

- **Single computer:** Some of AFRRI's partner stations had only one computer, which also served as the on-air computer. Broadcasters found it almost impossible to find time for production and editing on the computer.
- **Limited recorders/microphones:** Often the entire station would share a single recording device (tape or digital), and one microphone, making field recordings almost impossible because the on-air studio needed the scarce resources.
- **Recording / editing skills:** There is a shortage of broadcasters with knowledge to edit, mix and produce on a computer, as well as skills to manipulate a digital recorder for interviews.

PRC1 taught AFRRI that farmers like to hear their own voices and voices of other farmers like them on farm radio broadcasts, in addition to the voice of experts. In order to maximize the impact of AFRRI's radio campaigns, radio stations needed support to make the interview and production process faster and easier to conduct.

9.4 The Experiment

There were two elements to this experiment. AFRRI supplied radio stations and broadcasters with the necessary digital equipment to create their radio programs for the campaign, provided hands-on technical training required to successfully operate the equipment. AFRRI also trained broadcasters how to use the story-based approach to farm radio programs.

Table 6: Package 2 equipment and cost analysis

Item	Price (USD)	Average lifespan	Cost per year	Cost per show[53]
Desktop computer system with UPS	$900	3 years[54]	$300	$5.75
Service & parts (8%)	$72	3 years	$24	$0.46
Marantz PMD660 MP3 recorder	$500	3 years	$166.66	$3.20
Service & parts (8%)	$40	3 years	$13.33	$0.20
Sansa clip MP3 recorder	$50	1 year	$50	$0.96
Total			$553.99	$10.57

[53] Assuming a weekly show over the lifetime of the equipment.

[54] On-air and production computers at radio stations are typically under heavy use and experience power surges, dust and other environmental factors. Therefore 3 years is a conservative average lifespan but could be longer.

Training:
As outlined more completely in Package 1, and in the document, *Strengthening the broadcaster: Capacity development in the African Farm Radio Research Initiative,* AFRRI's seven-day, face-to-face training workshop, called Building Broadcaster Capacity, provided ample hands-on training for broadcasters in digital recording techniques and computer editing/mixing skills. Each broadcaster was given a 4GB Sansa Clip, a tool that proved to be one of the most revolutionary and impactful ICTs used in the experiment.

> ***"Sansa: This gadget was the centre of most of my recordings. The quality was just fantastic, very portable, and easy to download material into a computer through the USB for editing. I also used it for monitoring live programs on radio and as a playback system."***
>
> **Bashir Amin,**
> **MBC Malawi**



Daouda Diarra from Radio Banjo Kayes practices interviewing with a Peule livestock farmer in Mali.
Photo credit: Bartholomew Sullivan

Production software used in radio stations:
The majority of partner radio stations in Africa use Adobe Audition -- which retails for $350 -- for radio production and on air in studios and the majority of the partner stations are using unlicensed copies of

the software. Although FRI provided training on an open-source digital audio software – Audacity[55] -- most producers and broadcasters at AFRRI partner stations preferred the simplicity and familiarity of Adobe Audition. This prompted AFRRI to consider approaching Adobe about volume licensing for their product which will be acted upon in the future.

> ***"Les NTICs font participer le maximum de paysans aux programmes de la radio / ICTs enable the participation of the maximum number of farmers in the radio station's programs."***
>
> **Seydou Diakité,**
> **Station Manager: Radio Jigiya**

A closer look: "The traveling Sansa!"
Giving voice to farmers with MP3 recorders

Country: Mali
Broadcaster: Flatie Sonogo
Radio station: Radio Jigiya



Each Monday morning, Flatie Sonogo, a broadcaster and well-respected farmer, would make the 25 km journey north from his home village of Ziangolodougou to the town of Zegoua. There he would prepare and present a farm radio program in his local language of Senoufo at the community radio station – Radio Jigiya. In his bag would be the usual assortment of things needed for the day's trip: food, water and an MP3 recorder full of interviews with farmers from his village. He would use these in his productions for the radio campaign on constructing compost pits.

The Sansa recorder is small enough to fit in the palm of his hand. This tiny recorder would travel with Fati from the village to the radio station once a week. It has enough storage and battery capacity to last the week away from computers and electricity. When Mr. Sonogo reached the studio he would upload the recorded interviews to the computer, recharge the Sansa via USB connection and begin to plan for his popular farmers' debate program in the Senoufo language. Although Flatie did not participate in the *Building Broadcaster Capacity* training firsthand, in the true spirit of camaraderie and as is the case with many AFRRI radio stations – the basics of the training were passed on to him by other broadcasters who did participate in the training.

[55] Open source audio editor free download: http://audacity.sourceforge.net.

9.5 What AFRRI Learned

Sansas were the most popular ICT tool: The enormous popularity of small, recording MP3 players was immediately obvious. Almost as immediately, AFRRI saw the vulnerability of this strategy: The relatively large number of "duds", and the vulnerability of the devices to viruses. Broadcasters carried these devices with them everywhere, which was one of their strengths; being so portable, they could be pulled out to conduct an interview or capture sounds virtually anywhere and at anytime. Because they also doubled as a portable storage devices (USB flash drives), they were prone to picking up viruses from cybercafés and shared computers. As a result, the Sansas often needed formatting and data wiping to restore them to their original states.

Many broadcasters do not know how to edit on a computer: Many presenters and broadcasters at AFRRI's partner radio stations had no previous experience editing and producing radio programs on a computer. Where there were computers prior to AFRRI, the task had largely been left to producers. Because producers are often overloaded with work, however, presenters could not get help editing their interviews into the productions as they would like. By training the presenters on the basics of digital editing, the presenters were able to do their own production work when the station producers were too busy to help.

Equipment and training can increase the number of farmers' voices on air: Providing broadcasters with portable digital recorders, and training them to edit the digital content is a powerful way to increase the presence of farmers' voices on-air, and to offer a series of interesting stories in farm radio broadcasts. The following indicate the relevance of these assets:

- Radio shows that featured more voices of farmers ranked higher in quality rankings than those with fewer voices of farmers.
- Many radio station managers and broadcasters wanted to purchase more of the Sansa Clip MP3 recorders from AFRRI to equip all broadcasters at the station, not just the ones participating in the AFRRI project.
- When a MP3 recorder (Sansa) was reported as faulty by a broadcaster, the sense of utmost urgency to have it repaired or replaced was high. One broadcaster at Volta Star in Ghana who accidentally dropped his Sansa in water actually repaired it by opening the case and drying it in the sun!
- Broadcasters consistently praised the quality of recordings produced by the sensitive microphone in the Sansa, which allowed them to capture interviews in almost any circumstance. The enthusiasm expressed by broadcasters with over 20 years of experience about these small devices was testimony to their impact.

Broadcaster survey: A survey, conducted with 51 broadcasters online using Survey Monkey in August 2010 after the completion of PRC2, confirmed the value of the digital recorders and editing equipment to broadcasters, and the impact it has had upon their work:

88% of broadcasters strongly agreed that the equipment support their station received from FRI helped to improve their programs significantly.
82% of broadcasters said, since AFRRI began, they have been conducting more interviews in the field.
Broadcasters consistently praised the Sansa MP3 recorder as useful because it was easily portable, had excellent audio quality, and the battery lasted for days.
More than 50% of the broadcasters noted, however, that over the course of the 1.5 years they worked on AFRRI radio campaigns, their Sansa MP3 recorders stopped working and needed replacing.

A closer look: The portable MP3 recorder

Cost of 100 x 30 minute interviews

Sansa Clip (MP3)



$50 USD

90 minute cassette tape



$100 USD

The cost of a portable 4GB MP3 recorder is approximately $50 USD retail. If the recorder captures 100 good interviews, AFRRI can say it generates content at a cost of $0.50 an interview. This is cheaper than traditional, high quality digital recorders (such as the Marantz PMD660) and cheaper than using cassettes, which cost about $3 for a 90 minute cassette, meaning $1 per 30 minute interview. Additionally, a small MP3 recorder uses a rechargeable lithium ion battery, eliminating the costs of buying expensive batteries. These recorders are a good investment, but expect to replace them up to once annually [56]. The AFRRI study found the *Sansa clip +* by Sandisk to be a superior product to other similar recorders for its capacity to record live FM radio easily, the excellent battery life, a highly sensitive microphone with good auto gain control, and its general ease of use. Many broadcasters find its small size less imposing and threatening for interviewees than a larger recorder with external microphone.

[56] Technically, comparing an MP3 recorder to a recording cassette is different because one is a complete recorder and recording medium (mp3), while the other is just a recording medium (cassette). This comparison does not factor in the cost of a cassette recorder.

9.6 Conclusions and recommendations

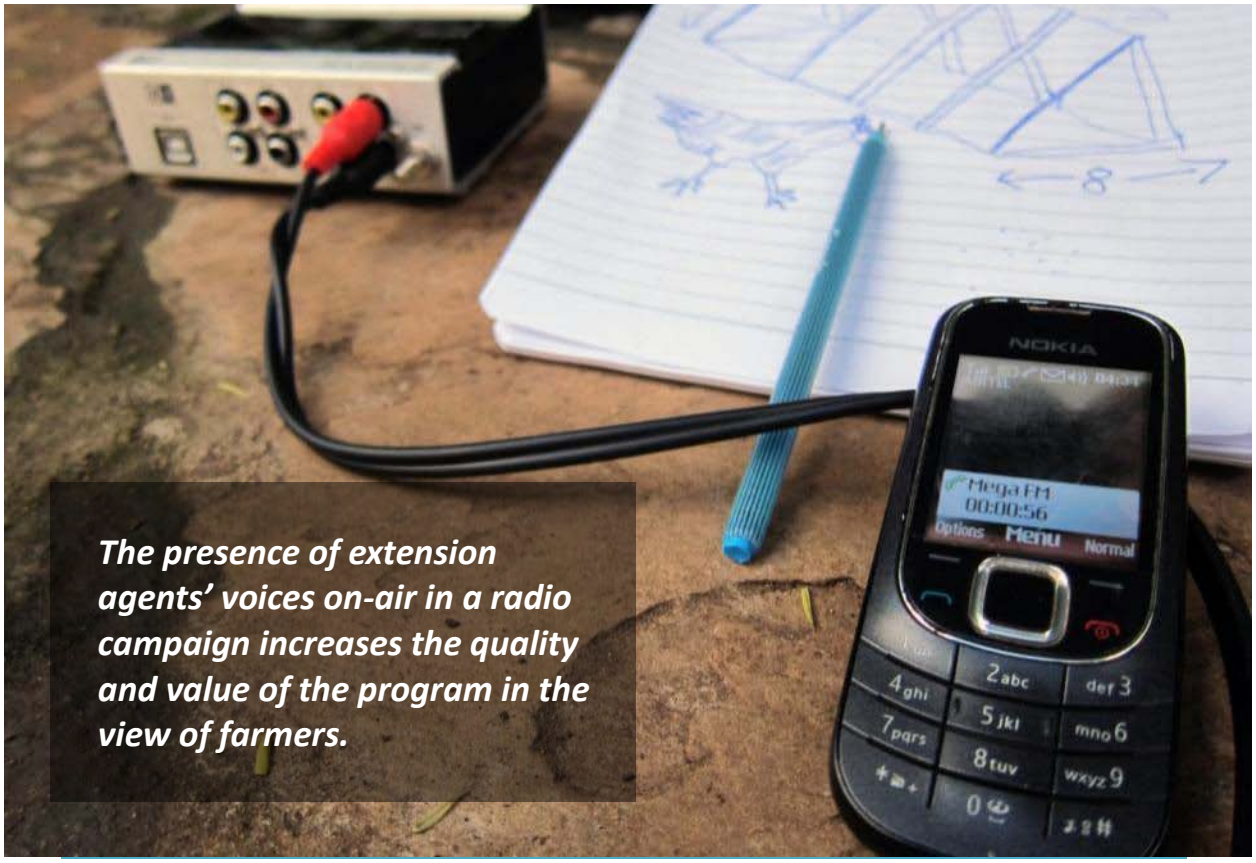
Multifunction recording MP3 players have revolutionized how radio broadcasters approach their work: Broadcasters can record an interview anytime, because they own their device and can take it anywhere. Devices that can record audio, play/record FM radio, act as a storage device, and have a long rechargeable battery life are invaluable.

Low cost, but prone to failure: As powerful and affordable as the small devices are, their relatively high rate of becoming defective, (over 50% in 1.5 years), is a source of frustration for broadcasters and radio stations. Sustaining this technology requires budgeting for periodic replacement. But at $50 a piece, they are treated more like supplies that belong to an individual broadcaster, rather than as equipment owned by the radio station shared amongst broadcasters and made available for professional use. As a comparison, stations can keep broadcasters supplied with MP3s more easily than they can keep toner in their printers.

Can Microsoft improve on the Sansa? An excellent way for the Bill & Melinda Gates Foundation to support the production of better farm radio is to invite its corporate partner, Microsoft, to create a special version of the Zune, (or its eventual replacement), and make it available in abundance at low cost to African broadcasters.

Digital editing training: Providing training on editing software to presenters and broadcasters with no production experience can have a great impact on farm radio programming. With more staff available to do basic editing, they can help make better quality broadcasts available more quickly. Most stations use unlicensed versions of Adobe Audition; however, Audacity is a free, user-friendly audio editor that can be learned quickly by experienced producers or inexperienced broadcasters.

10.0 Package 3:
On-air phone calls to extension agents



The presence of extension agents' voices on-air in a radio campaign increases the quality and value of the program in the view of farmers.

At A Glance…

Equipment:	Nokia 2330C handset with cable to connect to radio mixer
Annual Costs	**1x** Nokia 2330C handset ($36) **1x** Cable to connect phone into audio mixer ($15) Weekly airtime for call-outs ($8 x 52 weeks = $416) **TOTAL: $467(USD)**
Cost per radio show:	Approx **$10 USD**
Challenge:	Increase the capacity of radio stations to make and receive phone calls with extension agents and regional experts, both on air and pre-recorded
Tested Solution:	Equip stations with a mobile phone and airtime for calls to extension agents and other experts

Best Used For: Including a variety of expert voices on air in a cost-effective way.



"Through mobile phone, I managed to disseminate my knowledge on local chicken management to farmers. Most farmers in my areas benefited a lot with that knowledge. They now know how to treat and to keep their chickens. It has also saved the time and transport cost to travel from Kilosa to Dar es Salaam [to be interviewed for the program] where Radio Maria is."

Nicodemus Nzenga,
Extension worker in Kilosa District, Tanzania

10.1 What AFRRI wanted to learn

AFRRI expected that by calling extension agents and other experts using mobile phones (live–to-air or pre-recorded), radio broadcasters could conduct interviews without having to travel. This had the potential to increase the number of experts interviewed by the broadcasters, improve the quality of the radio programs, and increase listening communities' adoption of the agricultural improvements being promoted during the farm radio campaigns. AFRRI wanted to see if providing a radio station with a mobile phone, and the airtime required for calls to extension agents and experts would increase the amount of relevant and timely information broadcast to farmers.

10.2 Background

Agricultural extension services are one of the ways African farmers can receive relevant and timely advice on managing crops and livestock. The lack of a travel budget and the extremely high ratio of farmers to extension agents, however, make it difficult for extension agents to do their jobs. Through PRC1, AFRRI discovered that the presence of extension agents' voices on air in the radio campaigns increased the quality and value of the programs, according to farmer listeners. It also broadened the reach of extension services at a very low cost per farmer.

10.3 Challenge

Mobile phones allow the extension agent and the broadcaster to bridge the distance between them; broadcasting the interviews on the radio gives the extension agent the opportunity to reach a large number of farmers at one time. Nevertheless, some challenges have traditionally made call-outs from radio stations difficult:

- **Lack of equipment**: Many partner radio stations have limited budgets for equipment. Most lack the professional equipment needed for making quality phone calls on-air. The hybrid phone is a

device that patches a mobile or landline call into an audio source so it can be used on-air, live or recorded.

- **Call-ins vs. call-outs**: Where equipment does exist to broadcast phone calls live, the emphasis has often been on receiving calls during specified call-in segments. The call-out feature is a much more effective way to get extension agents on air live, however, because incoming phone lines are typically busy with listeners calling the station, looking to get their voices heard on-air.
- **Lack of airtime**: Radio broadcasters who want to include the voices of extension agents via mobile phone often have not had the budget for making these calls live-to-air, or even prerecorded for later use.

10.4 The Experiment

Partner radio stations that participated in this package were given mobile phone equipment, airtime for twelve weeks, and training to incorporate the voices of experts on their programs.

Table 7: Package 3 equipment and cost analysis

Item	Price (USD)	Average lifespan	Cost per year	Cost per show[57]
Basic Nokia handset (2330C) with handsfree/speaker	$90	2.5 years	$36	$1.44
Custom built patch cable	$15	1 year	$15	$0.28
Airtime for 10-15 minutes of call-outs	$32 per month		$416	$8
Total			$467	$9.72

Installation and Training:

The ICT officer in each country worked with the broadcasters and station technical staff to custom build hands-free cables to interface with the audio mixer. The customization allowed broadcasters to conduct live phone calls with extension agents/experts, in which the caller could hear, not only the voice of the broadcaster, but also other studio guests, other callers, and music. Broadcasters were trained to pre-record phone calls and transfer files digitally onto the computer for editing and inclusion in later programs.

Airtime for log sheets:

Each station participating in this package received the equivalent of 8 USD per week, every week, in mobile airtime vouchers. This was to enable them to make calls to extension agents or other agricultural experts, either on air or pre-recorded. In exchange, broadcasters were expected to email a log sheet summarizing how they used the phone and the airtime in the previous week.

[57] Assuming a weekly show over the lifetime of the equipment

A closer look: "This is Lilian calling: You're live on the air!"
The Radio Maria participatory radio campaign

Lilian Manyuka, radio presenter and producer of the AFRRI program, *Heka Heka Vijijini* (Busy Busy in the Village), knew she needed an expert voice to help her radio campaign on local chicken management. Because campaign topics ranged from purchasing and hatching chicks, to diet and disease management, to finding access to markets and buyers, Lilian needed a range of experts. She identified several sources of information: agricultural experts, Professor Muhaira and Dr. Flora from Sokoine University in Morogoro, (three hours drive from Radio Maria's Dar es Salaam studio): extension agent, Nicodemus Nzenga in Kilosa, (eight hours drive); and other experts from the District Agriculture and Livestock Development Office (DALDO) in Morogoro.



Lilian Manyuka, interviewing a farmer with her Sansa recorder in Tanzania.

As part of her weekly, one-hour radio program, Lilian spent the equivalent of $7 USD to make a series of phone calls to relevant experts over the course of a 15-minute segment. Throughout the segment, she asked experts critical questions raised by farmers in the previous program, (by call-in and SMS). She also delivered timely questions on the agricultural program she was promoting during the campaign, which helped keep farmers up-to-date on the improvement. To travel the distance required for in-person interviews would have cost over $300 in fuel and other transportation costs per week!

10.5 What AFRRI learned

Cost savings: The cost savings of reaching extension agents and experts based far from the station were immense. A five-minute phone call cost the equivalent of US$2 in airtime expenses. In that seemingly small amount of time, farmers are able to hear relevant information about planting, disease prevention, or local market prices. The money and time spent to travel for the same interview could be up to US$75.[58]

Attention span for on-air phone calls: Watching farmers listen to radio programs that employed this technology during the radio campaigns, AFRRI noticed some people lost concentration during long interviews conducted over the telephone. After about five minutes of a phone call, the concentration of the listener seemed to wane. This may have to do with the distinct sound quality of voices over the phone. There is a serious loss in the sound quality of a voice when using a mobile phone versus a landline; this has to do with the frequency and the compression bandwidth of GSM networks. Some listeners, however, said the sound of a voice on a phone, broadcast on the radio gives the message a sense of urgency; the feeling that "it's happening right now". This can be effective when used strategically for market price updates, reports from farmers' fields, or discussions with experts.

[58] See section 11.5 for cost analysis of doing field interviews vs. call-outs.

Pre-interviews: It is important to discuss with expert/extension agents what their contributions or interviews will be about beforehand. Some broadcasters in the AFRRI campaign would call their experts without warning and put them live on the air directly. In feedback, experts said they didn't appreciate being put on the spot and would have preferred the chance to prepare themselves, reflect on the content, and to find a quiet place to conduct the phone call.

> ***"Radio communication reinforces extension so both should move concurrently."***
>
> **Opira Santos,**
> **Karitas Gulu, Mega FM extension agent**

Variety of voices: Listeners stated a preference for hearing a variety of expert voices at different stages of the radio campaigns, especially when certain topics came into focus. There was sometimes a tendency to over-rely on one or two expert voices; and at times the listeners felt the messages were being repeated. This was not ideal for a campaign that was progressing through different stages of an agricultural improvement on-air, in partnership with farmer listeners.[59]

Log sheets: The initial experiment design included a log sheet at each station that was to be filled out by broadcasters to monitor the exact usage of the call-outs to experts, (and others). AFRRI was interested in knowing the length of the calls, to whom the calls were made, and the discussion topics. Unfortunately, it was not easy to gather this information from all of the broadcasters. Filling out log sheets accurately requires time and precision. It can be difficult to do when the broadcast is going live-to–air, and the broadcaster is working alone in the studio.

Each studio is different: On the technical side, designing a cable to connect the mobile phone to the studio was unique in each radio station and required some customization effort. Each radio station has its studio set up in a different way, including different mixers, monitor speakers, microphones and more. An "off the shelf" product locally available to radio stations would be the best long term solution. There are many alternatives to the Nokia handset–with-cable option, including the Gramin Radio Inter-Networking System (GRINS) telephony solution, designed by Gram Vaani, a team of software programmers and community radio enthusiasts in India. At the professional studio level, the "hybrid" device produces excellent sound quality and functionality. Even a landline plugged directly into the mixer could also be a viable option, although often a mobile phone call to a landline is quite expensive due to high internetwork call termination charges.

Statistics from a survey with 41 extension officers involved throughout AFRRI:

61% said they were able to reach more farmers than before they used radio as a communication medium.
43% received more calls/SMS/letters and verbal requests from communities after the PRCs began.
43% have witnessed change in knowledge about agricultural improvements among farmers who listened to radio campaigns.
66% say they now work more closely with broadcasters to serve farmers than before AFRRI.
61% say PRCs have given them confidence to use radio as a tool to serve farmers.
39% say they significantly reduced their transportation costs through radio.

