

The usage of radio and television as agricultural knowledge sources: The case of farmers in Morogoro region of Tanzania

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ABSTRACT

Radio and television are potential for knowledge dissemination. This study investigated the usage of radio and television as sources of agricultural knowledge among farmers in Tanzania. Specifically, the study identified major sources of agricultural knowledge used by farmers; determined the potential of radio and television stations as sources of agricultural knowledge; determined the accessibility and usage of radio and television agricultural programmes; investigated factors influencing the accessibility and usage of radio and television agricultural programmes and; devised strategies to improve accessibility of radio and television agricultural programmes. This study involved 314 randomly selected farmers from nine villages in Morogoro Region. Findings indicate that radio and television were among the seven sources of agricultural knowledge among farmers. Radio sets were more accessible and owned by more farmers than television sets. Findings further indicate that majority of farmers who used radio and television as sources of agricultural knowledge preferred to listen and watch agricultural programmes respectively during evening and night. The study showed that accessibility of radio and television sets, gender based division of labour, language, number of agricultural programmes broadcasted and awareness of the broadcasting time of agricultural programmes were among the factors influencing their usage as sources of agricultural knowledge. For improving the accessibility of agricultural knowledge radio and television stations should perform agricultural knowledge needs and enhance timely dissemination of needed knowledge.

Keywords: *agricultural knowledge; knowledge accessibility; radio and television stations; farmers; Tanzania*

1. INTRODUCTION

Agriculture is an important sector because it is the source of food and other raw materials for industries. In developing countries, including Tanzania, the sector is the major employer and driver of the economy (National Bureau of Statistics (NBS) 2016). Due to changes surrounding agricultural production and the scarceness of important resources for agricultural production including land, labour, capital and the need for quality agricultural produce to meet the expectations of the market the agricultural sector needs adequate access to agricultural knowledge (Niragira 2011; Schmidhuber et al. 2009). Therefore, making timely accessibility of agricultural knowledge among farmers is important for them to make rational decisions related to agricultural activities.

Various channels are used to disseminate agricultural knowledge to farmers; the most traditional but still most used among farmers in developing countries the face to face communication which is the most traditional channel in the history of mankind (Msoffe & Ngulube 2016). With this channel of communication communicators may employ different modes (facial expressions, gestures, intonation, words and body language) to convey a single message (Lewandowski et al. 2011). It also enhances immediate feedback because the communicating parties are in the same physical location (Min 2007). However, the channel is known for its shortcoming of distorting messages as they are passed from one person to another (Velentzas & Broni 2014).

Advancement in technology has brought about new communication channels which are either standalone or mediated communication devices. These channels include the print media, demonstrations, different mobile phone applications, radio and television sets and web based (include social media) channels (Livondo et al. 2015; Goggin 2012; Apata 2010; Lee & Ma 2012; D'Haenens et al. 2004). Decision on which communication channel to use depends on the awareness and credibility of media (Livondo et al. 2015), media richness, characteristics of the message being communicated, availability of feedback mechanism and urgency of the message (Ghanbari & Rahmati 2010). Moreover, the quality of the communication infrastructure being used for transferring a message affects the level of usage of some communication channels. For example, the quality of roads can affect the transfer of print media while that of ICT networks affects the adoption and usage of radio and television sets, web based media and mobile phones (Mtega & Benard 2013). Strategies employed in communicating agricultural knowledge may differ by type of a knowledge being communicated, credibility of the channel, level of development of the communication infrastructure, rural-urban settings, intended audience, dispersion of the intended audience and literacy level of the intended audience (Livondo et al. 2015; Mtega & Benard 2013; Mtega 2012; Apata 2010). It is for these factors some communication channels may have a lot of advantages to others.

Dissemination of agricultural knowledge in developing countries needs the consideration of channel and associated factors which may influence the delivery of the message. For example, rural areas in most of the developing countries have poor and impassable roads mainly during the rainy season (Berg et al. 2018) when agricultural activities are at their climax. This limits the dissemination agricultural knowledge packaged in print media. Likewise, most rural areas in developing countries do not have access to ICT networks and computers (Yagos et al. 2017). This limits the use of web-based media in disseminating agricultural knowledge. Moreover, disseminating agricultural knowledge through face to face communication channel in rural areas in most developing countries including Tanzania is limited by the poor farmers to agricultural extension offer ratio (Daniel 2013; CUTS International 2011).

As opposed to agricultural extension, radio and television stations have a great potential of being able to reach more people at a given time because broadcasting are made possible through satellites and antennas (Wahab 2015). Moreover, conversion from analogue to digital radio and television broadcasts has made the accessibility and reach-ability of radio and television frequencies more wider (Wahab 2015). In Tanzania, radio and television broadcasts are known to reach most rural areas and there are some radio stations which are limited to semi-urban and rural areas of the country (Tanzania Communication Regulatory Authority (TCRA) 2017; Ngowi et al. 2016; Ngowi & Mwakalobo 2017; Ngowi et al. 2016).

1.1 Statement of the problem

Despite the great potential of radio and television stations to knowledge dissemination and the accessibility, studies conducted in Tanzania indicate that the level of usage of radio and television sets as sources of agricultural knowledge among farmers is still low (Mubofu & Elia 2017; Spurk & Dingerkus 2017; Angello 2015; Sanga et al. 2013). Moreover, studies (Msoffe & Ngulube 2016; Ronald et al. 2014; Elly et al. 2013) indicate that there is an inadequate access to agricultural knowledge among farmers in Tanzania. This study is set to investigate factors influencing the usage of radio and television as source of agricultural knowledge among farmers in Tanzania. Specifically, the study identifies major sources of agricultural knowledge; determines the potential of radio and television stations in dissemination of agricultural knowledge; determines the accessibility and usage of radio and television agricultural programmes; investigates factors influencing the accessibility and usage of radio and television agricultural programmes and; devises strategies to improve accessibility of radio and television agricultural programmes in Tanzania.

1.2 Conceptual framework

This study was guided by the Technology Acceptance Model (TAM). The model is used to determine factors influencing the usage of information systems (Davis et al. 1989). It helps in providing the basis for tracing the impact of external factors on internal beliefs, attitudes and intentions (Davis et al. 1989). In the current case the model guided the study to determine all factors influencing the usage of radio and television sets as sources of agricultural knowledge among farmers.

2. METHODOLOGY

This study was conducted in Morogoro region of Tanzania. The region was established in 1962 after dividing the then Eastern Province of Tanganyika into regions. According to last census conducted in 2012, region had a total of 2,218,492 people (1,093,302 male and 1,125,190 female) with a total of 385,260 households; among them, 378,400 households being directly involved in agricultural production (National Bureau of Statistics (NBS) 2013).

Administratively, Morogoro region is divided into eight district councils namely Gairo, Kilombero, Kilosa, Ulanga, Malinyi, Morogoro Municipal, Morogoro Rural and Mvomero. Morogoro region has abundant agricultural land suitable for crop production and have good climate favourable for agriculture and other economic investments. Among the eight district councils Kilombero (with 19 wards and 79 villages), Kilosa (with 35 wards and 139 villages) and Mvomero (with 18 wards and 132 villages) were involved in this study. These three district councils are homogenous in terms of the major crops grown, availability of agricultural research institutes, and ICT infrastructure (URT, 2016; TCRA, 2015). Basing on reception of radio and television, Mlimba (with eight villages), Mang'ula (with eight villages), and Lumemo (with six villages) wards of Kilombero district; Rudewa (with six villages), Chanzulu (with four villages) and Kimamba B (with one village) wards of Kilosa district; and Wami Dakawa (with four villages), Mvomero (with five villages) and Hembeti (with seven villages) of Mvomero district were purposively selected as the study area. One village from each ward was randomly selected and included in the study area with nine villages. Villages selected from Kilosa district included: Rudewa Batini with 4,876 villagers), Chanzuru (with 3,617 people) and Kimamba B (with 5,967 villagers). Michenga (4,120 villagers), Mgudeni (8,775 villagers) and Mlimba A (with 7,449 villagers) were selected from Kilombero district while Hembeti (with 4,010 villagers), Mvomero (with 9,321 villagers) and Wami Dakawa (7,209 villagers) were from Mvomero district. These villages had a total of 55,344 villagers. According to the (National Bureau of Statistics (NBS) 2016), 59% of the Tanzanian population constitute the working age. Therefore, among the 55,344 people from the nine villages 32,653 of them were within the working age. (URT 2013) indicates that 80% of the working population in Tanzania are farmers; this makes a total of 26,122 farmers from the nine villages.