[59] Ward, D. (2011) Manual for Participatory Radio Campaigns. Ottawa: Farm Radio International.

> ***"Agricultural institutions should work very closely with radio stations to propel information dissemination on best farming practices. AFRRI is a glowing example of a perfect integration of extension, broadcasting and farming."***
>
> **Enoch Kyambadde,**
> **URDT - Uganda Rural**
> **Development Training Center**



10.6 Conclusion and Recommendations

Budget and schedule for call-outs: Call-outs to experts are the most affordable and reliable way to consistently feature the voices of experts and extension officers throughout a radio campaign. It requires planning, however, to include these interviews in a radio program. Some budget should be set aside each week for broadcasters, which includes a reasonable number of call-out interviews per week, to make sure the feature is used.

Get extension agents involved, but keep it about the farmers: Radio can help extension officers get their jobs done, and help researchers and experts get their key messages heard by rural people. The farmer-centered approach that FRI uses strives to value the farmer and their needs first, so the language and feeling of call-outs to experts is best received when the questions bear in mind the context of the farmers and what they are doing in their fields.

A variety of voices at the right time: Listeners want to hear a variety of experts interviewed to correspond with the different key times of a progressive radio campaign. For example, it is important that an interview about seed varieties be done before planting season and messages about post-harvest loss options be done before harvest. Consideration of farmers' information needs, based on what decision they are considering, should ideally shape the choice of experts to include in the radio program.

A closer look: The Amazing MP3 player becomes a call-out device

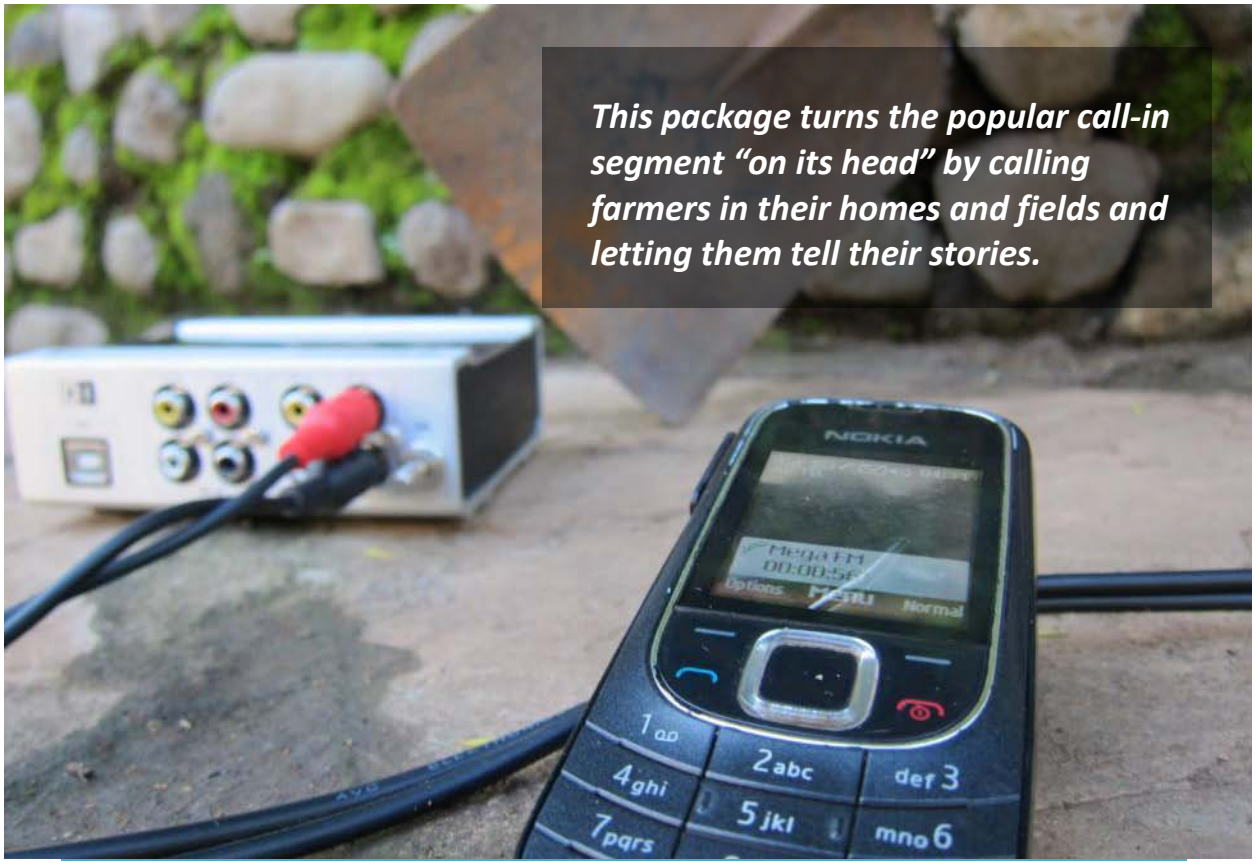
Creating a cost-effective method for call-outs

Broadcasters were amazed by the simplicity of one way to record phone interviews -- using a mobile phone with speakerphone capabilities and their Sansa MP3 recorder :

1. The broadcaster calls the expert and explains the interview and how it will work.
2. The broadcaster places the phone on the table and turns on the speakerphone.
3. The broadcaster places the Sansa MP3 recorder next to the phone and starts to record.
4. The interview is conducted, all parties can hear one another, and the Sansa's sensitive microphone captures a mix of the expert's voice on speakerphone, along with the voice of the broadcaster.



11.0 Package 4: On-air phone calls to farmers/listeners



This package turns the popular call-in segment "on its head" by calling farmers in their homes and fields and letting them tell their stories.

At A Glance…

Equipment:	Nokia 2330C handset with cable to connect to radio mixer
Annual Costs	**1x** Nokia 2330C handset ($36) **1x** Cable to connect phone into audio mixer ($15) Weekly airtime for call-outs ($8 x 52 weeks = $416) **TOTAL: $467(USD)**
Cost per radio show:	Approx **$10 USD**
Challenge:	Increase the capacity of radio stations to make and receive phone calls with farmers, both on air and pre-recorded
Experiment:	Equip stations with a mobile phone and airtime for calls to farmers

Best Used For: Including farmers' voices on air in a cost-effective way.



Anthony Lwanga interviews a farmer in Uganda.
Photo credit: Blythe McKay

> ***"We chose the ICT packages because we wanted to have a closer rapport with farmers. We used the call-out to farmers because we have farmers who have excelled and can talk to fellow farmers almost like extension agents. This interaction is a way of peer education, which motivates other farmers to learn from their fellow farmer."***
>
> **Anthony Lwanga,**
> **Station Manager, KKCR Uganda**

11.1 What AFRRI wanted to learn

In PRC1, AFRRI learned that listeners love to hear their own and other farmers' voices on the radio. Regular phone calls made on air between listeners and broadcasters, (call-in/call-out), improve farmers' perceptions of a broadcast's quality, thereby increasing listenership. At the same time, the regular contact between farmer and broadcaster bolsters the relationship of trust and engagement between the two. AFRRI wanted to know if providing a radio station with a mobile phone, and the airtime to make calls out to farmers from the studio could increase the quality of radio broadcasts; both from the perspective of other farmers, and of the broadcasters, themselves.

11.2 Background

At many African radio stations, the call-in segment is one of the most popular formats: listeners are keen to get their voices heard on the air. One limitation, however, is that call-ins often exclude those who lack phones or airtime credit, or those who cannot get through to a busy phone number. Call-ins are also more difficult for the producer/presenter to control. Without complicated pre-screening and time delays, call-in shows can become 'greetings' programs, where callers phone in to send a message to a

friend or relative, rather than to participate in a discussion about the radio campaign topic. Following the format of CBC's popular call-out program, "As it Happens[60]", (on the air for 35 years in Canada), this package turns the popular call-in segment "on its head" – making them "call-out segments" to farmers in their homes and fields so they can tell their stories.

11.3 The Challenge

There are a number of challenges associated with getting the voices of farmers onto the radio using mobile phones:

- **Equipment**: Many of the stations AFRRI worked with have limited equipment budgets and most lack professional equipment for making quality phone calls on-air. (Typically, a device called the 'hybrid' has been used).
- **Call-ins vs. call-outs**: Where equipment does exist to broadcast phone calls live, the emphasis is often on receiving calls during call-in segments. This limits participation to those who can afford airtime units for calls.
- **Quality**: During call-in segments, it is typical for the presenter or broadcaster to have three out of five call-ins dropped; in other words, the caller gets cut off because their airtime units run out, or they lose the network coverage. This can be distracting and frustrating for listeners and presenters. It also tends to degrade the quality and professionalism of the program.
- **Airtime units**: Besides listeners needing airtime to call the station, broadcasters also need to have a budget for making call-outs to listeners or specific guests.
- **Lack of battery charge:** In cases where a village lacks reliable electricity, listeners' mobile phones are often switched off when they're not in use to conserve battery life. This makes it difficult for broadcasters to reach listeners to include them in call-out segments.

11.4 The ICT Solution

The ICT solution for call-outs to farmers is a different application of the same technology involved in call-outs to experts. It is comprised of a combination of equipment, training and financial resources to make it a complete package that would serve the purpose of the experiment as well as leave radio stations and broadcasters with capacity to continue after the campaign.

Table 7: Package 4 equipment and cost analysis

Item	Price (USD)	Average lifespan	Cost per year	Cost per show[61]
Basic Nokia handset (2330C) with handsfree/speaker	$90	2.5 years	$36	$1.44
Custom built patch cable	$15	1 year	$15	$0.28
Mobile phone airtime for 10-15 minutes of call-outs	$32 per month		$416	$8
Total			$467	$9.72

[60] As It Happens: http://www.cbc.ca/asithappens/about/show.html.
[61] Assuming a weekly show over the lifetime of the equipment.

Installation and training:
The ICT officer in each country worked with the broadcasters and technical people at the station to custom build each hands-free cable to interface with the audio mixer used. The customization allowed the broadcaster to conduct a live phone call using the Nokia 2330c phone with farmers. During the call, the caller could hear, not only the voice of the broadcaster but also any other audio which was being mixed in: other studio guests, other callers[62], and music segments. The broadcasters were trained how to prerecord phone calls on the Nokia phones, and to transfer the files digitally onto the computer for editing, so they could be included in a program later[63].

Airtime for log sheets:
On a weekly basis, for a total of 12 weeks, each partner radio station participating in this package received the equivalent of US$8 per week in mobile airtime vouchers to make calls to farmers either on air or prerecorded. In exchange for the airtime, the broadcasters were expected to send, via email, a log sheet summarizing how they used the phone and airtime in the previous week.

> ***"ICTs made the radio programs more participatory than before and it generated a lot of feedback that the radio station would not have received otherwise."***
>
> **Richard Ekotu,**
> **Station Manager, Voice of Teso Uganda**



Call-outs to farmers can be a very good alternative to the traditional call-in

[62] Some radio broadcasters experimented with conference calls in their call-out segment, putting two or three callers on at the same time.
[63] Broadcasters were also shown how to use their portable MP3 recorders to record a phone call, explained in detail in Package 3.

A closer look: *"Habari yako?"* (What is your news today?)
Calling out to farmers at Sibuka FM, Tanzania

Sibuka FM is one of the few stations to which people can tune in, in Maswa, Shinyanga district of Tanzania, because the town is relatively remote. There was a perception that the station played too much modern music, (Bongo flavour), and that Sibuka was not a station for farmers. This perception changed when PRC1 came on the air. As people started to hear agricultural content and voices of farmers, the popularity of the station started to increase amongst farmers. Upon reflection with farmer group discussions and broadcasters it was suggested that the inclusion of farmers' voices on air, talking about their agricultural issues, would further cement the station's commitment to the farming communities. It was decided that the program would feature a segment with call-outs to a variety of farmers.



Gloria Kiwia making a call-out to check up on one of "her Farmers" in a campaign

What's wrong with call-ins?

The station previously had only a single landline telephone (TTCL) connected to the on-air mixer. The cost of calling a landline from a mobile phone is prohibitively expensive to many of the rural people in the area. As a result, the voices on air during call-in segments are, for the most part, relatively well-off people from the town centre of Maswa.

Solution: Call-outs to farmers

The farmers to be called, who were mostly known to the broadcasters, either from visits to the communities or from calling in during previous broadcasts, were alerted they were on the air, and then encouraged to participate in the program by asking a question, offering feedback, or sharing news.

Results: Voices of farmers heard on-air

The experiment lasted eight weeks out of the approximately 20 weeks of the full radio campaign. During this time an average of six call-outs were made to listeners per week. 22 men and six women were called. The figure to the right illustrates what farmers wanted to speak about on the program. 28% of called farmers had messages for broadcasters; 24% had messages for fellow farmers; 21% had questions for other farmers; 17% were market related discussions; and 10% were updates from the farmers on their activities in the fields.

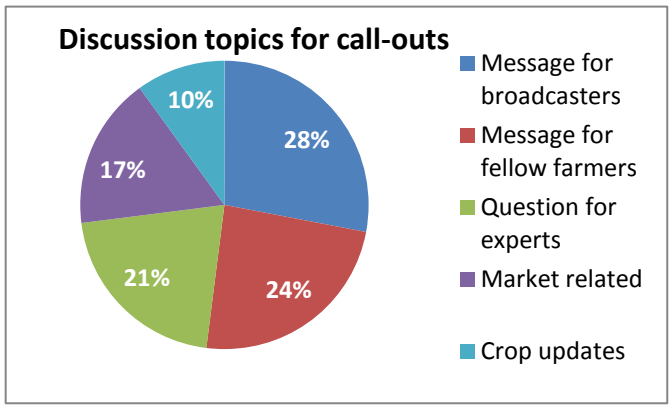


Figure 18

Call-outs to farmers in Sibuka FM's listenership area strengthened the relationship between farmers and broadcasters. Broadcaster Gloria Kiwia from Sibuka shared her delight at being able to follow up on a regular basis with "her farmers", to find out how they were progressing. These call-outs were also an opportunity for broadcasters to get suggestions from farmers. This was helpful in planning upcoming programs in the campaign.

11.5 What AFRRI learned

Call-outs to farmers can boost other farmers' listenership, knowledge and practice: Farmers appreciate the voices and viewpoints of fellow farmers on air: It makes for a more engaging show. The following two charts illustrate the difference between radio stations that made extensive use of call-outs to farmers, (among other methods for getting farmers voices on air), and those that did not make regular call-outs to farmers in their weekly radio programs. Each chart compares two radio stations in the same country; the comparison is based on listenership; listeners' knowledge about the agricultural improvement promoted during the campaign; and listeners' uptake of the promoted agricultural practice.

Figure 19

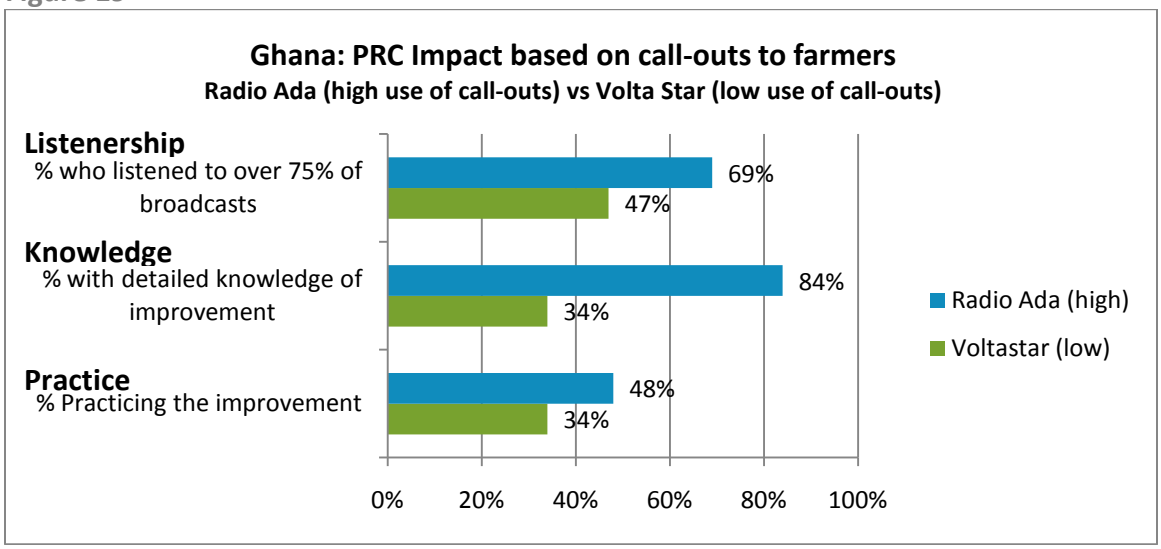
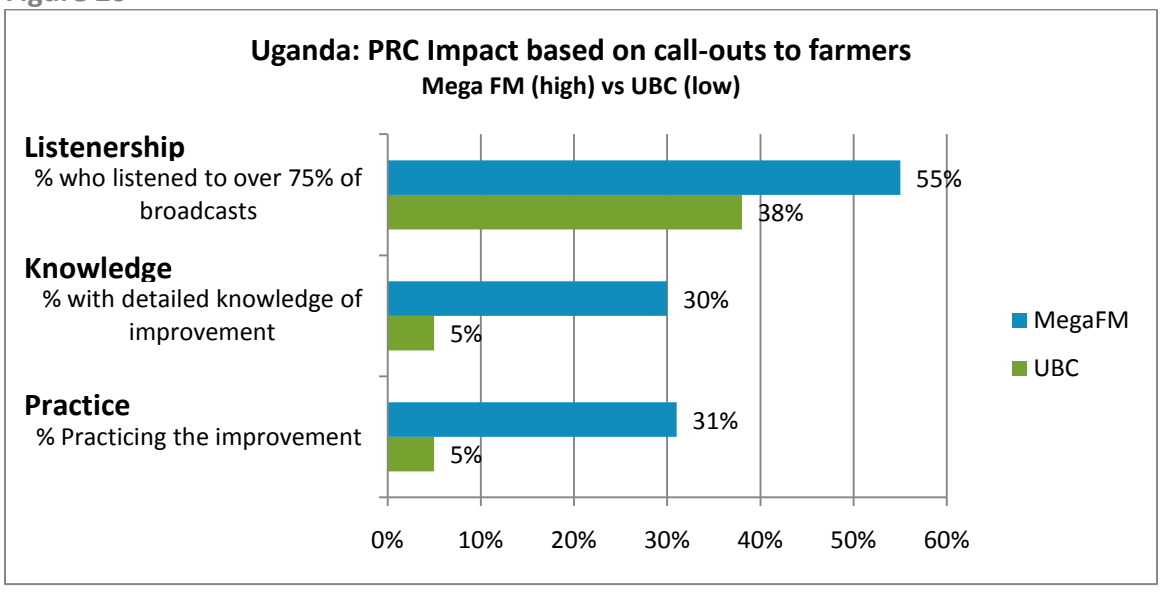


Figure 20



These two comparisons[64] show some dramatic differences. Stations with a high presence of farmers' voices showed up to a 22% increase in regular listenership than stations with low presence of farmers' voices, (Ada vs. Volta Star). 30% of listeners at Mega FM, which regularly included farmer interviews and call-outs during the radio campaign, said they gained knowledge as a result of the radio campaign, 25% higher than listeners of UBC, which had no call-outs. Finally, a difference of 26% (Mega FM vs UBC) was found among those practicing the agricultural improvement that was promoted throughout the radio campaign.

Call-outs are cost effective[65]: Call-outs to farmers are an affordable way for broadcasters to keep in touch with people in the villages, but they are not a replacement for face-to-face interviews and visits to the listening communities. Broadcasters working on farm radio programs love visiting the village and conducting interviews with farmers on-location, when possible. Communities love visits from the radio stations. These trips are often expensive and take time for transportation; call-outs can bridge this gap from week to week. At the same time, community members made it clear that mobile phones should not replace in-person visits from radio stations to the communities.

Call-outs to farmers require planning: Broadcasters are busy during their programs; often the phone is ringing off the hook with people who want to speak on the air. To do a call-out program effectively requires good program planning: to decide who the broadcaster will call, at what point in the program the segment will feature, and which topics will be discussed.

Call-outs require airtime credit: Usually broadcasters at a station will share a common phone for call-ins and call-outs. These broadcasters need to have their own supply of airtime credit either allocated by the radio station management or, as was the case in this study, directly from the AFRRI country office on a weekly basis.

Call-outs can increase the diversity of farmers' voices on air: At Mega FM in Uganda one group of older women were convinced there was a caller who had a special "super phone" which could always get through during call-in segments: "Why else is it that we only hear his voice, and when we try to call we get a busy signal?" By making an effort to do call-outs, it can encourage the inclusion of new voices, of those who may not be able to "compete" during the call-in segments.

[64] The variable of call-outs to farmers was not the only variable contributing to these differences. The stations that used call-outs to farmers also may have put more effort into production of their programs.
[65] see box: Head to head - costs of doing field visits

Head to Head: The cost of doing field interviews

Cost of 3 interviews with farmers

Callout



$8 USD

Field Visit



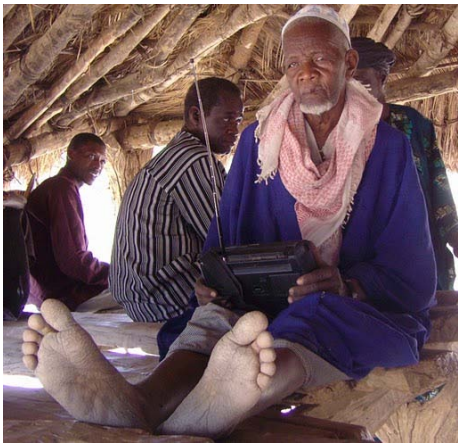
$75 USD

The above illustrates the money that can be saved by doing call-outs to farmers in the field in place of field visits. While call-outs should not be considered a replacement for field visits, they offer a cost-effective alternative when travel to the field is unfeasible or too costly. The above costs are based on the average of USD $8, which was necessary to purchase airtime credit, (approximately 3 x 3-5 minute calls-out to farmers). If you carry this figure over the entire 18 week PRC, it is still an economical way to reach farmers: Just USD $144 for the entire campaign. Making field visits for each of these interviews could quickly exhaust the radio station's budget. USD $75 is an estimate of a typical field trip by a radio station, including staff time, transport costs, lodging and meals. In a real world context, the cost of field visits can become prohibitive and more often than not, the interviews would simply not occur without a more economical backup. This is becoming an even more serious issue with the rise in fuel prices across the continent.