Simple random sampling technique was employed in selecting the sample of farmers to be included in the study from each of the selected village. Basing on the Table for determining the sample size developed by Krejcie & Morgan (1970) a total of 362 farmers were randomly selected from the nine villages.

2.1 Data collection and analysis

The study used a questionnaire to collect data from farmers. This data collection tool was used because most of the farmers were able to read and write. It was administered to 314 farmers making a response rate of 87%. Focus Group Discussions (one in each district) were conducted

to complement data collected through questionnaire. Data collected through questionnaire were analyzed using the Statistical Package for Social Sciences (SPSS). To determine the association between variables cross tabulations of selected variables were done where frequencies, percentages and tables were generated. Qualitative data collected through Focus Group Discussions were analyzed through content analysis and summarized into descriptions and explanations.

3. FINDINGS AND DISCUSSION

The study involved 314 farmers (48.7% and 51.3% male and female farmers respectively). This implies that more females than males in Tanzania are involved in agricultural production. Supporting this observation, NBS (2017) also shows that slightly more females are involved in agricultural production than males.

3.1 Major sources of agricultural knowledge among farmers

Farmers use different sources of agricultural knowledge. Findings in Table 1 indicate that fellow farmers, radio, mobile phones and village based agricultural advisors were the major sources of agricultural knowledge among farmers. Other sources of agricultural knowledge used include agricultural input suppliers, agricultural extension staff and television.

Table 1: Major sources of agricultural knowledge among farmers

Source of agricultural knowledge	Frequency
Fellow farmers	305 (97.1%)
Radio	193 (61.5%)
Mobile phone	152 (48.4%)
Village based agricultural advisors	120 (38.2%)
Agricultural input suppliers	105 (33.4%)
Agricultural extension staff	102 (32.5%)
Television	90 (28.7%)

Results from Focus Group Discussions revealed that most farmers accessed agricultural knowledge from other sources before passing it to fellow farmers. This implies that fellow farmers were considered to be an immediate source of knowledge. Most farmers (97.1%) mentioned to access knowledge from fellow farmers because of being available and having an experience in agriculture. Results from Focus Group Discussions reveal further that radio was preferred because most of the agricultural programmes provided timely knowledge. On the other hand, farmers considered mobile phones as channels facilitating agricultural knowledge sharing and/or consultations with other agricultural knowledge sources.

Findings in Table 1 indicate that 38.2% of the farmers accessed agricultural knowledge from village based agricultural advisors who were under some agricultural projects implemented in the study area. However, village-based agricultural advisors who were farmers with extra trainings on Good Agricultural Practices only served few farmers benefiting from some projects. Others (33.4%) accessed agricultural knowledge from agricultural input suppliers. It was found during stakeholders' analysis that each village had one to three agricultural input suppliers and that not all attendants of agricultural input shops had background education in agriculture. Findings in Table 1 indicate further that 32.5% of the farmers accessed agricultural information from agricultural extension staff. Results from Focus Group Discussions indicate that access to

agricultural extension staff was inadequate due to limited number of agricultural extension staff in villages. It was mentioned that each village has one agricultural extension staff. This made it difficult for one agricultural extension staff to serve a minimum of 1500 farmers in a village within a growing season (refer Table 1).