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A closer look: *"Qu'en pensez vous?"* (What do you think?)
Calling out to farmers at Radio Fanaka, Mali

Radio Fanaka's listeners are not accustomed to using SMS on their phones. Instead of using the SMS alert (as outlined in section 16.0) to remind its listeners to tune in, the radio station would call the heads of the listening groups 30 minutes before a broadcast to remind them to gather people to listen to the radio program. After the one-hour broadcast was finished, the radio station's broadcasters would patch their phones live-to-air and begin calling the same listening groups one by one. Each group was given between five and ten minutes to reflect upon the broadcast they had just heard, ask any follow-up questions, or state their intentions about the agricultural practice that was discussed on the program. The phone would typically be passed from person to person at the listening group so that each person who wanted to could state his or her name and get a chance to share his or her views. This use of call-outs was an innovative way to include the voices of farmers on-air. It shifted the responsibility for calling, from the farmers to the radio station, and bypassed the competition for the highly congested "call-in" lines.



A farmer in Mali with his radio set in a radio listening club. Radio Fanaka would make call-outs to such listening clubs to give everyone a chance to express their views

11.6 Conclusion and Recommendations

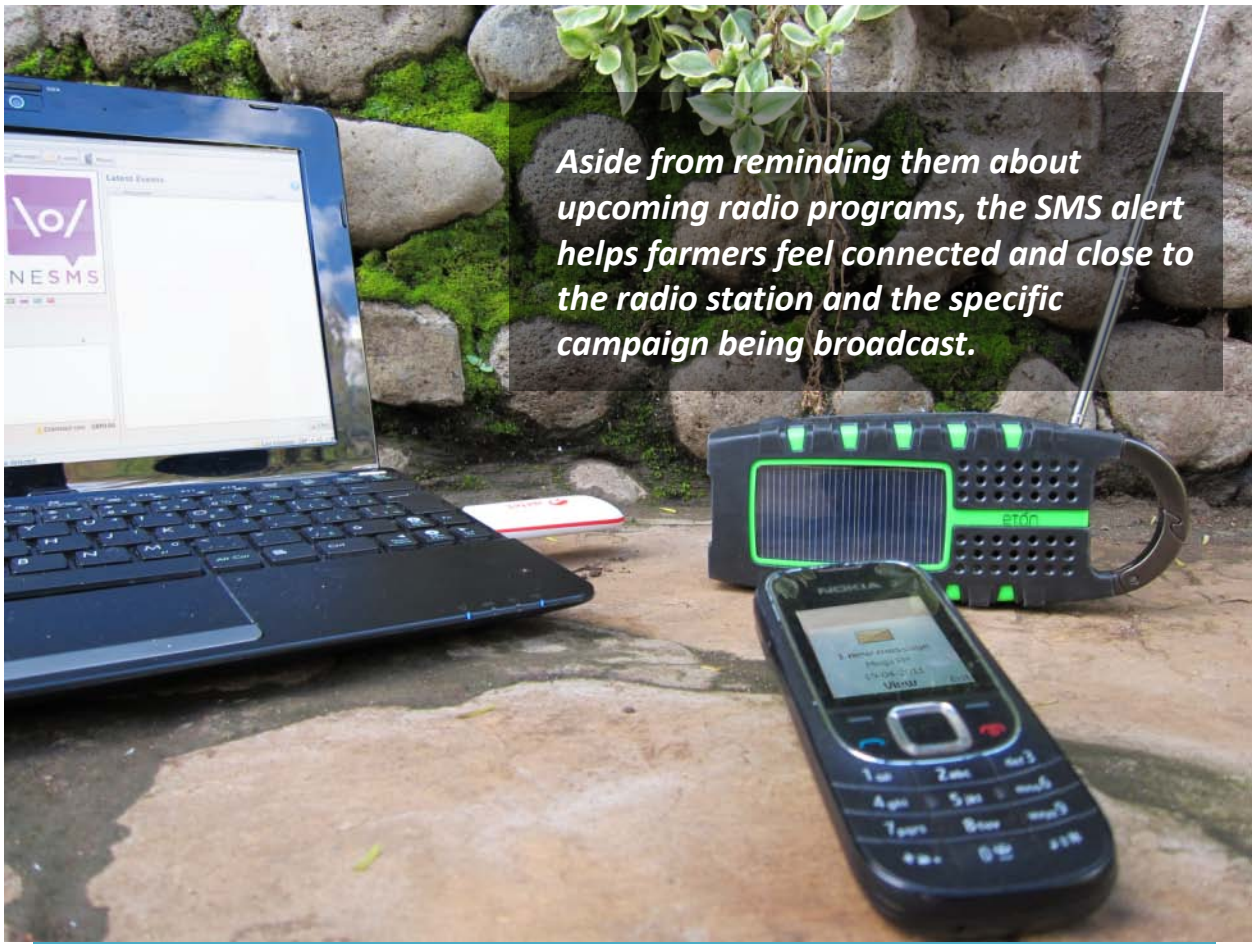
Use call-outs regularly: Call-outs to farmers as a regular short segment each week are an affordable way to have a continuous story, which includes the voices of individual farmers or groups of farmers. This consistency, combined with a variety of voices, (to avoid isolation and frustration), is the winning combination to keep a farm radio show engaging for its audience.

Call-outs can be used to gather feedback: Call-outs to farmers open a feedback channel between the broadcaster and its listeners. They can be an excellent way for broadcasters to receive encouragement, as well as suggestions for upcoming shows. One interesting way to do this is to have a call-out segment after each weekly broadcast to gather feedback from radio listening groups.

Plan your call-outs: By contrast, call-ins are a chance for surprises in a group conversation that is happening on air between a broadcaster and callers. A good call-out program is more like an interview in which the guest/caller is somewhat prepared for what will be discussed. The listeners will benefit from this planning and preparation as the questions for the caller can be strategically linked to the campaign topic being discussed.

Provide airtime to broadcasters to keep call-outs consistent: Either arrange this through the station managers or a project coordinator. When broadcasters receive mobile phone air credit before their broadcasts are live on air, they are more able to keep things running smoothly.

12.0 Package 5: SMS Alerts from Broadcasters



Aside from reminding them about upcoming radio programs, the SMS alert helps farmers feel connected and close to the radio station and the specific campaign being broadcast.

At A Glance…

Equipment:	USB Mode linked to FrontlineSMS software on desktop PC
Annual Costs:	**1x** USB Modem ($16.60) **1x** Desktop PC ($324) Clickatell bulk SMS for 200 farmers per week ($10x52=$520) **TOTAL: $896 USD**
Cost per radio show:	**$17.22 USD**
SMS cost per farmer per campaign:	$0.90 cents to reach a farmer with alerts for duration of a campaign (0.05 per SMS x 18 weeks)
Challenge:	Increase the listenership of farmers by reminding them of upcoming programs via SMS alerts
Experiment:	Equip a radio station with a computer + modem installed with Frontline SMS and send farmers weekly SMS alerts

Best Used For: Increasing farmer listenership and connection with the program.

12.1 What AFRRI wanted to learn

AFRRI expected to see that listeners who receive an SMS text message reminder 30 minutes before each broadcast -- with information about time of broadcast, radio frequency, and topics -- would be more likely to tune in and listen to the program.

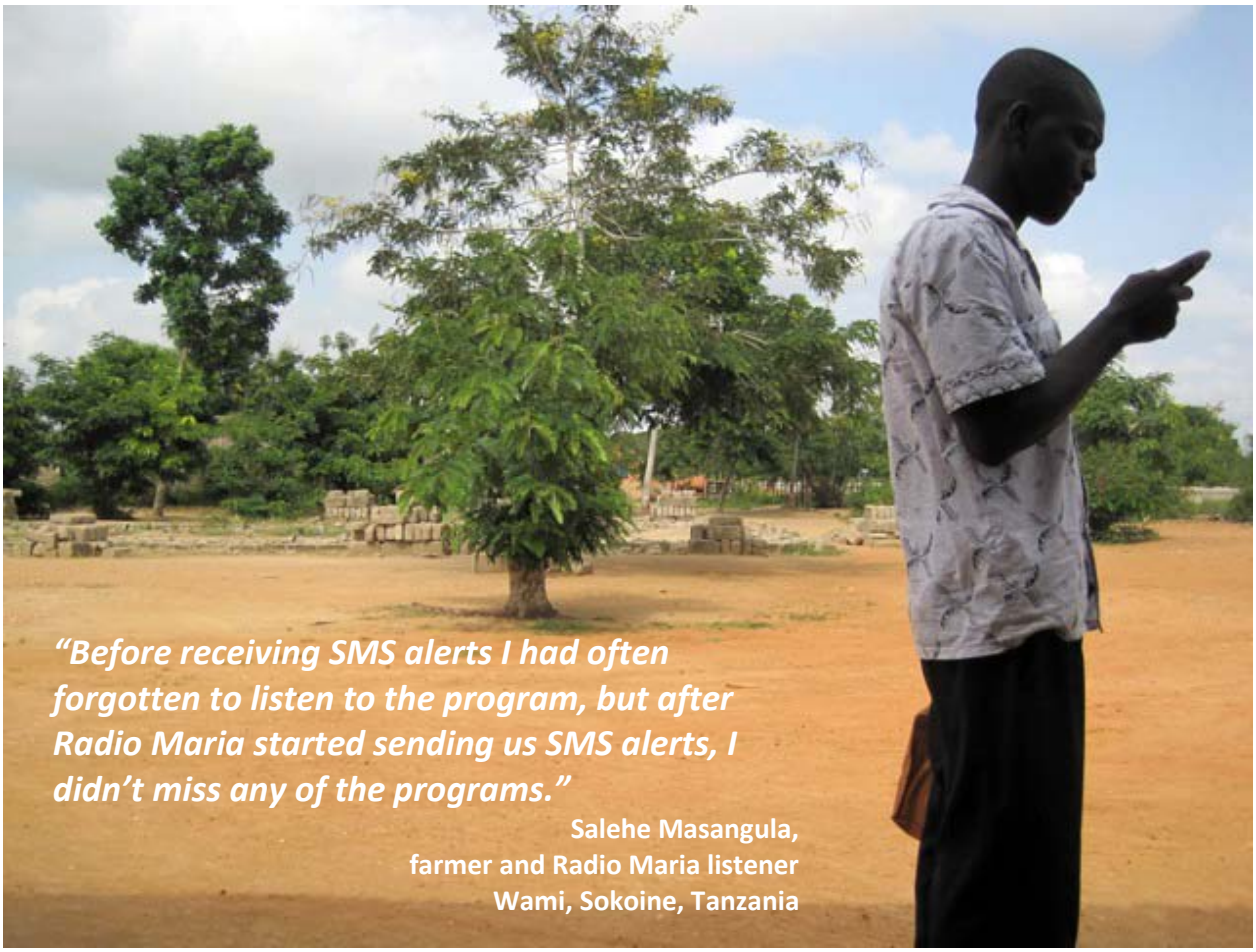
12.2 Background

During PRC1 many listeners stated that they would have liked some help remembering to tune into broadcasts at the scheduled times. Often farmers are busy moving around between the field, the market, and home, and they sometimes forget to tune in. Many farmers from the listening communities AFRRI worked in have mobile phones. Figure 2 shows the level of mobile phone ownership across ALC, PLC and CC communities in all five AFRRI countries, divided by gender. AFRRI found considerable discrepancy in the levels of ownership across the countries and gender -- ranging from 65% of males in Ghana owning phones, to 8% mobile phone ownership amongst women in Mali.

12.3 The Challenge

There are a number of challenges associated with getting SMS alerts to the farmers' phones:

- **Getting the numbers:** To get the phone numbers and names of those who want to subscribe to the alerts, AFRRI put a clipboard and pen in the ALC communities and allowed people to sign up.
- **Language and literacy**: Choosing the most suitable language for the alerts is important, so the farmers can understand the message in the alert. Broadcasters sending alerts must also take literacy levels into account.
- **Lack of battery charge:** In some cases, where a village lacks reliable electricity, listeners' mobile phones are often switched off when not in use to conserve battery life. Sometimes subscribers will not receive SMS messages until they turn their phones on – by which time the program may have already aired.
- **Network reliability and signal strength**: The timely delivery of SMS alerts relies on the reliability of mobile phone networks, which can be intermittent in certain areas. In some listening communities, the signal strength from a network is so low that alerts may not reach subscribers' phones.
- **Software and hardware limitations**: There are increasingly more software packages available to help manage a database of contacts to send and receive SMS messages; however, it is sometimes difficult to identify which software works best with which hardware.
- **Airtime units**: The cost of sending an SMS can be prohibitively high and service can be very slow. It is important to find an SMS provider that sells bulk SMS credit to keep the costs down.



12.4 The ICT Solution

Package 5 involved multiple steps: collecting a database of listeners' mobile phone numbers; inputting the contacts in a database; installing and training broadcasters to use FrontlineSMS software; training broadcasters to manage the sending/receiving of SMS alerts; and training radio staff on a number of data collection tools to monitor the impact of the package with listeners.

Equipment and Software:

- **FrontlineSMS** software installed on the AFRRI computer for composing, sending and receiving SMS messages from a database of contacts
- **USB modem** (wireless broadband) with SIM card to send and receive SMS
- **Mobile phone** for follow-up interviews
- **Clickatell**[66] account to pay for SMS message credits

[66] www.Clickatell.com is a UK and South African based SMS gateway/aggregator.

Table 8: Package 5 equipment and cost analysis

Item	Price (USD)	Average lifespan	Cost per year	Cost per show[67]
Desktop computer system with UPS	$900	3 years[68]	$300	$5.75
- Service & Parts (8%)	$72	3 years	$24	$0.46
USB dongle/modem	$50	3 years	$16.60	$0.32
Basic Nokia handset (2330C) with hands free/speaker	$90	2.5 years	$36	$0.69
Clickatell cost to send SMS to 200 listeners ($0.05 perms)[69]	$10		$520	$10
Total			$896.60	$17.22

Installation and Training:
The ICT officer in each country installed FrontlineSMS (FLSMS) on the AFRRI computers, and helped the broadcasters input all the mobile numbers of farmers collected from the field. The USB modem was used in conjunction with the software, to be able to read SMS messages sent to the radio station. This feature was not easily used, because there was no computer dedicated to SMS sending and receiving. In training, therefore, AFRRI put emphasis on sending SMS alerts out. Clickatell.com, a South African-based international SMS company, was used as a gateway for sending the SMS alerts.

How the SMS alerts were sent:
The alerts were sent from the AFRRI computer containing a database of all listeners, which was setup to a Clickatell account, and an installation of FLSMS software. The broadcaster or station technician wrote weekly SMS alerts, with some basic information about the show start time, any special guests, and the frequency of the radio program. The last sentence of the SMS encouraged people to "*Please share this alert with 8 to 10 of your neighbours.*" The entire SMS was written in the local language of the broadcasts. A preview of the SMS was sent to the broadcasters' own phones as a test. Thirty minutes prior to the broadcast, the SMS was sent to all subscribers in the database.

Airtime and "follow-up call" log sheets:
On a weekly basis, for a total of 12 weeks, each partner radio station participating in this package received the equivalent of USD $8 in airtime to conduct follow up calls with a random selection of SMS alert subscribers. The log sheets were used as a monitoring and evaluation tool to measure the impact of the SMS alerts on the listenership of the radio programs throughout the campaigns. Data was collected to find out if subscribers received the SMS, whether they listened, what the show was about, and other relevant information to gauge their level of listening. Broadcasters received airtime for calls and SMS for their upcoming shows, following the submission of their SMS log sheets from the previous week.

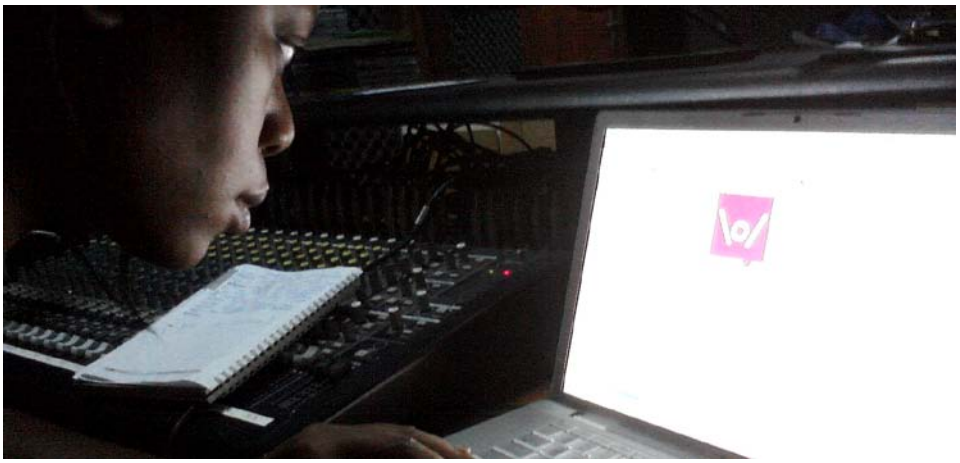
[67] Assuming a weekly show over the lifetime of the equipment.
[68] On-air and production computers at radio stations are typically under heavy use and experience power surges, dust and other environmental factors. Three years is a conservative average lifespan but could be longer.
[69] Other SMS gateways/aggregators in each country usually offer much lower prices for SMS messages sent within country. Clickatell prices are based on international SMS prices.

Head to Head: The cost of reaching one farmer with SMS



5 cents per SMS

SMS alerts can be sent to a farmer at a cost of 5 cents per SMS. Alerts can be sent to 300 farmers, once a week, for 18 weeks, for $270 (5,400 SMS sent in total).[70] It costs under $1 USD (about 90 cents) to send SMS alerts to one farmer throughout an entire 18-week radio campaign. Since many large campaigns will be seeking to reach tens of thousands of farmers rather than hundreds, AFRRI experimented with including the sentence, "Please share this alert with 8 to 10 of your neighbours," at the end of each alert.



Lilian Manyuka uses the Frontline SMS system at Radio Maria in Tanzania.
Photo credit: Bart Sullivan

[70]The figure of 300 farmers per week comes from collecting phone numbers from ALCs. In a real-world context there may be substantially more subscribers to the alerts.

A closer look: A reminder to listen

SMS alerts from a listener's perspective

When interviewed about the impact of the SMS alert on her listening habits during the PRC2, Mrs. Esther Chambo shared some surprising insights. She recounted her listening habits, but also explained her relationship to the radio station, and her newly-acquired technological skills with her mobile phone.

When Esther first signed up for the SMS alerts from MBC (Malawi Broadcast Corporation), she was only able to press the green "answer" button on her phone to receive a call. As she started to receive the SMS alerts on her phone from week to week, she learned how to open, read, and eventually send SMS messages.



Mrs. Esther Chambo: A maize farmer from Benadi community in Malawi who received SMS alerts from MBC.

Surprisingly, Esther said she listened faithfully to the program, whether she received an alert or not, because "it is our program." She explained that the SMS alerts were much appreciated, and she wanted them to continue because she liked the close communication with the radio station. Esther's sense of ownership of the program was typical among listeners from Active Listening Communities (ALC), because they were actively engaged and highly involved in the ongoing development of the radio campaign. SMS alerts – aside from being a reminder to listen – can also build a strong connection between listeners and broadcasters. In future, AFRRI would like to collect mobile numbers of listeners from outside ALCs; listeners who have not met the broadcasters, to determine if SMS alerts can build a similar "closeness" between radio station and all listeners.

> ***"The package improved the listening patterns of target communities; they became excited and were always ready for the broadcasts, and gave feedback in the follow-up calls."***
>
> **Everess Kayanula,**
> **Station Manager, MBC, Malawi**

A closer look: Reminding to listen

SMS alerts from a broadcaster's perspective

Grace Amito noticed several interesting and unexpected results from the SMS alert package at Mega FM. As part of the research design for this package AFRRI asked broadcasters to make follow- up calls with a random sample of SMS alert subscribers, to find out if they received the SMS and if they listened to the program each week. Originally intended to capture statistics about the impact of the SMS alerts, Grace said the follow-up calls had a far greater effect on the relationship between broadcaster and listener:



Grace Amito interviewing a panel of experts and connecting farmers by phone

> "Sending an SMS, a farmer thinks you are talking directly to him or her. This farmer does not know I've sent it to approximately 500 other farmers. They read *'This Wednesday we are having a very interesting program about the benefits of fruit tree growing. Miss the program only if you must!'* This makes the farmer so interested – so really, how can you miss such a program? To make things even more interesting, on Thursday I start calling 60 random farmers to check up on them. Our conversation could go something like this:
>
> **Grace:** 'Hello Peter Okello (I don't even know this Okello, by the way). How are you - my name is Grace Amito. I'm calling from Mega FM.'
>
> **Okello:** 'Hey Grace – I've been listening to your program, it's so interesting!'
>
> You see the kind of touch I have now with Okello? Okello thinks that I know him and Okello thinks it's a crime not to listen to my program. To the extent that they thought I was testing them – it's as if they think I'm putting them in a class – if you don't listen to the program, Grace is going to call you!"

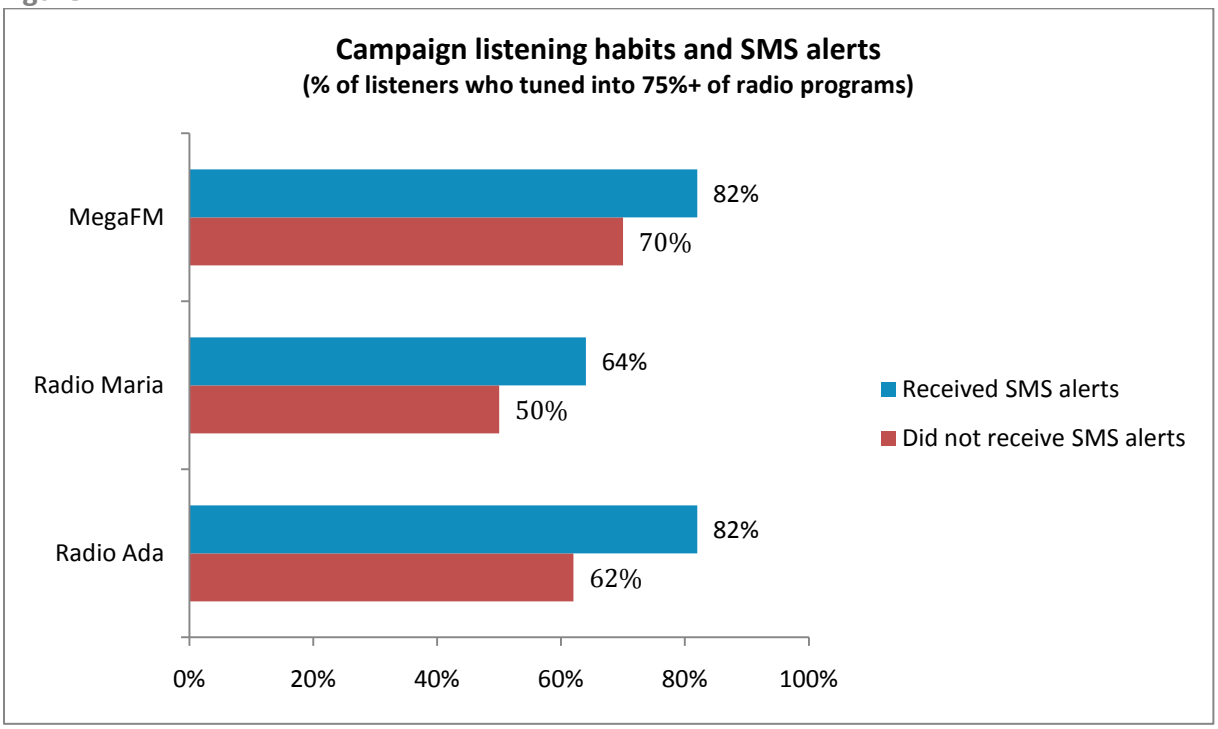
"To receive SMS alert in my phone, I feel that I am closer and friend to the broadcaster and the radio station; it also give me the appetite to listen to the programs. Radio Maria cares about farmers."

Monica,
farmer and Radio Maria listener,
Kitete, Tanzania

12.5 What AFRRI learned

SMS alerts increase listenership: As the chart below shows, there are noticeable differences in the campaign listening habits of listeners who received SMS alerts versus those who did not.

Figure 21



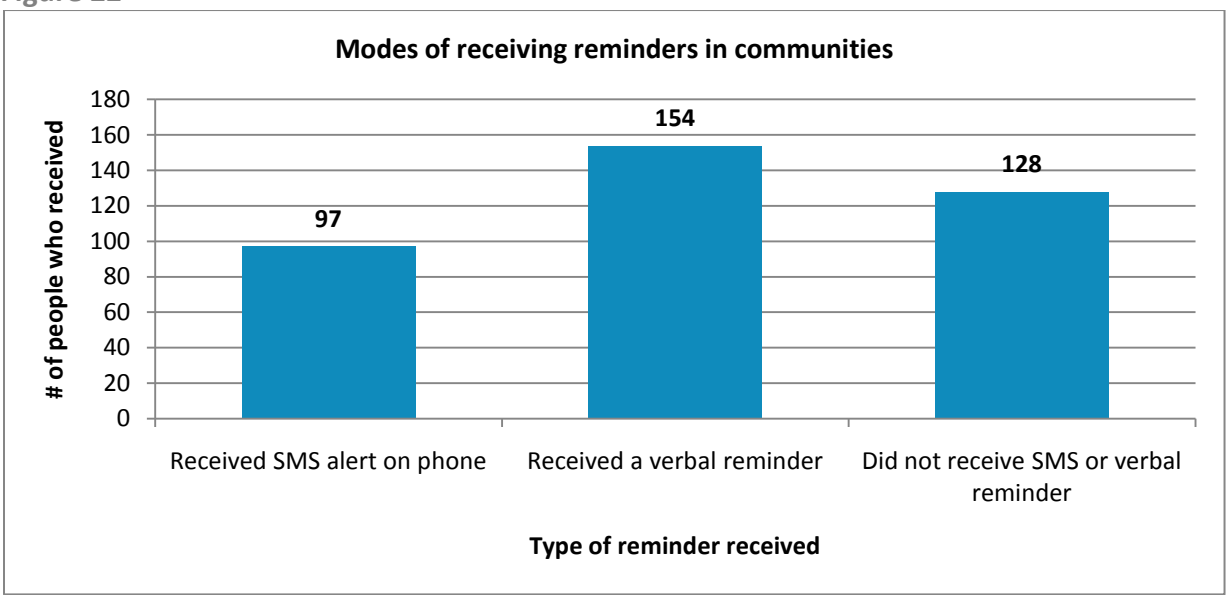
The PRC2 outcome evaluation revealed that the more episodes of a PRC that a farmer hears, the more likely she or he is to adopt a new practice (see figure 4 in Executive summary).

SMS alerts also serve to strengthen the bond between listeners and broadcasters during a radio campaign. Listeners repeatedly talked about feeling a sense of closeness and connection to the radio station upon receiving regular reminders about the program through SMS.

Verbal reminders can broaden the reach of SMS alerts: AFRRI encouraged broadcasters to write, "*Please tell 8 to 10 others about the upcoming show. Thx!*"[71] at the end of each SMS alert they sent to subscribers. AFRRI discovered that these verbal alerts had a significant impact. Of 379 different households surveyed in six ALC communities that participated in the SMS alert experiments, 97 people indicated they were receiving regular weekly SMS alerts; another 154 people indicated they received a verbal reminder to tune into the upcoming broadcast, (see figure below). For every one SMS alert sent, almost two other people in a separate household received a verbal reminder to listen. This illustrates the power of word of mouth in rural communities and is an important consideration when looking at scaling up SMS alerts.

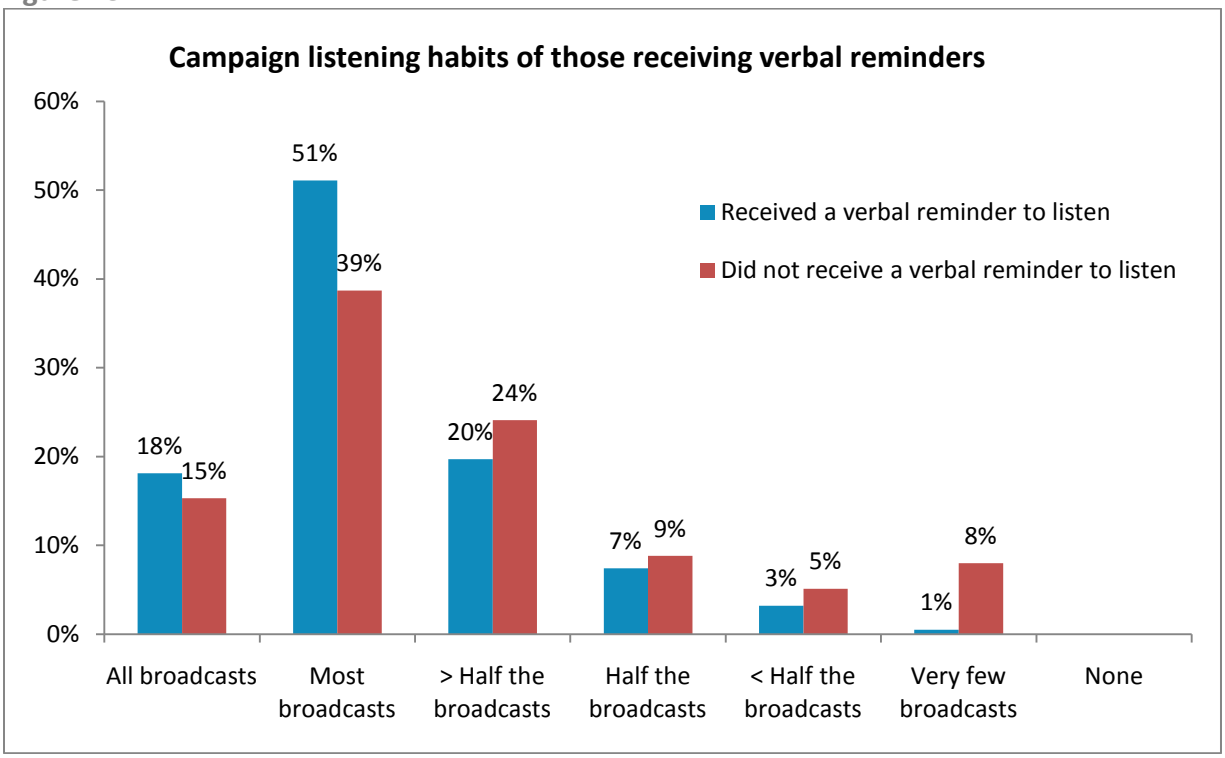
[71] Broadcasters always wrote SMS alerts in the dominant local language of their listeners.

Figure 22



Of those who received the verbal reminders, 76% indicated, "Yes, it helped me to remember to listen." The analysis of campaign listening habits for those who did not directly receive an SMS on their phones demonstrates that the verbal reminders had an impact on people who listened to over 75% of the programs, but had no noticeable effect on the other categories.

Figure 23



Learning opportunities for farmers: Receiving SMS alerts can be the push for listeners to learn how to use their mobile phones. In listening communities in Mali, where only eight in 100 women own mobile phones, the culture of using the SMS functionality of mobile phones for communication had not been developed prior to AFRRI. Through community visit training sessions by radio station staff, groups of women were taught how to open and read SMS messages.

Building a listener database: Collecting mobile phone numbers and storing them in a database is an essential step toward successful integration of SMS alerts into farm radio strategies. It is the beginning of building a listener database – a channel through which a station can reach its listeners with messages in the future.

Use the radio to gather numbers: To broaden the reach of a radio station, and include more listeners in the SMS alert service, (rather than listeners from ALCs, as in this research), AFRRI recommend using the radio programs to harvest mobile numbers. Broadcasters would announce on air that listeners could send SMS messages to the radio station – including their names and locations – if they wanted to subscribe to the SMS alert service. Alternatively, broadcasters encouraged people to "flash" their numbers; broadcasters then identified those "missed calls" as new subscribers to the service.

SMS gateways: Finding a reliable and affordable SMS gateway[72] that delivers SMS alerts quickly can be a challenge. Originally the plan for this ICT package was to use the local mobile operators in each country, insert a SIM card in the USB modem connected to a computer, and send bulk SMS through this number. This turned out to be a very slow, and somewhat unreliable, procedure. It took approximately 30 minutes to send 300 SMS messages using a USB modem and a local SIM card with FrontlineSMS software. AFRRI could never reliably send this many SMS messages due to network problems, limits of numbers of SMS enforced by the networks, and other issues. As an alternative, AFRRI used Clickatell, a UK and South Africa-based SMS gateway. Through their services AFRRI could send the same 300 SMS instantly. AFRRI could also easily assign and manage the weekly airtime credits for the different radio stations needing to send their SMS alerts. The challenge with Clickatell was that payments needed to be made via credit card or international bank transfers, as opposed to the convenience of scratch card airtime vouchers from local mobile operators. This made it difficult for the radio stations to sustain the SMS alerts on their own.

Software: FrontlineSMS is good software for managing a database of listeners' mobile numbers and then composing, sending, and receiving SMS messages. But the software has challenges: unreliable device drivers made it difficult to get a good connection between the modem and the software; the inability to cancel "queued messages" meant that sometimes 100-plus SMS messages from previous weeks were unnecessarily resent; and finally, some functionality could be improved to make it useful in a radio station environment[73].

Revenue potential: Some radio stations are interested in developing capacity for bulk SMS messaging to listeners because of its revenue-generating potential: Advertisers may pay them to send messages to large numbers of customers. While the opportunity to make this sort of revenue is attractive, it carries

[72]SMS gateway is the service which handles sending and receiving of SMS, usually a mobile phone company but can be a third party like Clickatell.

[73] These issues and more are being addressed in a new version of FrontlineSMS as well as a project for a Radio specific plug-in for FLSMS: http://radio.frontlineSMS.com.

the risk of lowering the efficacy of using SMS alerts to increase listenership. Essentially, it depersonalizes the service tested by AFRRI, and exposes listeners to the world of SMS spam.

12.6 Conclusions and Recommendations

SMS alerts work: Sending an SMS alert 30 minutes before a program is broadcast can improve regular listening habits of subscribers by up to 20%[74]. To expand the reach of this service beyond active listening communities, it is recommended that the radio, itself, be used to acquire more subscribers by allowing them to sign up by SMS, or by calling a specified subscriber number.

Farmers have indicated that, aside from reminding them about upcoming radio programs, the SMS alert helps them feel connected and close to the radio station and the specific campaign being broadcast.

Broadcasters have indicated that the "follow-up phone calls", initially designed for research purposes to measure the impact of the SMS alerts, also served another valuable function: Listeners appreciated the random call and the chance to briefly talk to the broadcaster. The short "quiz" that listeners were given by the broadcaster often ensured that the listener would tune in the following week just in case they were called and quizzed again. There is clearly value in maintaining some form of follow-up calls to randomly selected SMS alert subscribers.

[74] In Active Listening Communities ALCs where subscribers have met radio station staff.

13.0 Package 6:
Radio agents - Playback on demand with solar MP3 radios & mobile phones



For group listening it is essential to find a technology that is technically perfect: It should be easy to operate, durable in quality, loud enough in volume to work for a group and, most importantly, have a reliable backup power source.

At A Glance…

Equipment:	Solar-powered radio with MP3 player/recorder Solar-powered mobile phone
Annual Costs:	**1x** MP3 radio/recorder w/solar + crank power ($21.25) **1x** Solar charger ($16.60) **1x** Coral-200 solar mobile phone by ZTE ($35) **TOTAL: $73.85 USD**
Cost per radio show:	**$1.39 USD**
Challenge:	Increase the listenership and participation of farmers, especially women, through ability to listen to playback of programs "on demand" and use a communal mobile phone
Experiment:	Equip a community elected "radio agent" with MP3 playback listening capabilities

Best Used For: Increasing listenership of program, especially among women and listening groups

13.1 What AFRRI wanted to learn

Could supporting a woman to become a radio agent[75] increase listenership? Would she be able to attract a diverse group of farmers, including women? Could a radio agent increase phone interaction between broadcasters and individuals who would normally not have that opportunity?

13.2 Background

During the survey in PRC1, AFRRI discovered that women listened to radio programs less frequently than men due to lack of access to radio sets. Often the household radio, if there is one, leaves the house with the husband/father when he goes out. Women also miss radio programs because their household duties and chores prevent them from being available to listen to the radio at the time of the broadcast.

On average, across all the listening communities surveyed in five countries, 85% of men have at least one radio set in the house compared with 68% of women. The difference of 17% shows us that women have less reliable access to radio sets than do men.[76]

AFRRI also discovered that phone interaction between women farmers and broadcasters has been low due to lack of access to mobile phone sets. As illustrated on the mobile phone ownership chart in section 16.2, an average of 18% of female farmers own phones, compared with 42% of male farmers.

13.3 The Challenge

Absence of ownership and lack of access to radio sets and mobile phones are fundamental constraints to the capacity of some small-scale farmers, particularly female and more resource-poor farmers, to benefit from farm radio services. This package sought to overcome that limitation. There are several practical challenges related to providing farmers with communal radios and mobile phones for listening to, and participating in, radio programs:

- **Lack of ownership**: Women own significantly fewer radio sets and mobile phones than do men. This restricts their access to listening and ability to call in to participate in radio programming.
- **Lack of power:** Many of the communities are off the electrical power grid and, as a result, charging mobile phones and powering radio sets is difficult.
- **Cost of batteries:** Many listeners cannot afford to purchase batteries for their radio sets; although low-priced batteries are available, the quality and life expectancy is so poor many forgo spending money on them.
- **Gender dynamics of sharing equipment:** It was noted that women would not feel comfortable going to a man to ask to use a communal radio set or mobile phone; however, the reverse happens commonly.
- **Training:** Learning to use new technology to record and playback radio programs can be complicated and difficult.

[75] A radio agent is a person who provides a radio to a group in the community to listen to, as well as affordable access to a mobile phone.
[76] See Figure 1

13.4 The Experiment

Equipment:

Based on the needs and challenges identified, AFRRI searched for a radio set that was solar powered and allowed for recording and playback. As there was nothing "off the shelf" available to meet these needs, (at the time the powerful Lifeplayer radio[77] from Lifeline was not complete). AFRRI connected with Matt Yorke at One Media Player Per Teacher[78], who offered custom built solar radios with an MP3 player fused into the device.

Each radio agent was equipped with the following:

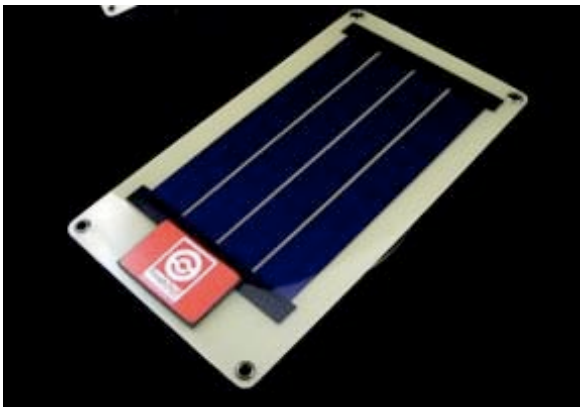
- One Eton FR500 solar crank radio
- One ZVue Elvis Presley limited edition MP3 player/recorder attached
- One Toughstuff solar panel[79]
- One Coral-200-Solar mobile phone by ZTE



Eton Fr500 radio



ZVue Elvis Presley MP3 player/recorder



Toughstuff solar panel



"Kasana" Coral-200-Solar phone by ZTE

[77] http://www.lifelineenergy.org/lifeplayer.html
[78] http://www.ompt.org/
[79] http://www.toughstuffonline.com/pages/toughstuff-solar-panel

Table 9: Package 6 equipment and cost analysis

Item	Price (USD)	Average lifespan	Cost per year	Cost per week
MP3 solar crank radio[80]	$85	4 years	$21.25	$0.41
Solar charger (phone)	$30	2 years	$16.60	$0.29
Basic Nokia handset (2330C) with handsfree/speaker	$90	2.5 years	$36	$0.69
Total			$73.85	$1.39

Identifying the radio agent:
In each community a process was undertaken to identify a suitable person who could be nominated as the radio agent. Communities recommended someone who was well known, lived in a central location, had technical ability in operating the equipment, and who generally had a good rapport in the community. Two-thirds of radio agents in the AFRRI project were women and were already actively involved in some type of community group.

Responsibilities of the radio agent:
The roles and responsibilities of the radio agents included the following:

- Keeping the radio and mobile phone safe
- Making the radio available for real-time listening when the farm radio program was on air
- Recording the radio programs when on air for playback later
- Keeping the phone charged and loaded with enough airtime to make calls to the radio station
- Maintain a logbook of activity from community members using the radio/phone services
- Liaising weekly with broadcasters from the radio station on progress

Training:
Each radio agent was brought to the local radio station for in-house training to operate the equipment. A manual was given to the radio agents to help them remember the technical procedures involved in recording the live broadcasts for playback later.



Radio Agents Apila Florence (Omalera village), John Omoding (Omugenya village) and Rose Alaso (Amototi village)

"Radio agents are a fantastic idea that evolved between communities and their radio stations. As the technology improves, the potential for the services they can provide is amazing."

Bartholomew Sullivan,
Regional ICT Officer,
Farm Radio International

[80] The Eton MP3 radio was a prototype and is no longer available – the price listed here is for a Lifeline Lifeplayer MP3 solar/crank radio

A closer look: Radio on demand

Radio agents and group marketing in Tanzania

Radio: Tanzania Broadcasting Corporation (TBC)
Agricultural topic: Forming groups for collective marketing
Communities: Munguwi Village, Mpwapwa formed three radio listening groups that used the radio agent.



Evelina Musa lives in Chamanda, in the Dodoma area of Tanzania. She is 46 and has 11 people in her household. Although the family has a radio in the house, her husband, who is a sunflower farmer, takes it to the field everyday to listen while he works. This is a common situation for many women who work in the home across Africa.

Evelina is interested in learning about processing the sunflower oil that comes from their crop. Unfortunately she has been too busy to hear the live broadcast from the TBC farm radio program for several weeks. Luckily, Evelina knows that there is a radio agent in her community.

After finishing her household duties, she goes out in the afternoon to collect water. On the way she makes a point of visiting Mama Imani, Chamanda's local radio agent. Trudging up the hill, burdened with bottles of water, Evelina is happy to see Mama Imani waiting in her small house on the outskirts of the village. After a friendly chat, it is down to business.

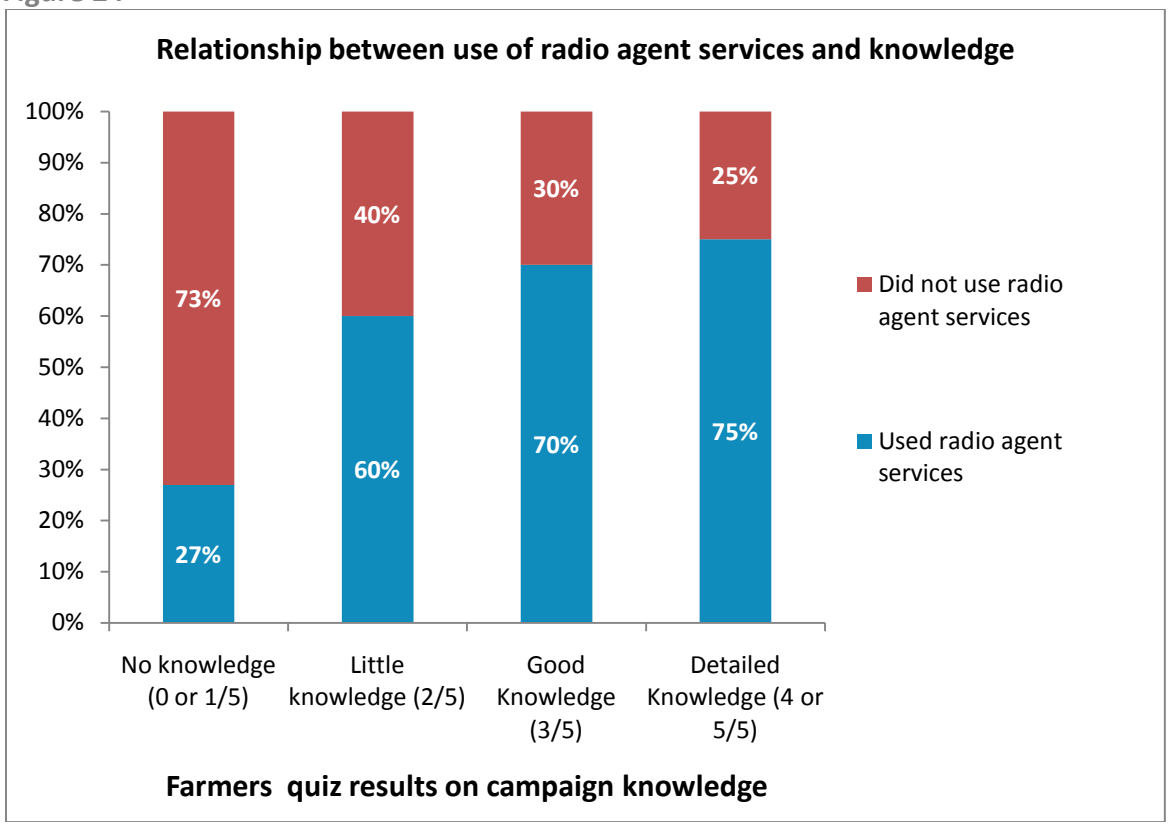
With a turn of a dial and a few button clicks by Mama Imani, Evelina is listening to the recorded broadcast from TBC on group marketing from two weeks back. The program discusses ways to process and market sunflower crops. Now, it doesn't matter that Evelina missed the live broadcast. It doesn't matter that her household duties made her too busy to attend the group listening last week either, because she knows that the programs are waiting for her at the radio agent's house.