Based on the findings in Table 1 and results from Focus Group Discussions it is evident that farmers become a source of agricultural knowledge after accessing it from another source. Few farmers accumulate knowledge through long term experience in farming that other farmers consult them when they have agricultural knowledge needs. Mobile phones are mostly facilitating the acquisition of agricultural knowledge unless farmers use some specialized mobile phones applications which can provide information services. Other agricultural knowledge sources including the village based agricultural advisors, agricultural input suppliers and agricultural extension staff can hardly serve only few farmers due to their limited number (very low agricultural service provider to farmers ratio).

3.2 The potential of radio and television in provision agricultural knowledge among farmers in Tanzania

Agricultural radio and television broadcasts can only reach many farmers if there is a wider coverage of radio and television networks. Findings in Table 2 show that radio and television stations in Tanzania are categorized according to authorised coverage area. They have a national coverage if their signals are accessed national wide, regional if signals are accessed within a specific region, district if signals are only accessed in a specific district and community if signals are accessed in a smaller area.

Table 2: Number of radio and TV stations in Tanzania

Authorized coverage	Radio stations	Television stations
National	6	5
Regional	17	5
District	70	16
Community	30	0
Total	123	26

Source: TCRA (2017)

Findings in Table 2 indicate that there more radio stations (123) than television stations (26). Moreover, stations are given different broadcasting licenses which define the area of operation. TCRA assigns market segments into which stations operate. The authorized coverage defines the distribution of signals and radio frequency spectrum management (TCRA 2017). Among the radio stations six have national coverage while 17, 70 and 30 have regional, district and community coverage respectively. Likewise, five television stations have national coverage while five and sixteen have regional and district coverage respectively. None have community coverage. This implies that radio and television broadcasts can be accessed throughout the country. Moreover, findings in Table 2 tell that Tanzanians have a wide choice in terms of radio and television station to listen and watch respectively. This has created a great potential of radio and television in disseminating agricultural knowledge in Tanzania.

Findings in Table 1 indicate that radio is the second most used source of agricultural knowledge among farmers. Findings in Table 3 indicate that 81.8% and 40.4% of the farmers mentioned to use radio and television as sources of information. These findings imply that radio and television are among the potential sources of knowledge among farmers.

3.3 Usage of radio and television as sources of agricultural knowledge

Findings in Table 3 indicate that majority of the farmers (81.8%) used radio while 61.5% used radio as a source of agricultural knowledge. This implies that 75.1% of the farmers who mentioned to use radio used them as sources of agricultural knowledge.

Table 3: Usage of radio and television as sources of agricultural knowledge n=314

ICT tool	Frequency distribution	
	Used radio/television for various purposes	Used ICT tool to access agricultural knowledge
Radio	257 (81.8%)	193 (61.5%)
Television	127 (40.4%)	90 (28.7%)

Moreover, 40.4% of the farmers mentioned to use television while 28.7% used television as sources of agricultural knowledge. This implies that almost 70.9% of the farmers who mentioned to use televisions used them as sources of agricultural knowledge. Findings in Table 3 imply that most of those using radio and television considered these tools as potential sources of agricultural knowledge. Results from Focus Group Discussions reveal that agricultural knowledge accessed through radio and/or television was considered to be more credible.

3.3 Factors influencing the usage of radio and television as sources of agricultural knowledge

Findings indicate that several factors influence the usage of radio and television as sources of agricultural knowledge among farmers.

i. Time for airing agricultural programmes

Time preference accessing agricultural radio and/or television programmes among farmers is contrary to the broadcast time of most agricultural radio programmes. Results from Focus Group Discussions reveal that most radio agricultural programmes were broadcasted during morning hours; however, most farmers involve themselves in agricultural activities from morning to afternoon.