This is truly *radio on demand.*

13.5 What AFRRI learned

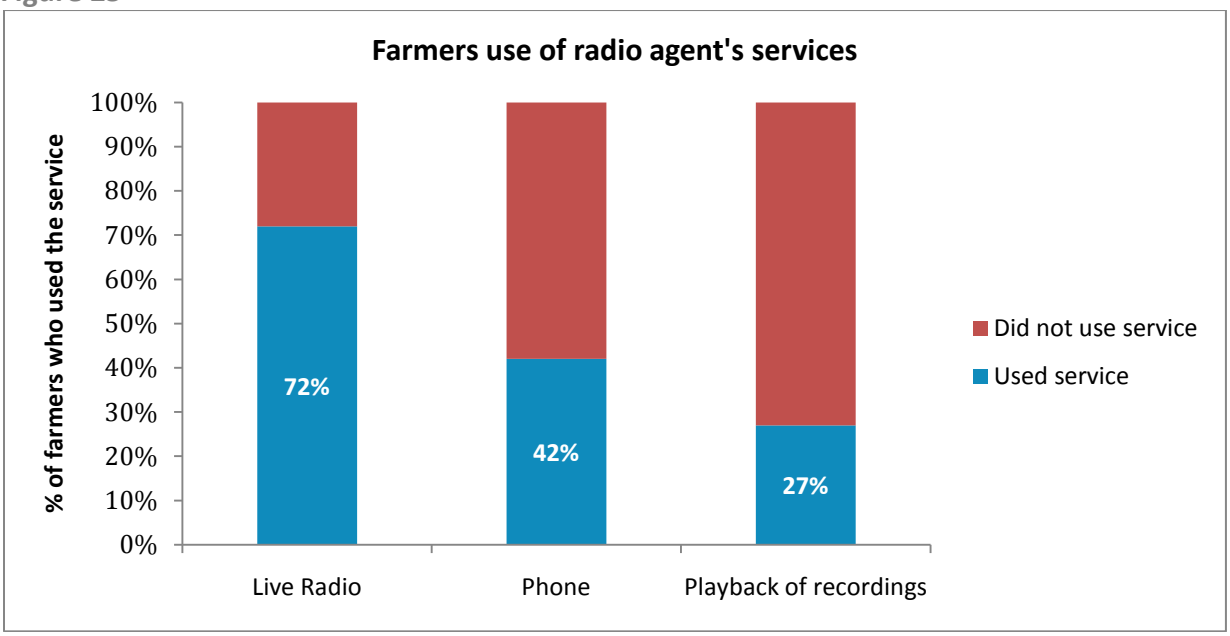
Knowledge: AFRRI surveyed 415 farmers, in eight listening communities that had radio agents, about their knowledge of the agricultural topic promoted in the radio campaign. Figure 24, below, shows that there is a relationship between the use of radio agent services and the degree of knowledge about the promoted agricultural improvement. The greater a farmer's knowledge about the topic, and the higher their score on the quiz, the more they likely it is they made use of a radio agent's services.

Figure 24



Services used: In the household survey, farmers were asked to select all the types of radio agent services they used: 72% of farmers used the radio agent services to listen live to the radio in a group listening format; 42% made use of a radio agent's phone or SMS; and 27% used the radio agent to listen to a previously recorded radio program.

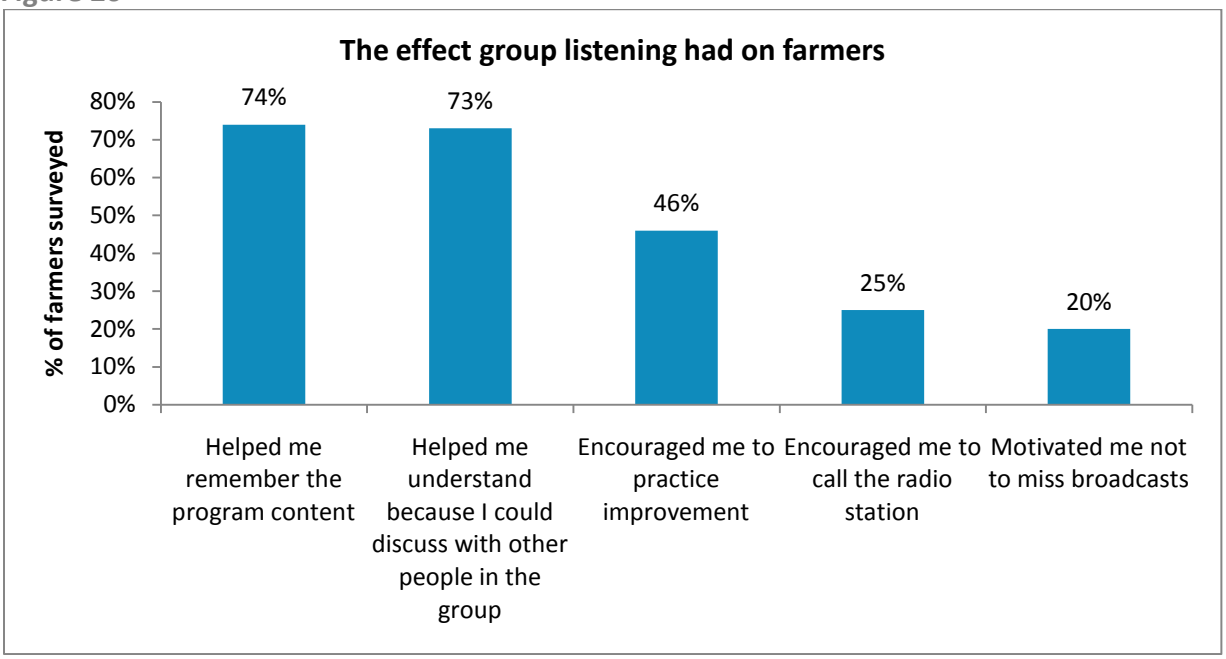
Figure 25



Note: Farmers used more than one type of service

Impact of group listening: AFRRI surveyed 200 farmers who said they listened to the radio in listening groups: 73% said it helped them to better understand the content because they could clarify and discuss the topic as a group; 46% stated that listening in a group encouraged them to start practicing the agricultural improvement promoted in the radio campaign.

Figure 26

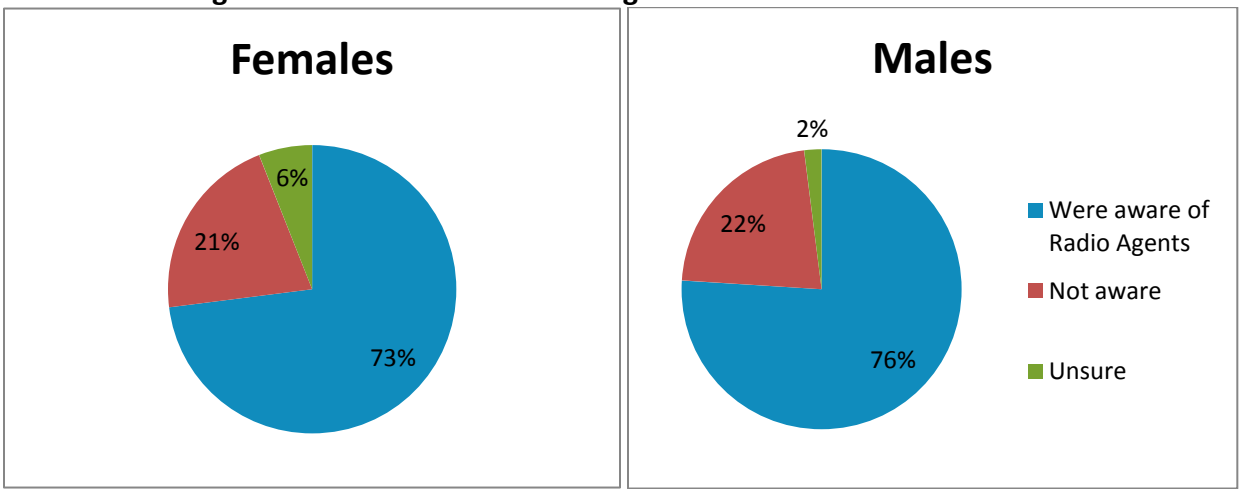


Agreements and protocol: There must be a well-documented and signed agreement between the radio agents and their radio station partner. Without this, equipment can go missing and parties can lose touch with one another. It is essential to have an agreed reporting and communication strategy between all parties.

Awareness: Overall, there was a high level of awareness about the radio agents and the services they offered in the ALCs: 73% of females and 76% of males were aware. This was in large part due to the high level of involvement with the communities through town meetings in selecting/nominating the radio agents and witnessing the presentation of equipment to the radio agents.

Figure 27

Percentage of listeners aware of radio agents in their local communities



Women's use of the services: Radio agent services were especially designed to increase listenership and participation of women in radio campaigns: 63% of men and 37% of women used the radio agent's services.



A radio listening group listens intently to the farm radio broadcast in Tanzania
Photo credit: Margaret Kingamkono

Training: Radio agents said they would benefit from more training in the use of the technology to achieve the technical tasks required of them. They found the instruction manual helpful, but needed more time to practice to get the procedures right. Recording the live broadcasts for playback was sometimes hindered because they had difficulty using the software on the MP3 recorder.

Recording live versus copying to a memory card: Recording radio broadcasts in real time and storing them for playback has the benefit of making the most recent broadcasts instantly available for playback. This does require, however, that the recording process runs smoothly. The alternative method for getting the recording onto the MP3 radio is bringing the radio or memory card to the radio station to have the station's technical staff copy the files to it. This requires the broadcasts to be properly archived at the station, and weekly trips to the station by the radio agent.

Youth helpers: In some cases, where the radio agents didn't feel totally comfortable using the MP3 radio, they would recruit a young person from the community to be the designated operator. This partnership seemed to bring some cohesion between the youth and adult listening groups in certain cases.

Solar and batteries: The number one issue raised by radio agents was the reliability and durability of the batteries in the MP3 radios. The MP3 player AFRRI used was grafted and wired into the radio so that the two devices shared one power source, but the battery drained quickly as a result. This led some radio

agents to disconnect the MP3 player completely, so the radio could be used on its own. On the Kasana solar phone, AFRRI discovered that people were not comfortable leaving a valuable asset, such as a phone, out in public to be charged by the sun. The strength of the solar panel was often not adequate to charge the phone beyond 20-30 minutes of call-time usage. This was frustrating for the radio agents.

Timing: In some cases the programs were aired at night, (note: solar doesn't work at this time so a reliable recharge system is essential), and this proved a problem for groups trying to gather and listen to the radio live, to participate. Women and men both reported feeling unsafe and uncomfortable traveling to a neighbour's house after 9pm. Although this broadcast time was chosen by the community prior to the experiment with radio agents who had been established by AFRRI, it resulted in low usage of radio agent's services while the broadcast was live-to-air.

Collection of log sheets: Unfortunately, collecting log sheets from the radio agents proved difficult, particularly with listening communities that were relatively distant from the radio station. Monitoring the type of activity and usage of the radio agent's services is important for improving the service. (Note: The new Lifeplayer Plus MP3 radio from Lifeline Energy has built in software for logging exact usage).

13.6 Conclusions and Recommendations

Increases knowledge: Farmers who make use of radio agent's services and participate in group listening demonstrate a higher level of knowledge about an agricultural campaign topic than those who do not. It is recommended that the radio agent be involved in the campaign process as much as possible. The agent should be provided with handouts/literature on the agricultural topics and contact details for extension/agricultural experts.

Agreements required: Agreements at the community level are important in identifying the most suitable candidates to act as radio agents, and the terms for using the services. Agreements between the radio agents and the radio station are essential. These agreements could include the reporting schedule, maintenance of a log sheet, an airtime/payment schedule and equipment ownership.

Find the right technology that works: It is essential to find a technology that works perfectly. It should be easy to operate, durable, loud enough to work for a group and, most importantly, have a reliable backup power source, (i.e.: solar-powered AND rechargeable batteries). Appropriate technology will help the radio agents provide their services and play their roles in the community. Until recently, this technology did not exist, and improvised mash-ups[81] were required. The introduction of the Lifeplayer Plus MP3 may provide the required solution and should be evaluated in a separate study.

[81] Mash-up is the act of combining various separate elements to create a new entity

14.0 Package 7:
Freedom Fone - Interactive Voice Response (IVR)



At A Glance…

Equipment:	Freedom Fone GSM gateway + computer
Annual Costs:	**1x** Desktop computer ($324) **1x** OfficeRoute GSM gateway modem w/ 4 SIM cards ($180) **1x** Mobigater GSM gateway w/ 1 SIM card ($25) **TOTAL: $529USD**
Cost per week:	**$10.15 USD**
Challenge:	Increase listenership and access to information "offline" for farmers, especially women, through mobile phone calls to IVR
Experiment:	Train radio broadcasters to design and maintain an IVR

Best Used For: Increasing access to valuable and frequently changing information such as market prices and weather forecasts, in addition to voicemail

> ***"The Freedom Fone system should be made available to all districts in the country and people should be taught how to use the service."***
>
> **Mottey Wisdom**
> **Farmers' Fone caller,**
> **Ghana**

14.1 What AFRRI wanted to learn

Can supporting a radio station to design, implement and maintain an Interactive Voice Response (IVR) service for its farm radio program increase listenership and interactivity with its listeners? AFRRI wanted to learn about an IVR service that provides program summaries, market prices, and voicemail services to listeners.

14.2 Background

IVR is a technology that allows humans to interact with computers through the use of the dial pad on their phones to access information. It is typically used by banks, government offices, large businesses, including mobile phone companies, to handle high call volumes and to provide callers with the information they need quickly. In phone calls to IVRs, callers are presented with a menu of options -- "Press 1 to listen to this menu in English" or "Piga 2 kwa Swahili," for example – from which point they can navigate the information they require. After they have obtained the information, the callers can end the phone call or continue to navigate more information.

In the past, IVR technology required expensive computer equipment, proprietary software, and reliable fixed phone infrastructure, making the system out of reach for most African radio stations. Due to the availability of open source software, however, Voice over Internet Protocol (VoIP) technology and affordable GSM gateway technology[82], IVR has become a realistic option for both radio stations and their listeners.

[82] GSM gateways are modems that can convert mobile phone calls into digital calls which can be processed by a computer.

14.3 The Challenge

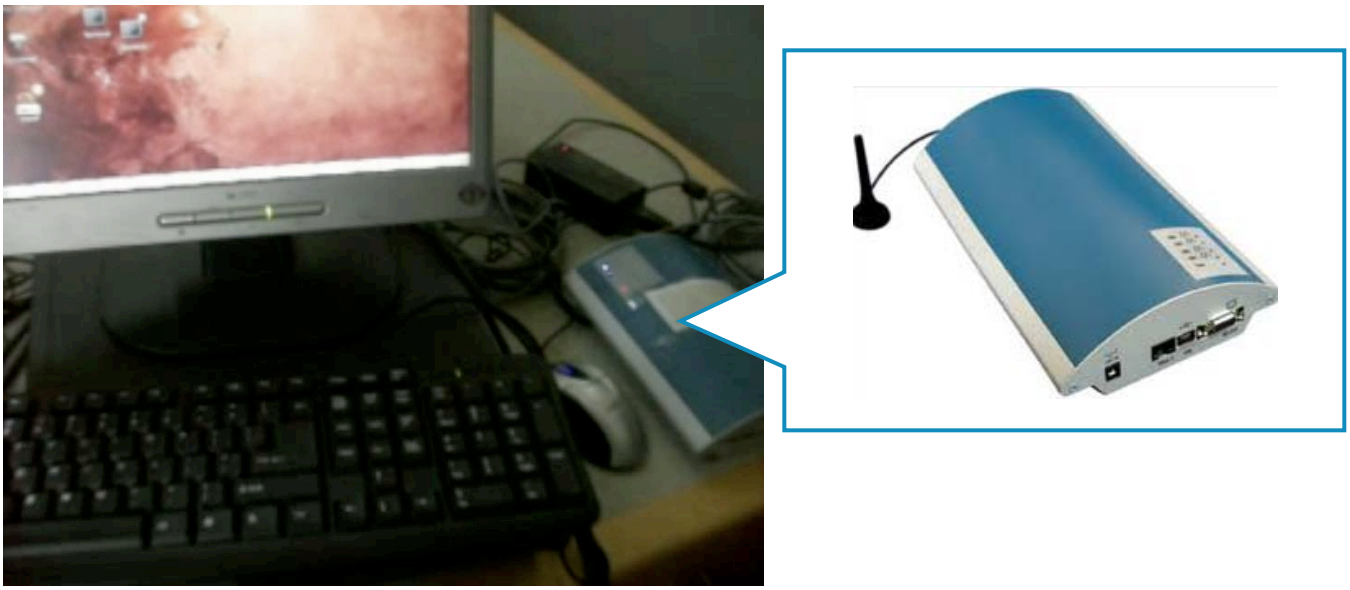
The challenges this package sought to address involved the following:

- **Make information available on demand:** Farmers want to listen to specific content on their phones on their own schedules. Frequently accessed information may include market prices, agricultural techniques, weather reports and other information that could be considered an essential part of a farm radio broadcast.
- **Make voice based services:** SMS is small and convenient for short bits of information but is not ideal for reaching those who can't read or those who have difficulty learning to use SMS on their mobile phones. Key information should be available in an audio format via a mobile phone call.
- **Increase interaction**: Farmers want the chance to have their voices and comments heard by broadcasters as well as by other listeners. In what ways can IVR open this communication channel between broadcaster and listeners?
- **Affordability for radio stations**: Radio stations operating on limited budgets need an IVR solution that can be acquired, maintained, and sustained at an affordable cost.
- **Affordability for callers:** Farmers who have cell phones need an affordable model for calling and accessing the information on the radio station's IVR system. This involves both leveraging existing discount tariffs on mobile networks[83], as well as making the information concise and condensed, to make call times as short as possible.
- **Make it work with existing technology**: An IVR system should be designed to work perfectly with mobile phones and the networks most commonly used by farmers.
- **Should not rely on internet:** Many new innovative IVR systems such as CallFire and Voxeo exist "in the cloud." This means no hardware or software is needed to design and maintain the IVR – only a reliable internet connection is required. However, the case at most partner radio stations is that internet is often unreliable and expensive. Although cloud based IVRs hold great promise in the future, the current reality is that most radio stations do not have adequate reliable internet for this yet and must seek a non-internet dependent solution.

14.4 The Experiment

After some research into an appropriate technology that could address some of the challenges above, AFRRI began to explore which IVR technology would best work for our radio partners' needs. AFRRI connected with an organization called Kubatana Trust based in Zimbabwe. Kubatana hired a software development company to design an open source IVR system to help make local news available by phone in Zimbabwe, sidestepping the notoriously restrictive state-controlled media laws. Through close partnership between Kubatana and FRI, an agreement was reached to use the Freedom Fone system in Tanzania and Ghana to enhance the PRCs by making relevant information available to farmers off air.

[83] Many mobile phone networks offer discounted tariffs based on calling "special numbers" (friends/family), calling within the same network, or paying a daily flat fee for unlimited calls.



Freedom Fone equipment and costs:
The following setups were purchased and installed at two radio stations: Radio Maria in Tanzania and Volta Star in Ghana.

Table 10: Package 7 equipment and cost analysis

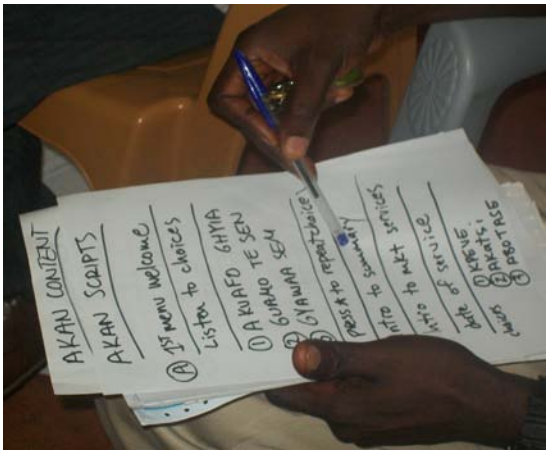
Item	Price (USD)	Average estimated lifespan	Cost per year	Cost per show
Desktop computer system with UPS to run FF Server	$900	3 years[84]	$300	$5.75
- Service & Parts (8%)	$72	3 years	$24	$0.46
2N OfficeRoute – GSM gateway (4 SIM cards)	$900	5 years	$180	$3.46
Mobigater Pro – GSM Gateway (1 SIM card)	$75	3 years	$25	$0.48
Total	$1947.00		$529	$10.15

[84] On-air and production computers at radio stations are typically under heavy use and experience power surges, dust and other environmental factors. Therefore three years is a conservative average lifespan but could be longer.

A closer look: Freedom Fone in Ghana and Tanzania

1. Designing the Farmers' Fone service at Volta Star Radio

Volta Star wanted to offer voice-based services to support its smallholder farm radio listeners throughout a four-month radio campaign on organic fertilizers. On a radio program broadcast in two languages, EAFRRI and Akan, farmers from all over the Volta region in eastern Ghana were encouraged to make use of organic fertilizers, like manure, on their crops. The broadcasts featured regular updates about major commodity prices from regional market centres. The farm radio team at Volta Star, including broadcasters, extension agents, and farmers, put their heads together to decide what types of voice-based services would be most useful for their farmers. The "Farmers' Fone" was created and featured the following three services in two languages:



1. A five minute summary of the previous week's farm radio broadcast.
2. Up-to-date commodity prices from five regional markets.
3. Voicemail functionality to allow listeners to leave feedback for the radio station.

2. Designing the Kuku hotline service at Radio Maria



Radio Maria's transmitters cover up to 50% of Tanzania and its population of almost 45 million people[85]. With such a huge potential listener base, anytime the phone lines are opened for call-ins on air, the phones ring off the hook. Based on this demand by listeners to interact with the station through mobile phones, the farm radio wondered "How can we use this trend to gather more stories from our farmers and find out about their experiences on the campaign topic of improved local chicken management?" The solution that evolved was called the "Kuku Hotline", an IVR to host a competition: Farmers had to submit their best stories via voicemail messages. Through a series of 30-second radio spots throughout the day, including regular announcements of the hotline number, farmers were encouraged to call the hotline, and leave a message with their names, locations and their stories about how they've used the agricultural improvement in under 60 seconds. The top 20 stories, as rated by the broadcasters, received a t-shirt, and got to hear their stories featured on air repeatedly. A future version will open the voting up to listeners via SMS polling.

"I am very happy to be one of the winners for shindano la HekaHeka Vijijini. That's gave me courage and confidence as a small-scale farmer. I will be participating in any other competition because I now know I can."
- Mama Mkoba, chicken farmer and Radio Maria listener in Wami Sokoine Village.

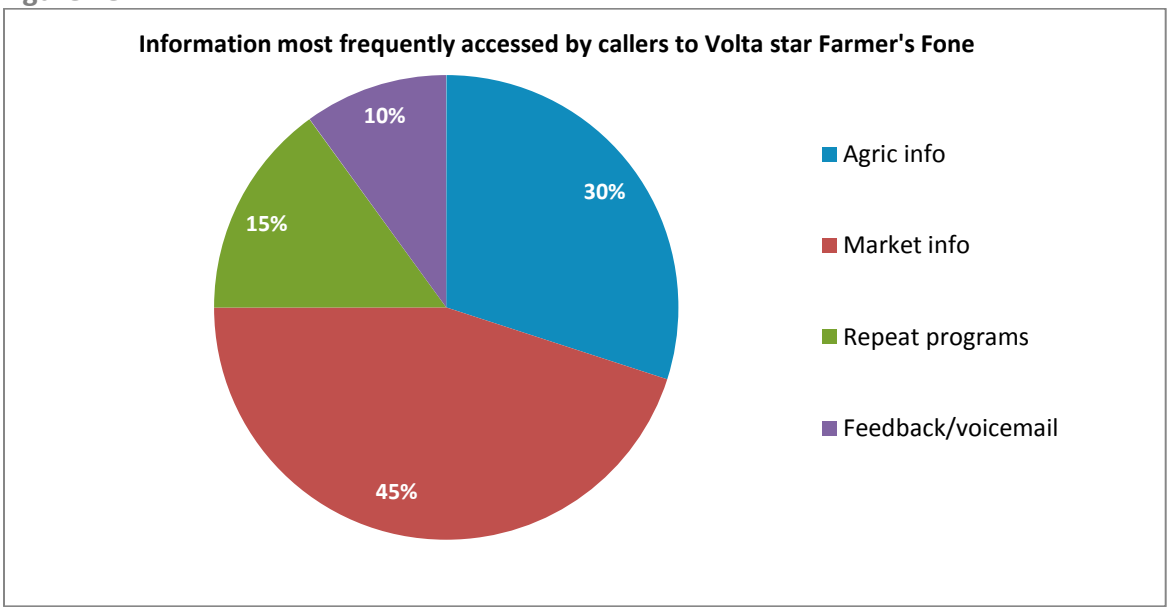
"Freedom Fone helped boost the awareness on the radio that there was campaign happening! People wanted to give their stories and participate only they hadn't been given the opportunity to contribute their stories before – the Kuku Hotline really invites and entices them!"- Margaret Kingamkono, AFRRI NRC Tanzania.

[85] 2011 World Bank, World Development indicators. Taken from http://data.worldbank.org/country/tanzania

14.5 What AFRRI learned

Farmers give priority to succinct, useful information: Farmers' Fone at Volta Star was originally designed to feature a five minute edited summary taken from the full 60-minute weekly radio broadcast. This was not the most commonly used feature, however. Interviews with Farmers' Fone users, and call data records (CDR) found that 45% used Farmers' Fone to access market information and prices; 30% listened to agricultural tips prepared by extension agents; and only 15% listened to summaries of repeat programs regularly. A further 10% said voicemail messages were their most commonly used feature.

Figure 28



Farmers will spend their money/airtime if information is valuable: Based on the surveys with Kuku Hotline IVR callers, none of the male farmers (0%) indicated that the cost of calls was a barrier to using the hotline. In Ghana, at Volta Star, IVR software statistics about the time and length of calls verified what farmers also explained: By being conscious of calling times at night, when call costs are lowest (MTN and other networks have discount calling rate "zones"), and choosing to call the IVR number that is "within network"[86], it was possible to keep call costs to a minimum.

Farmers demand up–to-date information: Over the four-month period when the Farmers' Fone was running at Volta Star, a total of 4503 calls were made to the system. Of these, only 752 calls were over 60 seconds long, (presumed to be callers listening to the pre-recorded information).[87] Yet 1491 calls were much shorter; people presumably checking if the information on the IVR had been updated since their last call. If too many days passed and the information had not been updated, callers would leave

[86] The most affordable call rates are typically offered when a caller calls someone who uses the same mobile network. It was possible for anyone on any network to call the IVRs however, the radio stations made a variety of numbers available from different networks so the callers could choose the most cost efficient number to call.
[87] Calls over 60 seconds were assumed to be someone using the system for their information needs (show repeats or market prices)

voicemail messages demanding that the broadcasters -- in the concise words of one caller -- “Please keep it up-to-date, thank you.”

Farmers spend on average 120 seconds listening to IVR: For those who made regular use of the pre-recorded information on Volta Star Farmers’ Fone , the average length of their call was approximately two minutes (120 seconds). This was the time it took to navigate through the system and listen to the information needed and hang up.

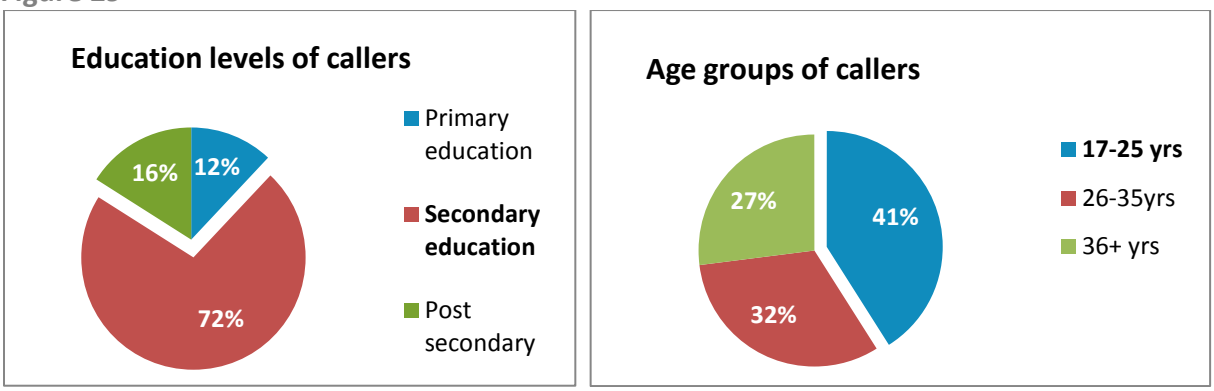
***Farmers want response to their feedback*:** During the campaign at Volta Star, the Farmers’ Fone IVR recorded a total of 237 voicemail messages left by farmers for the broadcasters. Some of these messages were followed up with broadcasters and extension agents addressing concerns on air. When interviewed later, farmers requested that all their questions be answered, to encourage and motivate them in the future.

Farmers send SMS and expect responses: The Kuku Hotline IVR on Radio Maria received almost 300 SMS messages from farmers, even though it was never advertised as a service that could receive SMS. The nature of the messages included requests for agricultural information, encouragement to the broadcasters and greetings, (“Salamus”).

The IVR technology is confusing for many farmers: Many of the Farmers’ Fone callers would hang up in the first 15 seconds of their call, not able to answer the first set of instructions in their local languages: “Press 1 to listen to repeat radio programs; press 2 for market prices; or press 3 to leave a voicemail message”. After five seconds of inactivity the call would hang up. In follow-up interviews it was discovered that many of these one-time callers didn’t understand how to use the system and had never tried again.

Education level is a significant factor determining who uses the IVR: Eighty-eight per cent of regular users of the Farmers Fone IVR system had a minimum secondary school education. This trend might be related to the higher technical ability of those who went to secondary school. But it is very possible that factors such as income level, mobile phone ownership and access to resources of those with only a primary school education are equally determinant factors.

Figure 29



Young people learn to use the system: Of a cross-section of callers to the Farmers' Fone at Volta Star, 41% of the regular callers to the system were between the ages of 17-25-years-old. One reason for this trend may be their ability to quickly learn how to use the IVR menu.

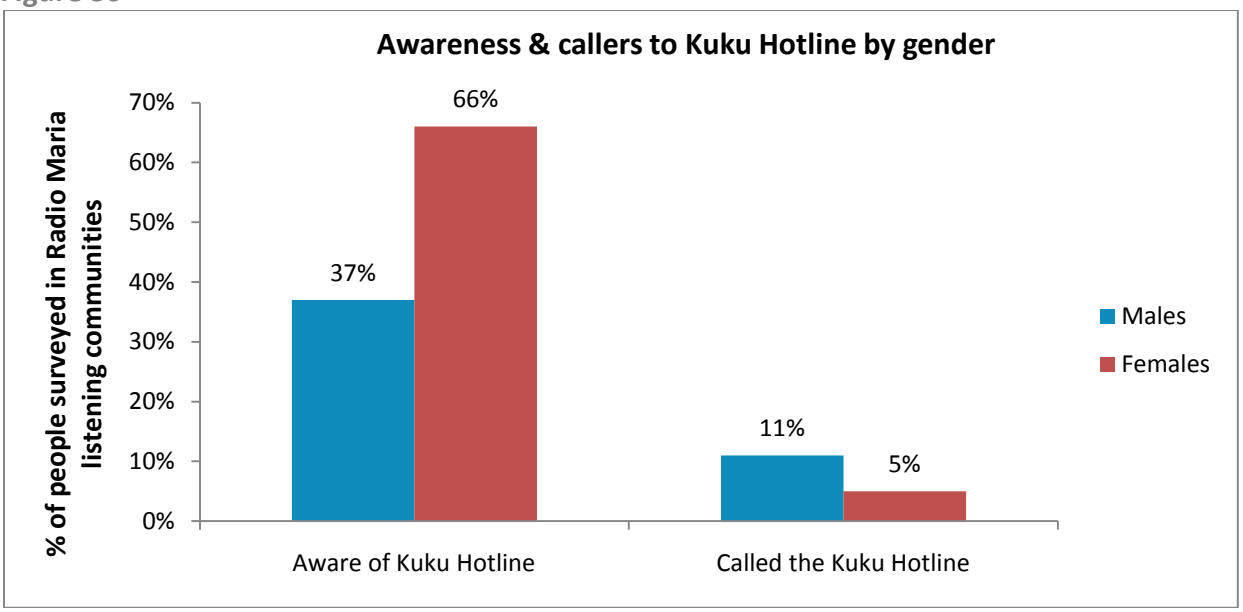
IVR- for-women can work: The Kuku Hotline was especially designed to attract female farmers to the IVR system and tell their stories. To do this, broadcasters produced radio spots featuring examples of women calling in with their stories, and played the spots during times of day they believed women might be listening at home. Although call statistics on gender were not gathered, AFRRI found that in surveyed communities, women's awareness of the hotline service was 30% higher than men's. Women were only half as likely as men to actually call the number, however.

Listen to an example of a radio spot announcing the Kuku hotline and how a caller can participate in the competition. The top 20 stories describing how they applied their knowledge heard on air about raising local chickens, will win a t-shirt.

http://bit.ly/farmradiokuku1



Figure 30



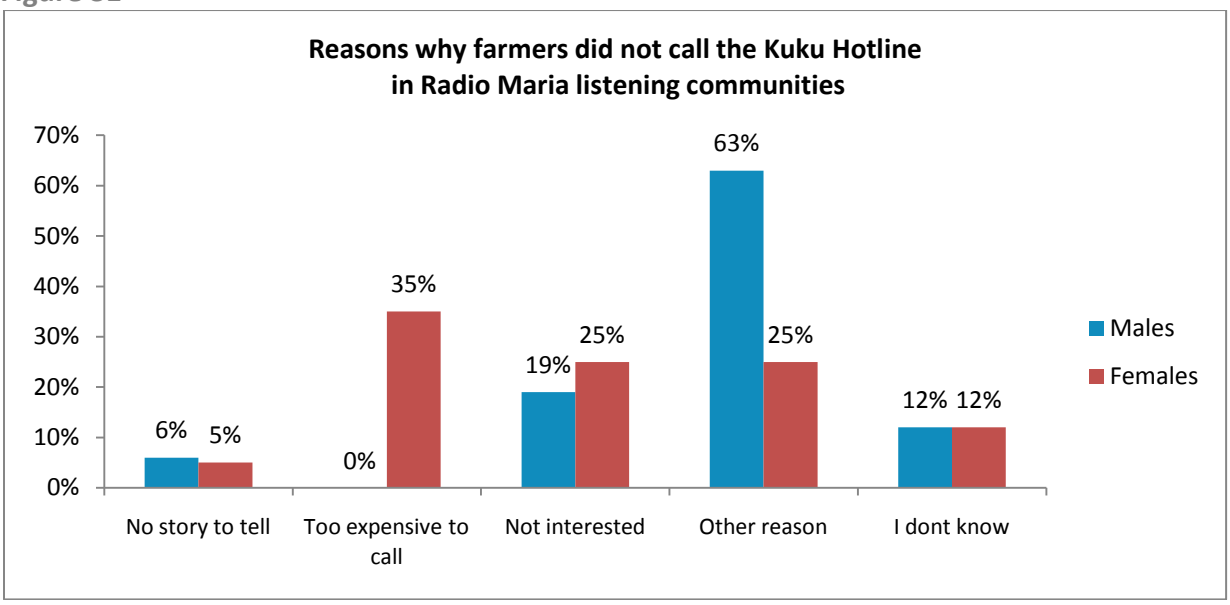
Women callers are limited by finances: Although the Kuku Hotline IVR and competition was designed especially to encourage women farmers to call, women were limited in their ability to call, largely for financial reasons: 35% of women stated "too expensive to call" as the primary reason they didn't call the service, whereas none of the men surveyed identified finances as a limitation. It is important to note that, although women may have the airtime, the phone, and the know how to call, they may not have the power within the family to decide how the airtime/money is spent.

Listen to two winners of the Kuku hotline farmer's stories competition.



http://bit.ly/farmradiokuku2

Figure 31



"The Freedom Fone offered listeners the opportunity to leave their comments and questions at their free will – even when the program had already ended."

Anane Gbadago,
Farm radio presenter,
Volta Star Radio, Ghana

14.6 Conclusion and Recommendations

Keep the data up to date: Farmers will call repeatedly to check for updated information, (several times a week, in some cases). If you make a promise about how frequently the information on the IVR will be updated, stick to this plan. It is recommended to hire someone or provide resources to broadcasters to ensure that the information is up to date and relevant.

Keep data succinct, useful and quickly available: Because callers are typically using their money/airtime to call the service it is important they get the information they are looking for easily, so they can get off the phone quickly. It is recommended that information be no longer than 120 seconds, the average length of call for regular users.

Follow up on voicemail and SMS: If farmers take the time to leave comments and make requests, find a way to acknowledge or respond to them in the best way possible. It is recommended to have some airtime and human resources set aside weekly to attend to these requests.

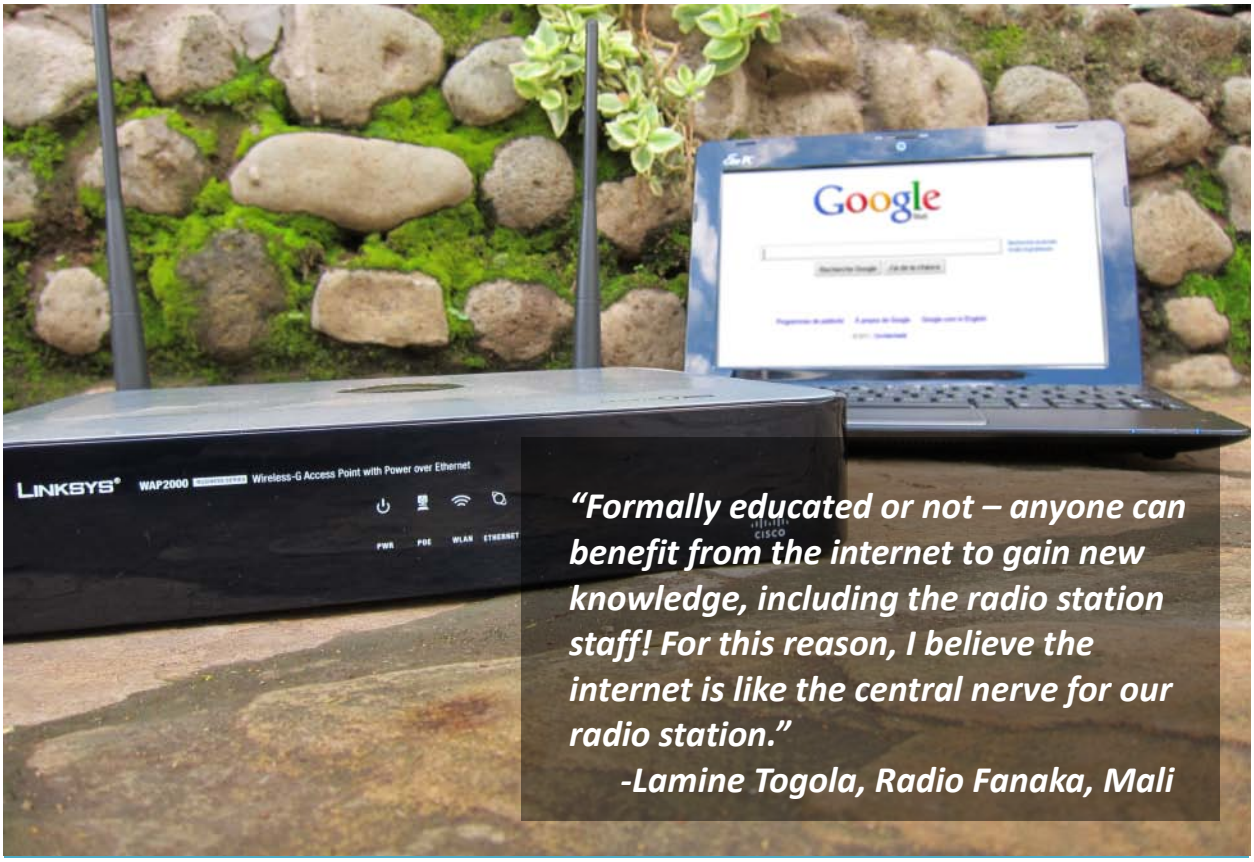
Make it easy to use: Most farmers are new to the idea of IVR, so it's important to keep it simple from the start. It is recommended to have "demonstration broadcasts" on radio, where broadcasters actually call the number live on the radio for the benefit of farmers who are listening so they can learn how to do it themselves.

Don't make assumptions about education levels: Although the majority of callers to IVR have reached secondary-level education, it is recommended to design menus and services to accommodate those with the lowest levels of formal education, including the illiterate.

Design IVRs with women in mind: There are some features of an IVR that attract women callers such as the chance to leave messages and up-to-date market prices. It's more challenging, however, for women to call, due to a lack of airtime on their phones. It is recommended that an IVR system for women also consider discount rates or a potential "call back service" in which women callers will be called by the IVR and the charges reversed.

Make IVRs available on most commonly-used mobile networks: Farmers will spend money/airtime to call an IVR that has valuable information, especially when the call cost is as low as possible. It is recommended to find out which mobile network most farmers in the region are using and choose these networks as the public phone numbers for the IVR modems.

15.0 Package 8:
VSAT and wireless internet service provider (WISP) model



At A Glance…

Equipment:	VSAT Internet and wireless access points
Annual Costs for Radio station	**1x** VSAT internet packages (modem, dish + LNB) (free w/ subscription) **1x** Monthly internet subscription package ($250 x 12 = $3000) **1x** Wireless router with Quality of Service (QoS) ($30) **1x** Wireless access points (AP) ($20) + UPS backup ($33)
	TOTAL: $3083
Challenge:	Increase internet connectivity for radio station and other community organizations
Experiment:	Use a VSAT satellite internet and Wireless APs to create a WISP business model at a radio station

Best Used For: Connecting rural radio stations to the internet in areas where no reliable internet is available.

> ***"Grâce au VSAT, la radio Fanaka a reçu de nouveaux partenariat avec PANOS et l'UNICEF. Ainsi, elle reçoit les programmes des autres radios qu'elle envoie au bureau central de Bamako/ Thanks to the VSAT, Radio Fanaka has forged new partnerships with PANOS and UNICEF. Also, the station receives radio programs from other stations and sends them to the central office in Bamako."***
>
> **Oumou Coulibaly,**
> **Director Radio Fanaka, Mali**

15.1 What AFRRI wanted to learn

Can equipping a radio station with a VSAT internet connection and a series of Wi-Fi access points enable a radio station to run a small business as a wireless internet service provider (WISP) in the local community? Related to this question, AFRRI specifically wanted to learn the following:

1. Can broadcasters increase the quality of their programs by conducting research online at the station?
2. Can an internet connection and access to online audio content enable new partnerships to be formed between the radio station and local NGOs?
3. Can clients in the surrounding community gain internet access through Wi-Fi connections as well as a cybercafé at the radio station?
4. Can a radio station generate modest revenue, above covering costs, by charging clients a monthly connection fee for internet usage, if their business acumen is developed enough?