Table 4: Farmers' preferred time to accessing agricultural programmes

Time of the day	Time prefer to access agricultural programme	
	Radio n=193	Television n=90
Morning	12 (6.2%)	6 (6.7%)
Afternoon	13 (6.7%)	3 (3.3%)
Evening	100 (51.8%)	37 (41.1%)
Night	68 (35.2%)	44 (48.9%)
Total	193 (100%)	90 (100%)

Findings in Table 4 indicate that 51.8% of the farmers mentioned to prefer listening radio agricultural programmes during evening. Others, 35.2% mentioned to prefer listening agricultural radio programmes during the night. These findings imply that airing agricultural radio programmes during morning or afternoon limits more than half of time of the day limits 87% of the farmers from

accessing agricultural knowledge through radio. This is supported by Fasina (2015) who also found that listenership to radio agricultural programmes become high if such programmes are aired during farmers' preferred time.

Among farmers who used television as a source of agricultural knowledge 48.9% preferred to watch television during the night while 41.1% mentioned to prefer watching such programmes during the evening. Supporting these results, Nazari et al. (2011) state that television agricultural programmes broadcasted after farm activities are likely to have more watchers than those broadcasted during the morning or afternoon. These findings imply that broadcasting such programmes during morning and afternoon hours limits 90% of all farmers from accessing agricultural knowledge through television programmes.

ii. Ownership of radio and television sets

Among farmers radio broadcasts were either accessed through radio or mobile phones with a radio application. Findings in Table 5 indicate that 81.8% of the farmers used radio sets while 77.8% of them owned radio sets. Moreover, findings indicate further that majority (96.5%) of the farmers who owned radio sets used them for accessing agricultural knowledge. therefore, ownership of radio sets by farmers is determinant of physical availability of the medium; ownership enhances farmers' exposure to radio agricultural programmes (Okwu et al. 2007).

Likewise, findings indicate that 40.4% of the farmers used television while 53.5% of them owned television sets. Moreover, when compared to farmers who used television as source of agricultural knowledge (refer Table 4), these findings imply that 75.6% of all farmers who use television as source of agricultural own television sets. Moreover, all farmers owning television sets used them for accessing agricultural knowledge.

Table 5: Accessibility and ownership of radio and television sets

ICT tool	Frequency		
	Accessed ICT tool n=314	Owned ICT tool n=314	Use radio/television as source of agricultural knowledge n=owned ICT tool
Used radio sets	257 (81.8%)	200 (77.8%)	193 (96.5%)
Used television set	127 (40.4%)	68 (53.5%)	68 (100%)

Findings in Table 5 indicate that there is a slight difference in terms of ownership of a communication tool and using it as a source of agricultural knowledge. All farmers who owned television sets used television as sources of agricultural knowledge while 96.5% of farmers owning radio sets used radio as an agricultural knowledge source. During Focus Group Discussions farmers owning both radio and television sets mentioned to prefer watching to listening. This implies that agricultural programmes broadcasted through television station can have a stronger impact to farmers than the same aired through a radio station. Generally, ownership of a communication tool has a direct influence on usage of the tool as a source of agricultural knowledge.

iii. Power supply

Findings in Table 6 indicate that 60.1% of the farmers owning radio sets had electric power connection in their houses while 39.9% did not have. Moreover, among farmers owning television sets, 89.7% of them had electric power connection in their homes while 10.3% did not have.

Table 6: Radio and/or television set ownership and having electric power connection at home

ICT tool ownership	Is your residency connected with reliable source of electric power?		Total
	Yes	No	
Radio set	116 (60.1%)	77 (39.9%)	193 (100%)
Television set	61 (89.7%)	7 (10.3%)	68 (100%)

Results from Focus Group Discussions reveal that most farmers acquired television sets after being connected with a reliable source electric power supply. These findings imply that connection to electric power influences ownership of some ICT tools. The level of influence may vary with the quantity of power a given ICT tool may require for operation. It is for this reason most of those owning television sets mentioned to be connected with the national electric power grid.

Findings in Table 5 indicate that ownership of radio and television sets influences usage radio and television as sources of agricultural knowledge. Therefore, access to reliable sources of electric power has an influence on increasing the usage of radio and television as sources of agricultural knowledge.

iv. Quality of signals

The quality of signals influences the usefulness of radio as sources of agricultural knowledge. Results from Focus Group Discussions indicate that some few areas had poor radio reception; this limited some farmers from accessing knowledge. Results revealed the problem of poor reception did not influence those using television sets because they had to acquire and install satellite dishes or antennas for receiving television broadcasts.

v. Costs associated with acquisition and maintenance of radio and television sets

Results from Focus Group Discussions reveal that costs associated with maintenance of radio and television sets are high. Farmers mentioned that they had to acquire an alternative source of power if not connected to the national electric power grid. Those using television mentioned to make monthly subscription as to get television channels. Those who did not have money for subscribing television channels were limited from accessing agricultural programmes. Therefore, costs associated with acquisition and maintenance of television and radio sets had a direct influence on usage of radio and television as sources of agricultural knowledge.

vi. Relevancy of contents

Results from Focus Group Discussions reveal that not agricultural contents broadcasted through radio and television stations were relevant to all farmers. It was revealed that not all agricultural knowledge categories needed by farmers were delivered through these radio/television programmes. Moreover, some of the knowledge categories were delivered without considering the cropping calendar. This is supported by Odiaka (2011) who also found that not all knowledge

categories needed by farmers were broadcasted by through mass media. This had a negative impact on trust of radio sets as a source of agricultural knowledge.

vii. Number of radio/television agricultural programmes broadcasted

A review of schedules from prominent radio and television stations in Tanzania indicate that there are very few agricultural programmes in a week. Likewise, results from Focus Group Discussions revealed that there was limited number of radio/television agricultural programmes broadcasted per week. This limited the level of dependence of farmers on radio and television sets as sources of agricultural knowledge.

viii. Language

During Focus Group Discussions farmers mentioned that there were some television stations which broadcasted agricultural programmes in foreign languages mostly English. This made it difficult for farmers to understand the message being delivered. They only managed to watch a programme but could not understand what was being spoken. Showing the importance of using well knowledge languages for agricultural broadcasts Odiaka (2011) states when languages other than those used by majority of farmers are used for broadcasting agricultural programmes through radio or television stations the reach becomes very limited.

ix. Feedback

Findings in Table 7 indicate that only few farmers requested for more clarifications from radio and television broadcasting agricultural programmes. Among farmers using radio as a source of agricultural knowledge only 17% requested for some more clarification from a radio station while 3.3% requested for clarifications from television stations.

Table 7: *Farmers' access to feedback from agricultural radio/television programs*

ICT tool	Sought for clarification after agricultural programme broadcast
Radio set (N=193)	33 (17%)
Television set (N=90)	03 (3.3%)

Results from Focus Group Discussions farmers mentioned to asked questions through voice calls or SMS for seeking some clarifications on a programme broadcasted. They explained that sometimes in most cases feedback was delayed or not made at all. This discouraged farmers from seeking for further clarifications from radio and television stations broadcasting agricultural programmes.

x. Gender based division of labour

Gender based division of labour has an influence on usage of radio and television as sources of agricultural knowledge. Results from Focus Group Discussions reveal that female farmers had household duties after farm activities and most of them are conducted outside the main house where radio and television are radio sets are placed. Moreover, results from Focus Group Discussions indicate that after farm activities most male farmers listen to radio and/or watch television placed mainly in main rooms or in recreational areas away from home. Mtega (2012) found that household activities performed by female farmers after farm activities limit them from using sources of agricultural knowledge found away from where they perform their activities.