15.2 Background

Internet connections, or lack thereof, have been one of the most persistent challenges to the capacities of radio stations across AFRRI's network in Africa. With a stable and relatively fast internet connection, many things are possible that can enhance the overall capacity of radio stations:

- Participation in online broadcaster training and scriptwriting courses
- Sharing of audio, scripts and stories with other broadcasters
- Use of Skype and other VoIP clients to reduce cost of phone calls for interviews/correspondence
- Conducting online research for radio programs and campaigns
- Downloading audio content to be used in broadcasts
- Creating new partnerships/contracts with in-country NGOs that require a radio station to have reliable internet for downloading audio content
- Emailing log sheets and electronic forms crucial for correspondence with the central AFRRI office
- Use of SMS gateways like Clickatell to receive and send SMS using a computer
- Keeping anti-virus and other crucial software up to date

According to Ndiaye M et al (2008), internet connectivity was rated as the most highly sought-after resource, yet also the scarcest for the majority radio stations. This trend corresponds with the findings from surveys with AFRRI's own radio partners, of whom 64% identified internet connectivity as the most

important ICT resource lacking at radio stations; one which, if improved upon, could dramatically enhance their work.

Radio station as information provider: The radio station's role within the community, especially smaller community radio stations, is ideally one of information and news provider. In some cases the community radio can also be a focal point for organizing action and groups within the community. As such, the evolution of the community radio station to become a provider of internet service/access is a natural extension of this role within the community; providing internet access to individuals in the form of a cybercafé at the radio station itself, or providing internet via Wi-Fi to surrounding organizations for their own internal networks.

15.3 The Challenge

Internet connectivity in general:
The benefits of reliable internet access at the radio station present many opportunities for increasing the capacity of a radio station. Below are some of the most significant challenges radio stations and others in the vicinity face in obtaining and maintaining reliable and fast internet service.

- **Distance from Internet providers:** Today in most African countries, the mobile phone operators provide internet service in addition to mobile phone service. This "mobile broadband" or 3G internet service is typically available in urban centres but unavailable in rural settings where many of AFRRI's partner radio stations are located[88].
- **Low connection speed:** Sometimes the activities of radio stations -- accessing audio content, conducting Skype calls, or downloading software, for example -- are impossible if the connection speed is not adequate[89].
- **Cost management**: If available, internet connectivity can be prohibitively expensive for radio stations that are operating on a tight budget. Prices for mobile broadband internet can range from $20USD per 1GB of data (Mali) to as low as $10USD (Tanzania); however, the challenge is not simply the cost, but managing who uses the internet at the station and who absorbs the cost.
- **Disappearing credit:** Mobile broadband internet subscriptions are based on a "pay as you go" model in which the data allocated to your account decreases as used until empty, at which point the client needs to recharge with another "bundle". When a computer is connected to the internet, the default behavior is to automatically download updates in the background, sometimes in excess of 450MB; most operating systems, like Windows, are designed as though internet bandwidth is available in unlimited and fast abundance. To an unknowing internet user, this quickly depleted internet bandwidth seems unfair and expensive; what is needed is knowledge and transparency around *how* the internet bandwidth is being used.
- **Bandwidth management:** In an environment where multiple people are sharing internet use, the management of how much and when data is consumed is essential. Bandwidth-heavy applications, such as streaming video (YouTube), downloading music, videos, or software (BitTorrents), and software updates not only slow down internet speeds for others on the same network, but also but also use up the allocation of prepaid data transmission. Software can aid in limiting speeds and data consumption per user, to help share and manage the internet bandwidth so it will last longer.

[88] This challenge is widely known as the "last mile" problem
[89] GPRS and Edge are examples of mobile data services that are typically not fast enough for a radio station's needs

- **Unreliable and weak connections:** Internet connections can "go down" just like mobile phone connections, based on a weak network signal or interruptions to the mobile infrastructure.
- **Viruses:** One way viruses are propagated is via the internet. A computer infected with viruses can effectively become crippled, as well as spread to other computers on the network, and preventing future access to the internet.
- **Lack of training:** Internet and digital literacy is a learned skill which requires practice and learning through trial and error. Some broadcasters find it a challenge to learn the basics of email, web search, and basic use of web browsers.

Figure 32: The cost of accessing the internet in Maswa, Tanzania



This route is one traveled by many radio broadcasters at Sibuka FM in Maswa, Tanzania and broadcasters from many stations travel similar distance to access the internet. The inconvenience of internet access at many stations takes a major toll. Transportation costs and the cost associated with being away from the station can significantly lower the efficiency of a rural radio station.

VSAT and creating a WISP challenges:

In addition to the above challenges related to accessing the internet, in general, the following is a list of challenges related to setting up the VSAT WISP.

- **Technical expertise:** Trained technicians who have a basic understanding of wireless networking are required. It takes time to identify these technicians, especially in a rural setting, and to train them to maintain the network, and provide service to clients.
- **Equipment:** Setting up a wireless network requires purchasing wireless access points such as the Engenius 2610. These devices are not easily purchased in African counties and are considered a specialty item. It can be a challenge to pay for such devices overseas and have them shipped.

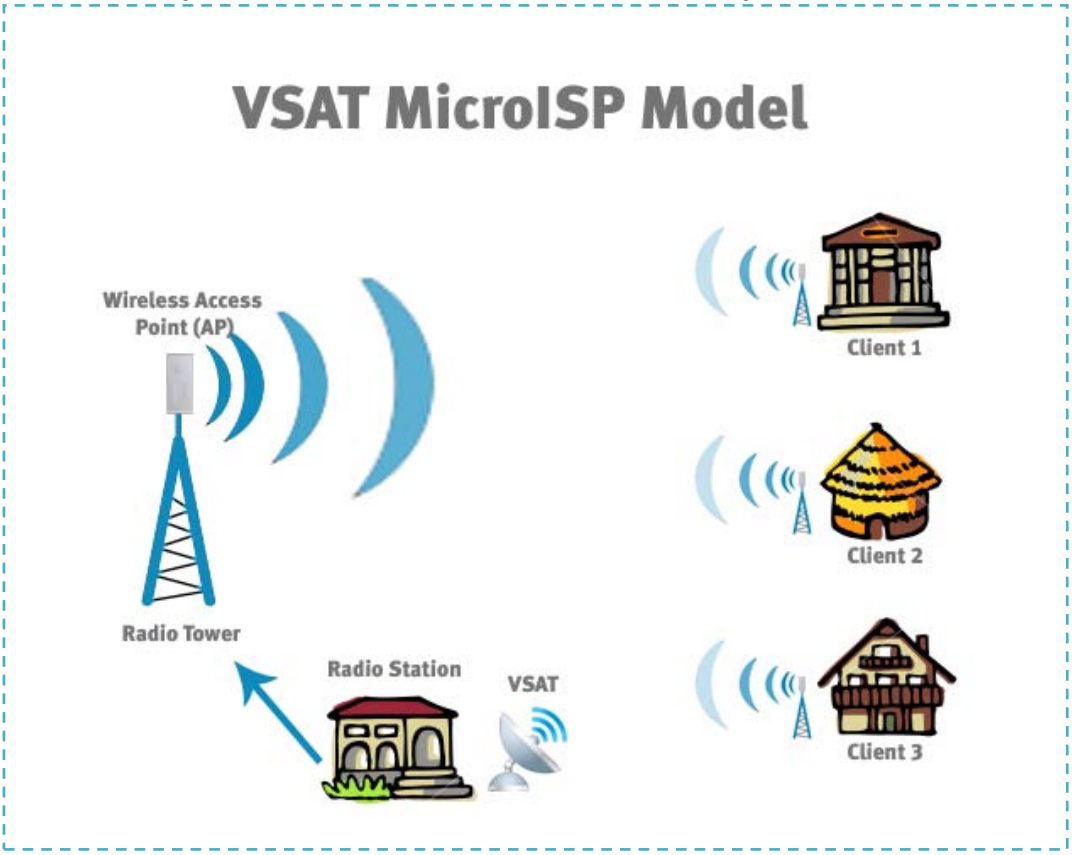
- **Customer management:** Clients don't always pay, even if they have a contract, so it is essential to come up with a manageable contract to maximize regular payments. You don't want to lose the Wi-Fi access points to non-paying customers.

15.4 The Experiment

Station selection criteria:
Two radio stations, Sibuka FM in Tanzania and Radio Fanaka in Mali, met the following criteria to be chosen to participate in this ICT package.

- **Technical capacity:** The station had to have technical staff with some knowledge about networking in general and wireless networking in specific. If an issue came up with the radio station's clients, they had to be able to respond and provide technical support
- **Last mile:** The station had to be in an area where virtually no alternative reliable internet service was available. Because satellite internet is an expensive option relative to other services such as ADSL and mobile broadband (3G) - the VSAT was intended to help with last mile connectivity at the station, and also for the station's clients in the surrounding community.
- **Clients in the area:** There had to be at least three clients within a 5km radius willing to sign a contract to regularly pay to receive reliable internet service from the station, shared through a wireless access point. These clients would work out a payment plan agreeable to all parties.
- **Business plan:** The station had to draw up a business plan to sustain the VSAT with surrounding clients, including a list of monthly charges and prospective clients whom had already stated interest in the service.
- **Accounts department:** The station had to have some capacity and experience managing accounts with a client base. The business model requires that clients paying for internet require staff at the radio station to manage their accounts: Contracts drawn up and agreed upon; invoices delivered and received; and technical support for clients are a few of the most important areas the station had to provide for the business model to work
- **25% cost-sharing with Farm Radio International, 100% ownership:** The station had to agree to pay 25% of the costs, including the equipment costs and the first three months of internet subscription from the supplier. After this point, the station would own the equipment 100% and take all responsibility for paying the monthly internet subscription charges.

Figure 33: An example of how the VSAT + WISP model is set up with clients



Cybercafé at the radio station:
One additional source of income and service provided for visiting community members was a small cybercafé with one or two desktop PCs connected to the internet. Radio Fanaka was already a community hub prior to the ICT package introduction – the station attracted many visitors throughout the day coming to visit broadcasters in person and greet radio station staff. Approximately six people per day now come to use the internet at the cybercafé, for an average of 30 minutes, at a cost of 500F (1USD) per visit.



Cybercafe at Radio Fanaka in Mali.
Browse the 'net for one hour for 2USD.
Photo Credit: Bart Sullivan

A closer look: Adama Cissoko

From mason supplier to mobile phone unlocker, Fana's first Wi-Fi customer

Adama Sissoko (left), is a young entrepreneur who became Radio Fana's first Wi-Fi internet client. Before Adama had internet at his shop, his services were limited to mobile phone repairs and accessory sales. With internet at his shop, he is able to provide a new range of specialized services to his customers: Adama unlocks/flashes mobile phones that have arrived into the markets in Mali from other countries, but are unusable because they are locked to a mobile network. The internet connection also allows him to update phone software, conduct business in France via Skype, download popular mp3 songs, and copy them onto his customer's phones - for a fee.



Equipment and costs:

The equipment for the WISP package at the radio stations can be organized into three different areas: A) VSAT satellite equipment for establishing the internet connection at the radio station; B) Radio station wireless equipment used to share the internet connection with clients, and C) Client-side wireless equipment installed at the client's office or home to establish an internet connection to the radio station. The details of these equipment categories are found in appendix A. Below are the cost metrics.

Table 11: Package 8 equipment and cost analysis

Item	Price (usd)	Average lifespan	Cost per year	Cost per week
A) VSAT equipment & subscription				
Hughes Hx50 modem	Free			
KU Band LNB	Free			
1.2metre VSAT dish	Free			
Monthly subscription[90]	$250		$3000	$58
B) Radio station wireless equipment				
Engenius 2611 Wireless access point	$100	5 years	$20	$0.38
Quality of Service (QoS) enabled router	$150	5 years	$30	$0.58
UPS power backup	$100	3 years	$33	$0.64
Total			$83	$1.60
C) Client side wireless equipment (cost per client)				
Engenius 2611 Wireless access point	$100	5 years	$20	$0.38
D) Radio station cybercafé (Optional)				
2 Desktop computers for a cybercafé (with UPS)[91]	$1800	3 years	$600	$11.50
Service & Parts (8%)	$144	3 years	$48	$0.92
Total	$2044		$668	$12.80

[90] A variety of internet monthly packages are available depending on upload/download speeds needed. This package allowed approximately 10 computers to share the connection with decent enough speed on each computer to do browsing and some downloading

[91] This is the price for new computers; in some cases, with a cybercafé model, you can use second hand computers to keep prices lower

Training:

Setting up and maintaining a wireless network using outdoor access points requires a specific set of skills including a good deal of experience administering networks. It was not immediately possible to find technically trained IT support in rural areas in Mali or Tanzania who could operate the equipment and train the technical staff at the radio stations. The regional ICT officer worked on site with staff, doing VSAT installation, wireless network setup and installation at client offices for approximately six days per country. In this time, staff were able to understand the technology enough to setup access points for clients but not to go into detailed network troubleshooting.



A look from above – The technical team at Sibuka FM in Tanzania had to climb the radio tower to install the VSAT high enough for a good line of sight link to the satellite

Photo Credit: Bart Sullivan

> ***"The VSAT was very important for us. We had no good internet before and then with the VSAT we could research our programs, send and receive emails/documents to the AFRRI office in Dar es Salaam 20 hours away."***
>
> **Ester Vicent,**
> **Broadcaster**
> **Sibuka FM, Tanzania**

15.5 What AFRRI learned

This ICT package was setup for two main reasons: First, AFRRI wanted to provide internet access to partner radio stations that were beyond the reach of conventional internet services because of their rural location; second, it was a means of exploring a business/cost-sharing model that could secure internet connectivity at a radio station for that could cover all costs or even generate a small profit. The assessment of the success of this ICT package is largely based on testimonials observed by stakeholders.

Business model: Radio stations can turn their VSAT connections into a sustainable business model that works for all stakeholders, not only to cover the costs of the monthly charges, but also to earn a small profit. Radio Fanaka in Mali charges numerous clients approximately $80USD per month[92], (if paid annually), for a Wi-Fi connection at their office/home/school. Fanaka's customers include a local high school that needed internet for its IT labs, a business that uses the internet for unlocking mobile phones[93], and the local District Councilor's office. These charges have covered all of Radio Fanaka's monthly VSAT internet-related costs, and the (small) salary of a technician.

Customer Management: To convert a VSAT connection at a radio station into a small cost-sharing enterprise, the radio station management team must be committed to extending its role to provide customer services and management with clients in the community. After Sibuka FM in Tanzania had successfully installed the VSAT, a number of Wi-Fi access points were ready to be deployed to clients. Unfortunately the station management failed to secure enough contracts with clients in the local community. As a result, the station was not able to make the monthly payments to the VSAT company, and consequently, the internet service was terminated.

Clients: Radio Fanaka has certain clients who pay month-to-month; the station has requested a simple web control panel that allows the station to "turn off" the connection of any client if payment has not been received after a certain amount of time. This is important because the wireless access point equipment is relatively expensive and in short supply compared with demand. It is in the radio station's interest to help customers make regular payments. Bandwidth monitoring and control for individual clients would also help with customer management at the station.

Reliability: Although VSAT helps provide an internet connection to AFRRI's partner stations in remote locations, the signal, itself, can be unstable; with internet outages three or four times per day for up to

[92] This is a high price for individuals but for many schools, NGOs and hospitals it is within their budget
[93] See section 15.5, A closer look: Adama Cissoko From mason supplier to mobile phone unlocker, Fana's first Wi-Fi customer

an hour each time. This is mostly because the VSAT is beaming connections back and forth to satellites; weather conditions, excessive wind, and other environmental disturbances contribute to the unstable connection. This can negatively impact the service at the station, and disrupt the internet service to paying clients.

Station evolution: With a stable internet connection, a radio station is able to perform tasks that are vital to the growth and evolution of the station: Broadcasters can conduct better research for their radio programs; news shows can find the latest international news and include local news/blogs for reporting live; staff can participate in online trainings; and the internet can even attract new partners to work with the radio station.

Technology: As wireless technology advances, the purchase, setup and maintenance of Wi-Fi access points used to distribute the VSAT internet signal become easier and cheaper. At the end of AFRRI, the technology at Radio Fanaka will be three-years-old and is limited: The radius for sharing internet is limited to clients positioned within the directional beam of 45 degrees from the station's radio tower; the distance a client can be from the station is limited to 6 kilometres; and the internet speeds at the source (VSAT) are limited. Regardless of these limitations, the demand for internet is high enough that there is a waiting list of up to ten clients for wireless access points. The challenge is purchasing and importing this high tech equipment into an African country because often these devices are not available in the local market.

Trust: In cases where radio stations have a good relationship with their communities and are perceived as trustworthy and reliable, the business model can work well: Clients are willing to purchase the wireless APs and make advance payments for their internet subscriptions. Radio stations that are not as trusted find it difficult to locate potential clients to sign up and purchase the necessary equipment from the station.

> ***"Educated or not, anyone can benefit from the internet to gain new knowledge, including the radio staff! For this reason, I believe the internet is like the central nerve for our radio station."***
>
> **Lamine Togola,**
> **Radio Fanaka, Mali**

15.6 Conclusion and Recommendations

Sustainable model: The VSAT WISP model can be a sustainable way to cover the radio station's internet costs, as well as share the internet connection with the local community – a natural progression of the radio's role in the community as an information and news provider. AFRRI recommends each station does market research suitable to the culture and community to determine a functional costing model.

Customer management is a capacity: It should not be assumed that a radio station can run as a WISP. The station must have the capacity to manage relations with the potential customers. AFRRI recommends that analysis of the station management's capacity to handle the business model is carried out before proceeding.

Software and training are essential: For the station to manage their customers, provide support, and maintain a healthy network, the station must be given network management software and receive training to maintain the network. It is also necessary to determine policies around handling customers and payments. AFRRI recommends that, in addition to network management software, the station be given software to maintain customer accounts. AFRRI recommends funders work closely with the station to design a policy to handle late payments and equipment ownership.

VSAT reliability is intermittent: VSAT internet involves satellite transmissions which can be affected by environmental conditions. It is important to realize this and be prepared for the connection to go on and off from time to time – customers should also understand this. AFRRI recommends finding a VSAT provider with a reliable history, and getting the connection as trouble-free as possible at the time of installation.

Reliable internet can help a radio station evolve: A reliable internet connection opens the station to a world of electronic resources, training and learning opportunities; It also extends the possibilities for partnerships with other organizations, which require internet access as a prerequisite to partnership because they distribute materials digitally through the net. AFRRI recommends talking to broadcasters about how they best believe the internet connection can be used to evolve the station – programmatically, as well as in terms of human capacity.

Equipment is improving, but importing can be difficult: Although the prices for new technology are steadily dropping and the "wow factor" of new equipment capabilities steadily increasing, the challenge of importing to sub-Saharan African countries remains. The cost of shipping combined with the high import duties levied in many countries can significantly add to the cost of setting up a WISP. For this reason, AFRRI recommends planning for growth and buying equipment accordingly. Efforts should be made to source and work closely with a reliable equipment distributor.

A community radio station is already an information provider: Because many community stations are the go-to hub for the latest local news, as well as a window on international news, it is a natural extension for the radio station to also provide Internet access – either to clients wirelessly or through a cybercafé at the station itself.

16.0 Beyond the technology

Training

Ensuring that broadcasters, producers and technical staff at the radio stations are confident in their use and understanding of the new technology is essential to introducing ICTs at a radio station. AFRRI discovered that holding training sessions for one or two days was not adequate. For a thorough training and troubleshooting session, one week is ideal at the station. Equipment needs to be installed properly and observed working in the environment of the radio station; as obstacles are encountered, they can be overcome. Limitations such as power outages, low network coverage, and limited internet accessibility are a few of the most frequent environmental challenges faced. The week-long training session can also be a chance for conceptualizing and designing how the ICT service will be used for listeners.

Training with radio listeners either at the radio station, in the village, or both, is equally important for some ICTs (see section 17: Radio agents). AFRRI found that "rushed training" was one of the leading causes of challenges amongst community radio agents. Radio agents admitted not being completely comfortable with the technologies, but did not communicate this due to lack of time. They also discovered network and power shortages impeded their work, which was not evident to FRI's trainers during the one-day training session.

Training on ICTs is essential to ensure a degree of sustainability of the technologies. If station staff, especially technical people, are not comfortable with the equipment, they are less likely to be able to continue operating the ICT for their station needs after the specific project has ended. This was particularly true of the SMS alerts package, (section 16), where stations were confused about how to maintain the service for their own needs.

Ownership

The radio stations that understood and believed the new ICT equipment really belonged to them and their listeners, (and not to FRI), were far more likely to sustain the use of the technology following the AFRRI project, including maintenance and general upkeep. It was important to make this clear at the outset of AFRRI's relationships with the radio stations: "We want to conduct some ICT experiments with you and when the research project ends, you keep the equipment." This sense of ownership also helped some discover innovative ways radio stations could use the technology. Radio Fanaka, for example, used their mobile phones to call-out after each farm radio broadcast had ended to conduct a live feedback and follow-up session; Rite FM in Ghana used their Freedom Fone to create separate voicemail inboxes for each of their popular radio shows; and Mega FM in Uganda used the FrontlineSMS software to maintain a database of numbers for their listeners.

Radio stations that believed they owned the ICT were more likely to overcome an unfortunately prevalent culture of "if it's broken, we hope someone else will come and fix this." When the station believes that the equipment belongs to them and not to an NGO or the government, and they see its value, they are more likely to take it upon themselves to seek solutions and fix problems.

Appropriate technology

There are certain considerations to be taken when choosing ICTs for radio stations in sub-Saharan Africa. In order to maximize the potential for ICTs to continue being used and sustained at the stations

following any formal development project, it is important to consider issues of parts availability, serviceability, affordability and simplicity of use.

Parts availability and serviceability are important factors to consider when deciding on an ICT. It is a very common sight to enter a radio station in Africa which is full of expensive non-functioning equipment imported from overseas and bought with donor and project funds. Radio transmitters, multi disc CD players, and digital mixing boards can lie for years without working because the parts are not available locally, they are too expensive to import, and the technical expertise to repair the equipment cannot be found locally. Sourcing and buying of new ICTs for a radio station should be done with the forethought and knowledge of sustainability around parts and servicing.