These results imply that gender based division of labour deprive female’s rights of accessing broadcasted agricultural programmes.

xi. Place where radio and/or television sets are fixed or found

The position where radio and television sets are fixed was found to influence the use of these communication tools as sources of agricultural knowledge. Results from Focus Group Discussions reveal that television sets were positioned in the main house. These results imply that those using most of their time in the main house had access to television. Moreover, those who did not own television sets mentioned to access television broadcasts from recreational areas away from home. Findings in Table 5 indicate that 77.8% and 53.5% of those using radio and television owned the communication tools respectively. These could access radio and/or television broadcasts from where such tools are placed in their homes. Moreover, farmers owning small radio sets mentioned to not have fixed positions for their radio sets as they could be carried and placed in any more convenient location. Findings in Table 5 indicate that 22.2% and 46.5% of the farmers owning radio and television sets respectively had to access these tools away home. According to Okwu et al. (2007), physical availability of the medium and ownership in particular enhances farmers’ exposure to radio agricultural programmes. This implies that farmers not owning radio and/or television sets had a limited exposure to radio and/or television agricultural programmes while those owning such tools had a better exposure.

xii. Literacy

Findings in Table 8 indicate that farmer’s level of education influences the level of usage of radio and television as sources of agricultural knowledge. Educational level in this study is categorized into four categories: informal education (attained outside the structured curriculum, it is more traditional and mostly attained through experience and asking from elders), adult education (is given to adults who did not have opportunity to go to primary schools), primary education (it is the basic education provided in Tanzania, it enables its leavers to conceptualize and act), and secondary education (it comes after the primary education, it is provided to those passing class seven examinations). It is seen from the Figure that 34.2% of the farmers using radio as source of agricultural knowledge had informal education. The percentage rose to 71.4%, 63% and 76.2% for farmers with adult, primary and secondary levels of education respectively. Likewise, the percentage of farmers using television as source of agricultural knowledge rose from 7.9% (for farmers with informal education) to 38% (for farmers with secondary education).

Table 8: *The influence of farmer’s level of education on usage of radio and television*

ICT tool	Frequency distribution			
	Informal education	Adult education	Primary education	Secondary education
Radio	13 (34.2%)	10 (71.4%)	138 (63%)	32 (76.2%)
Television	03 (7.9%)	05 (35.7%)	66 (30%)	16 (38.1%)

These findings imply that farmers’ level of education has an influence on usage of radio and television as sources of agricultural knowledge. The level usage of radio and television as sources of agricultural knowledge increases with an increase in farmer’s level of education.

3.4 Strategies to improve accessibility of radio and television agricultural programmes among farmers

Radio and television have a great potential in provision of agricultural knowledge to farmers because of their ability to reach more people at a time. For improving the usage of radio and television as sources of agricultural knowledge the following has to be implemented:

i. Increasing the number of agricultural programmes broadcasted in a week

Despite their potential findings from Focus Group Discussions indicate that there were few agricultural programmes broadcasted in a week. These findings are in-line with those of Shetto (2008) who found that in Tanzania there are few radio and television agricultural programmes broadcasted in a week and that there is no radio or television station dedicated to agricultural information services. Therefore, for optimizing the usage of radio and television sets as sources of agricultural knowledge among farmers it is important to increase the number of radio and television agricultural programmes within a week. This is supported by Sam & Dzandu (2015) who also mention increasing the number of agricultural programmes within a week increases the chances of being heard/watched by more farmers.

ii. Conducting farmers' agricultural knowledge needs

Results from Focus Group Discussions revealed that not all agricultural programmes broadcasted were useful. To increase the impact of agricultural programmes to farmers, it is important to conduct farmers' agricultural knowledge needs assessment from time to time. Ronald et al. (2014) mention that farmers' knowledge needs vary from time to time and therefore farmers' knowledge needs assessment helps to determine what farmers need at a particular time. According to Barrick et al. (2011), knowledge needs assessment helps to know the exact categories of knowledge to be provided and helps to maintain relevancy of the knowledge provided with needs. To have an impact to farmers, radio and television agricultural programmes should base on agricultural knowledge needs assessment results.

iii. Optimizing the use district and community radio and television

The major crops grown in different agro-ecological zones are not the same. Moreover, cropping calendars differ with agricultural zones. It is also common for different agro-ecological zones to differ in terms of rain season. For these reasons district and community radio and television stations are more suitable for addressing farmers' agricultural knowledge needs in specific agro-ecological zones.