Affordability is another key consideration when choosing an ICT that can be self-sustained by radio stations. More expensive is not necessarily better when choosing technologies. Although a digital telephone hybrid, (cost approx. $800USD), is the equipment of choice for patching phone calls on air in a high quality way, sometimes a more affordable local solution, (eg. modified Nokia phone, see section 10.4), makes more sense, because it can be replaced more easily if something goes wrong.

Simplicity of use and maintenance is essential when choosing an appropriate ICT. Radio broadcasters and producers' primary work is to make radio programs. ICTs should run as seamlessly as possible at the station. As tempting as it is to opt for ICTs that can "do it all", this often comes at the expense of complicated processes that can frustrate users. This is also true for ICTs at the radio listener level. Section 13.5 highlighted the difficulty radio agents had providing the appropriate level of service the community because the technology was too complicated for them to remember how to operate.

Sustainability

The ability of radio stations to sustain the ICT packages beyond the period of the experiments was of interest to the researchers. Because sustainability was not the only consideration when designing the experiments, not all the packages have proved to be sustainable. The following are some issues related to both financial and non-financial sustaining of ICTs at the radio stations after the experiments.

SMS alerts: Reaching a farmer with SMS alerts throughout a campaign for under $1 ($0.05 per SMS) may be cost effective for a sponsored campaign. SMS alerts can quickly become expensive, however, when growing the service to accommodate tens thousands of listeners. This can be even more unrealistic for radio stations that do not have a donor backing their radio programming. It is worth exploring a partnership with a mobile phone company or another sponsor who would like to put their brand on the SMS alert service: "This SMS alert brought to you by…"

Call-outs: Sustaining call-outs to experts and call-outs to farmers has been challenging for radio stations in the wake of the AFRRI campaigns. Often radio broadcasters need to use their own airtime if they want to make call-outs because radio station management does not budget for these types of services in the absence of sponsorship.

Hosted Freedom Fone IVRs for a fee: Rite FM in Ghana continued to operate its IVR for over a year following the AFRRI project, stirring up interest in the local area from other community-based organizations, NGOs and local businesses who would like to have their own IVR service. The technology of Freedom Fone allows radio stations to host and provide support for an IVR virtually, by assigning a unique SIM card for each local client. In addition to hosting the IVR, the radio station plans to develop other value-added services, including co-designing the IVR for clients, supplying information for the audio menus, recording/producing the audio menus and even offering discounts on radio spots to advertise their client's IVR service and phone number[94].

Cybercafé at the radio station: In one case, a radio station was able to partially cover its own internet costs, while at the same time as paying a small salary to an in-house technician, through revenue generated by a cybercafé.[95]

Wireless internet service provider: The same radio station used wireless access points to distribute their internet connection to surrounding businesses, government offices and schools, which helped offset the costs of an expensive VSAT connection.

Sustainability in the realm of ICTs and radio is closely linked with innovation and the creative ways that stations find to generate revenue. The following are some innovative income generation examples that AFRRI learned from its partner radio stations.

On-air classified ads: At Sibuka FM in Tanzania, the daily program "Sokoni Leo" (Today's Market) is a program in Swahili that announces classified ads received throughout the day by SMS to the broadcaster's phone. A customer who wishes to place an ad on the radio program must pay 2000 Tanzanian shillings (equivalent of $1.25USD) with an innovative payment method: by sending mobile phone airtime/credit to the phone of the broadcaster. Upon receipt of the SMS advert and the payment, the ad goes on air.

Radio agents as bulletin announcers: At KKCR Uganda, they have a system where a community member who owns a business – a kiosk owner, for example – becomes a radio agent and collects greetings, announcements, and other news to share on air for a small fee. At a scheduled time each day, the radio station makes a call-out to these agents, who then make the announcements on behalf of their customers.

On-air greetings via SMS: At Radio Maria in Tanzania, the program time for reading prayers and sending greetings to loved ones around the country is very popular. If someone wishes to have a special message read on the radio, they can pay for a premium service SMS, (approximately $0.30 cents), and send it to a special number, (short code), at the radio station. The revenue from this SMS is then divided between the radio station and the mobile phone company. When listenership is large and high volumes of SMS messages come through, this monthly amount adds up to significant revenue for the station.

[94] Raising awareness and advertizing the phone number for an IVR is one of the biggest financial challenges for deployments of Freedom Fone IVRs

[95] See section 15.5, Cybercafe at the radio station.

Partnerships with mobile phone companies: At some radio stations in Ghana, a deal has been reached in which a special number for the Farmers' Fone IVR has been granted. Anyone who calls this number makes the call at a discounted rate (50% off). Another station has approached mobile phone companies to sponsor its IVR service -- The caller hears, "Farmers' Fone, brought to you by ____ company," at the start of the call -- as well as to brand outgoing SMS alerts. Because many mobile companies are keen to demonstrate service and commitment to development or charitable causes, it is worth exploring partnerships where possible, especially in markets where there is competition between mobile companies.

Scalability

AFRRI has demonstrated that the more farmers listen to farm radio broadcasts, the higher their adoption rate of new agricultural practices promoted in development campaigns. The interactive technologies described in this report can help to increase listening and learning by farmers. While the technologies and outreach strategies in AFRRI were tested at a limited number of radio stations, these stations were located in five different countries and represented several different models of rural radio broadcasting. AFRRI believes that with training and technical support, ICTs could be widely used to enhance the effectiveness of radio for rural development.

ICTs and Extension

Because the primary focus of the research project was to look at how ICTs can enhance the effectiveness of radio as a development communication tool for agriculture, AFRRI needed to look more closely at partnerships with agricultural extension services. AFRRI asked the agricultural extension officers about the impact that certain ICTs had on their work. Although phone call-outs to extension agents, explored in section 14.0, was the ICT with the most focused impact on the work of extension agents, AFRRI wanted to know if any other ICTs also helped improve their work. Of 41 extension agents directly involved in the AFRRI research project, 61% said that ICT's significantly improved their work, especially during PRC2 which had a focused ICT component. Market prices and key agricultural messages made available to farmers through a mobile phone call to the Freedom Fone represent other benefits ICT to extension agents.

Live on-air calls between radio presenters and extension agents significantly helped reduce transport costs, for both radio stations and extension agents, who incur costs to visit farmers in-person. These calls also broadened the reach of extension services, because their key messages could be heard on radio by many at a time, rather than just a few. It was discovered, however, that this use of ICTs should not be a replacement for extension agent visits to farmers in-person. Both farmers and extension agents agreed that certain agricultural techniques require demonstration and face-to-face visits to maximize uptake, things that cannot be achieved by phone calls or radio programs, alone.

Areas for further research

The selection of ICT packages for the AFRRI research project was not exhaustive, but was developed to meet a specific set of needs and capacities of FRI's radio partners. The research project has prompted further questions that will fuel FRI's interest in developing and testing other solutions and areas for research:

Does the value of combining ICTs with radio extend beyond agriculture?

AFRRI has explored the application of ICTs with farm radio. Could this type of experiment be applied to other development areas, including health, community/rural development, and

education?

What help can automation of voice-based services provide?

AFRRI's experience with providing voice services via the Freedom Fone showed there is a great demand for this type of service, and potential to make all kinds of information available by voice through a mobile phone. IVR service can also be labour and time intensive, however, in order to keep information up to date daily. There has been great headway made in recent years in the areas of speech recognition and automating text to voice, including in African languages. It would be interesting to explore these developments further in the context of providing voice-based services in local African languages. Automated voice content is another growth area: VoipDrupal is a content management system that makes web pages accessible via phone; LIVES[96] is a phone-based learning management system developed by UBC and Commonwealth of Learning to deliver learning modules and quizzes over a phone; and Avaaj Otalo[97] presents new possibilities of a voice-based social network accessible by phone.

Can national ICT policies help radio and vice versa?

Many African countries have well-developed national ICT policies and are implementing them: Rwanda, Kenya, Uganda, Tanzania and Ghana are some of the most notable examples. While Uganda has used some universal service funds to support radio, the domain of radio is typically under the umbrella of the regulatory authority. Can African radio stations, particularly rural stations, be included as important allies in improving a country's ICT development – particularly around "last mile connectivity[98]"?

What is the role of the $100USD smart phones at a radio station?

The popularity of affordable and portable MP3 recorders prompted the following question: What if radio stations could get the same functionality of the Sansa, but in a phone, with all the added features of a smart phone for under $100USD[99]? Could FRI have new ways of communicating with broadcasters? Would a data-enabled phone open new channels for delivering content on demand, (i.e.: training or broadcast resources), right into the hands of a broadcaster while at the radio console? Could broadcasters learn how to use the features of a smart phone?

GRINS in African radio stations?

GRINS, a computer based radio mixing solution designed specifically for community radio stations in India, promises to overcome some of the main computer-related challenges in the studios of radio stations: viruses, lack of archiving features, and the inability to easily patch in live-to-air phone calls with ease. Could GRINS be deployed and setup successfully in radio station across Africa?

What other new revenue models exist for radio stations?

New ICTs and mobile phones, in particular, have started to unlock a whole new way for radio stations to gain revenue. In many countries, mobile phone companies have set up revenue-

[96] LIVES website: http://lives.cs.ubc.ca/

[97] http://hci.stanford.edu/research/voice4all/

[98] Last mile connectivity refers to getting internet access to the farthest rural reaches

[99] In September 2010, Kenyan mobile phone operator Safaricom and Chinese mobile phone manufacturer Huawei released an Android smartphone called the IDEOS for 7999 Kenyan shillings (approx $90USD at the time).

sharing models with radio stations where stations get a percentage of incoming calls or SMS messages. For stations that receive a lot of mobile traffic this can be a significant amount. Are there new revenue models that can work for smaller community and private radio stations across Africa to help generate the much-needed income to keep their stations operating?

17.0 Conclusion and recommendations

AFRRI set out to measure whether or not modern ICTs, including mobile phones, MP3 recorders and other tools, could improve the effectiveness of radio as a development communication tool.

Generally, AFRRI found that radio stations in sub-Saharan Africa want to increase their ICT capacities. Broadcasters know the value and capabilities of ICTs to improve their work, but radio stations often lack the experience and information to know which tools to choose. They also frequently lack the financial resources to purchase the tools, and technical support to help install and maintain the ICTs.

Radio listeners also want additional features from their radio stations that ICTs can help facilitate: an increase in two way communication channels like SMS and phone calls; technologies to allow off-air listening to frequently used, up–to-date and succinct information.

Based on eight different ICT experiments -- which implemented various ICT packages at both the radio station and listener levels -- AFRRI assessed the impact of specific ICT tools and their ability to increase radio's effectiveness in the area of development communication. Below is a review of these tools and the recommendations AFRRI has for each based on the research.

1. *Computers and computer literacy, including the foundations of virus prevention and internet search skills, are essential for the growth of ICTs at radio stations in sub-Saharan Africa.*

When computers are coupled with reliable internet connection, broadcasters and radio stations are opened to a world of electronic resources and news sources that can be used to elevate the quality of their broadcasts. Finding and using relevant resources in local languages remains a challenge. Initiatives such as Barza – an online community[100] scheduled to launch in November 2011 for broadcasters to collaborate on this issue -- represents an opportunity for more content to be created by broadcasters in local languages and developed over time. Mobile phones present an exciting possibility for delivering resources and learning materials to broadcasters, whether they are in the studio, in the field or at home.

Recommendations:
Any ICT-specific activities at radio stations should have a dedicated computer or two. AFRRI recommends supporting radio stations in the acquisition of reliable internet service for all staff, especially broadcasters, who require internet to properly research their programs. This could lead to better quality broadcasts and campaigns as well as improve communication channels between partners. Further support could be provided to stations sharing common language groups to develop more relevant content in their own languages for use on the radio.

[100] www.barzaradio.com is being developed by FRI, in partnership with CTA and with support from IDRC

2. *Portable and multifunctional MP3 recorders, combined with audio editing workstations, are the ultimate companion tools in the creation of engaging and entertaining farm radio campaigns.*

MP3 recorders can act as USB storage devices, and FM radio/recorders, in addition to capturing excellent audio interviews on a rechargeable battery that works for days. To maximize the benefits of the interviews, broadcasters need audio editing skills on software such as Adobe Audition or the freeware alternative, Audacity. Basic knowledge of editing audio and producing radio programs can dramatically enhance the quality of a radio campaign.

Recommendation:
Portable MP3 players should be considered a staple supply for each broadcaster rather than a station owned equipment for sharing. Because the failure rate of these small units can be high, expect to replace them every one or two years. Many presenters at radio stations do not have audio editing skills and often need to wait for a producer/technician, (who are often overworked), to edit their audio. AFRRI recommends providing software training for all radio station staff so they can edit audio and produce their own radio programs.

3. *On-air call-outs to experts are the most cost-effective way to include a variety of expert voices in a radio campaign.*

61% of extension agents involved in AFRRI's PRCs said that the radio campaigns and ICTs used helped them in their own work providing rural agricultural extension to farmers; they were able to reach more farmers than ever before.

Recommendations:
For a broadcaster to include two or three in-depth calls with experts, a certain amount of mobile phone airtime needs to be budgeted and reserved for this use. Normally experts cannot make it to the studio, or travel budgets may not allow for extensive transport. AFRRI recommends using call-outs as a way to include a variety of voices on air, which correspond with the message and timing of the campaign; rather than the same voice week in and week out. The key to effectively using phone calls to experts during a radio campaign is to schedule the time of the call and plan the content to be discussed ahead of time.

4. *On air call-outs to farmers is a highly cost-effective way to include the voices of farmers throughout all stages of a radio campaign.*

Radio programs that made a high use of call-outs to farmers experienced up to 22% more regular listeners than those that did not: A program that features the voices of farmers makes for engaging and entertaining radio. The same listeners also demonstrated up to 50% more knowledge about a campaign topic than listeners of programs where call-outs were not used. This suggests farmers like to learn from their peers and attach importance on hearing testimonies from fellow farmers before making a change to their own agricultural practices.

Recommendations:
Mobile phone credit should be set aside for broadcasters to make regular call-outs to a variety of farmers. Avoid using the same farmers each week as this can alienate some listeners. Instead make an effort to find farmers who are at all ends of the spectrum about the campaign topic from "dead set against", to "reluctant", to "exuberant" about adopting the new agricultural practice.

5. *Sending an SMS alert from broadcaster to listener 30 minutes before a program starts, is an excellent way to build regular campaign listeners.*

Listeners who received reminders on their phones were 20% more likely to listen regularly[101]. These listeners expressed feeling a sense of closeness to both the radio station and the radio campaign. In addition to this technique, for every SMS alert received on a phone, the SMS was shared verbally with an average of two other households, which also had a significant impact on listenership. An SMS alert service, using software like FrontlineSMS, can help radio stations build a database of the mobile phone numbers of their listening communities, which can strengthen connections for future communications.

Recommendations:
At a cost of $0.05 cents per SMS sent, a farmer can receive SMS alerts for the duration of a radio campaign for under $1 USD. This may still be too expensive for many radio stations. In addition to word–of-mouth techniques, like asking SMS subscribers to share the reminders with neighbours, AFRRI recommends exploring local SMS resellers who may offer cheaper rates[102] or developing partnerships with mobile phone operators in country to work together. Although many software platforms exist for sending and receiving SMS messages and managing contacts, AFRRI recommends waiting and exploring the upcoming 2.0 version of FrontlineSMS, (due for release in January 2012), and its companion radio plug-in, designed to help radio stations interact with their listeners.

6. *Radio agents equipped with a mobile phone and a solar-powered MP3-enabled radio that can record and replay broadcasts, are an effective way to encourage group listening and provide repeat listening opportunities for a community.*

In communities where a reliable radio agent was based, 75% of farmers who made use of services such as group listening, playback of missed broadcasts or calls in to the radio station demonstrated detailed knowledge about the radio campaign topic. This shows that when enhanced services for listening and participating in a campaign are provided at the community level, it can enhance listenership, knowledge, and practice of agricultural improvements promoted in the campaign.

Recommendations:
AFRRI recommends finding the right technology for use by the radio agents at the outset of the project. Our experiment involved piecing together different components because an all-in-one solution combining the elements AFRRI needed had not been created at the time of

[101] Regular listenership is categorized as having listened to over 50% of the weekly episodes of a campaign
[102] The $0.05 price per SMS is based on Clickatell's bulk rate for international SMSs, in country SMS rates may be significantly cheaper in many cases

our research. The Lifeplayer, a solar and crank based digital radio with MP3 playback and recording functionality made by Lifeline Energy, has received excellent reviews and field reports and promises to be the ultimate tool for radio agents.

You should always consider agreements and contracts between the radio station and radio agents. Agreements about equipment ownership, how often and when the services will be made available and how frequently the agent will communicate with the radio station are examples of key issues that should be agreed upon at the outset.

7.

The use of an IVR, such as the Freedom Fone, to provide voice-based information on demand can be an excellent way for a radio station to make its on-air information available off air for repeat listening through a phone call.

The Farmers' Fone at Volta Star radio in Ghana had 4503 callers over the course of an 18-week campaign about organic composting – an average of 40 calls per day. One fifth of those calls lasted over two minutes in length, in which people listened to market prices, agricultural tips and summaries of previous broadcasts. 35% of all calls were people calling to check to see if the data had been updated. The majority of regular callers were men under the age of 25 that had a secondary-level education. This tells us that young, male, educated farmers see value in calling a service to get up-to-date and relevant information, and they are willing to spend their mobile phone airtime to do so[103]. Age, education level and gender are all potential barriers to accessing an IVR-based information service, which complements a radio campaign.

Recommendations:
An IVR for farmers should be regionally relevant, (including market prices and weather, for example), and kept up to date, (at least twice per week). It is important to maintain these aspects of the service consistently from the launch of the service because if farmers find that it is irrelevant and out of date, they will stop calling and it will be very difficult to regain their interest.

The voicemail feature of an IVR system can be used as an effective channel for gathering feedback from listeners as well as for capturing stories and other content from farmers. This content and feedback can then be edited and produced as a segment in upcoming broadcasts.

Recommendations:
Consider creating a competition or activity with incentives to encourage callers to leave their personal stories – this can quickly build interest is the service. Feedback and questions left as voicemail on the IVR should be responded to either in person or on air, where possible. Several farmers expressed their frustration at using the feedback channel, but receiving no follow up.

[103] The cost of calling the Farmers Fone is the same as a regular phone call

8. ***Helping a radio station acquire a VSAT and establish itself as a small wireless internet service provider (WISP) in the community, can be a sustainable way to provide internet in remote areas where other internet options don't exist.***

If the station has the management capacity, a trusted relationship with the community and interested clients, relatively expensive VSAT costs can be covered, and even a modest income can be generated, by sharing the connection wirelessly with schools, businesses and government offices in the area.

Recommendations:
Find a suitable contract with clients that can maximize the likelihood they will pay on a regular and timely basis. Encourage discounts for those who pay up front for several months or years in advance and have a system in place for turning off clients who have not paid. It is essential to have a trained network technician available to handle any network troubleshooting as it arises.

AFRRI found that modern ICTs, such as the ones outlined above, can help overcome radio's fundamental challenge: It has traditionally been a one-way communication medium lacking opportunities for listeners to re-listen to vital information as well as to listen at their convenience. Tools such as call-outs, SMS alerts and IVRs enhance radio's interactivity with listeners by presenting them with opportunities to contribute their voices and feedback, in addition to providing them with opportunities to listen to repeat information on their mobile phones. These modern ICTs have become increasingly more affordable and AFRRI's research shows that ICTs can help make farm radio broadcasting a more sustainable and affordable process.

The evolution of farm radio programming in Africa has grown to the point that modern ICTs play an integral and inseparable role from radio. While many have predicted the irrelevance of radio in the Internet age, this is not the case in Africa where radio combined with ICTs continues to be the most powerful communication medium for reaching small-scale farmers.

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Appendix A:
VSAT and WISP equipment



Aboubacar Mziya, ICT Officer in Tanzania installs a wireless access point on a papaya tree at Sibuka FM in Maswa, Tanzania
Photo Credit: Bart Sullivan

A) VSAT Satellite equipment:

The VSAT satellite equipment is the source of the internet at the radio station. It communicates with a satellite orbiting in space. The actual VSAT, itself, was provided free of charge, (including shipping), from a UK-based satellite internet service provider, Bentley Walker, based on a one-year contract for monthly service for the two radio stations. The following equipment was supplied by Bentley Walker to each radio station:

- 1 x Hughes HX50 Modem
- 1 x 2 watt KU band LNB radio assembly
- 1 x mounting brackets

Each radio station sourced a second hand 1.2M antenna reflector locally to keep shipping costs down from the UK.

B) ***Radio station wireless equipment:***
For the radio stations to share their VSAT internet connection, a wireless network needed to be setup at each station. The following equipment was used:

- **Engenius 2610 outdoor wireless access point: $100USD**
  This outdoor Wi-Fi AP can share an internet connection over a 10km radius within a 170 degree direction. It must be mounted at the highest possible point at the radio station --radio towers are perfect for this --and must have line of sight vision, (no major obstacles blocking its path), between it and the client's identical receiving outdoor Wi-Fi AP.

- **Quality of Service (QoS) enabled wireless router: $150USD**
  This router is installed inside the radio station. It is connected to the Hughes HX50 modem and is responsible for distributing the VSAT internet connection equally amongst the radio station's computers as well as the surrounding clients via the outdoor Wi-Fi APs. Because the VSAT internet connection has certain bandwidth limitations in terms of speed and total data consumption allowed, the router is QoS enabled to allow each client's connection to be regulated. This is essential to ensure everyone's internet runs smoothly and is not dominated by a single heavy usage user/computer.

- **UPS backup power: 90USD**
  Power outages are a common occurrence. In order to maintain smooth operation where power cuts are less than 20 minutes, a backup power solution ensures that the internet can continue to run for the clients.

C) Client side wireless equipment
For a client to receive the shared internet connection from the radio station, the following equipment was used:

- **Engenius 2610 outdoor wireless access point(AP): 100USD**
  As above, the same Wi-Fi AP is used. The client mounts the AP as high as possible outside – pointing directly at the radio station's Wi-Fi AP with a clear line of sight vision between the two APs.

This report is dedicated to the memory of Dr. Martine Ngobo, Senior Researcher for the African Farm Radio Research Initiative. The impact of Martine's exemplary work to this project is immeasurable. Her dedication to her work has truly made a difference in the lives of thousands of farmers across Africa.

May the memory of Martine's smile serve as a reminder of the change one life can have on so many.
Thank you Martine.



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