iv. Awareness on radio and television agricultural programmes

To increase the impact of agricultural programmes, radio and television stations should have well known daily schedules. To make farmers aware of radio/television agricultural programmes schedules it is important to create awareness to listeners through different media including radio, television and social media.

v. Appropriating the time for broadcasting agricultural programmes

To be more impactful, agricultural programmes should be broadcasted after farm activities. Findings from Focus Group Discussions indicate that farmers perform agricultural activities from early morning to late afternoon. This implies that if radio and television agricultural programmes are broadcasted during this time they can hardly be impactful because the intended audience will not manage to access the disseminated knowledge. This is supported by Hailu et al. (2017) and Odiaka (2011) who describe that the best time to broadcast agricultural programmes is after farm activities when farmers can have time to listen/watch. Broadcasting agricultural programmes

when farmers perform agricultural activities reduces the level of accessibility and their impacts to farmers.

vi. Facilitating ownership of radio and television among farmers

Findings in Table 4 indicate that 81% of the farmers had access radio broadcasts, 63.7% owned radio sets while 61.5% used radio as sources of agricultural knowledge. Likewise, 26.8% of the farmers had access to television broadcasts, 21.6% owned television sets while 21.6% used television as sources of agricultural knowledge. Findings further indicate that 96.5% and 100% of those owning radio and television sets accessed radio and television agricultural programmes respectively. This implies that ownership of a communication tool influences its usage as a source of agricultural knowledge. This is supported by Tihamiyu et al. (2011) who found that the more farmers own ICT tools the higher the frequency of using such tools for agricultural purposes. Therefore, enhancing ownership of radio and television sets can raise the usefulness of these tools as sources of agricultural knowledge. Ownership of radio and television sets can be made possible through improving the radio and television infrastructure in the country. This can be done through adequate investment in the radio and television networks. This must be accompanied by reduction in tariffs associated with acquisition of radio and television sets.

vii. Improving electric power infrastructure

Findings in Table 6 indicate that access to sources of power influences the use of radio and television as sources of agricultural knowledge. Among those using radio as source of agricultural knowledge 60.1% were connected to the national electric grid. Likewise, 89.7% of farmers using television as the source of agricultural knowledge were connected to the national electric grid. Results from Focus Group Discussions reveal that it was easier to acquire an alternative source of power other than electric from the national grid to run a radio set than a television set. It was for this reason more farmers owning television sets were connected to the national electric grid. This implies that since power from the national electric grid is more reliable then connection to it can motivate farmers to buy radio and television sets. It is thus evidently that adequate investment in the power sector can increase the level of usage of radio and television as sources of agricultural knowledge among farmers.

An effective communication system involves a good feedback mechanism. Findings in Table 7 indicate that only few farmers managed to seek for clarification from broadcasted agricultural programmes. Results from Focus Group Discussions reveal it was difficult to get a feedback from broadcasted programmes. In most cases feedback was delayed because most agricultural programmes were not live. This limited farmers from having instant feedback For effective dissemination of agricultural knowledge radio and television stations should device suitable feedback mechanisms. This can increase their credibility and dependability as sources of agricultural knowledge among farmers.

4. CONCLUSION AND RECOMMENDATIONS

Regardless of their potential, the use of radio and television as sources of agricultural knowledge among farmers in Tanzania is still low. Limited ownership of these ICTs and poor infrastructure supporting their usage are some of the factors limiting the level of usage. Moreover, the very low number of agricultural radio and television programmes in a week limited the usage of radio and television as sources of agricultural knowledge. It is therefore recommended that radio and television stations should promote their agricultural programmes before airing them; they should also increase the number of agricultural programmes to be aired per week. The Government should reduce tariffs associated with acquisition and maintaining radio and television. Moreover,

the Government and the private sector should work together and improve the radio and television infrastructure in the country.

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