



UNFFE ICT4FARMERS BASELINE INDICATOR SURVEY REPORT FOR ENHANCING ICT ADAPTION, SERVICE DELIVERY, CONTENT AND DIGITAL SKILLS FOR SMALLHOLDER FARMERS



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By



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1. CHAPTER ONE: CONTEXT AND BACKGROUND TO THE STUDY

1.1. Introduction and Background

Uganda Communications Commission (UCC) was established under the Uganda Communications Act 2013 with the objective of developing a modern communications sector and is mandated by the Act to promote use of new communication technologies in the transformation of the country into a knowledge based economy. Furthermore, UCC administers the Rural Communications Development Fund (RCDF) a Universal Service Fund (USF) to communications in Uganda. Under RCDF UCC supports a number of initiatives in health, education, agriculture, private sector among others with the aim of promoting uptake of ICTs in the country.

We noted that in the execution of her mandate, Uganda Communications Commission (UCC) through the Rural Communications Development Fund (RCDF) launched a call for business plan proposals to establish a collaboration on the implementation of key activities under a general thematic area of enhancing ICT adoption in agricultural among small holder farmers. According to a study which was conducted by the UCC in 2019 on the state of ICT4Agric Innovation in Uganda.

The study revealed that, indeed agriculture employs over 70% of Uganda's population, of which majority are youth and women. These observations are in line with various studies and policy instrument of government including the MAAIF strategic plan, the Agriculture extension policy 2016 among others. The report noted that over 70% of the farmers are smallholder farmers based in rural areas, whose operations are greatly affected by; climate change, weak digital skills, limited access to productivity knowledge along value chains, limited access to quality farm inputs, weak logistics systems, limited access to quality extension services, weak business intelligence, limited access to quality markets among others. The emerging 4th industrial revolution powered by artificial intelligence, 5G and data science does provide possibilities of addressing some of these challenges as illustrated in the figure below;



Figure 1: ICT Revolution

The UCC study also revealed that, indeed Uganda has witnessed a rapid development of ICT4Agric Innovation, but the uptake of these innovations is constrained by a number of factors including; limited awareness of these innovations, low internet and smart phone



penetration especially in rural areas, lack of appropriate digital skills, inappropriate programmes implementation models which are project and donor driven, limited articulation of value add to various stakeholders among others. Furthermore, the study on the state of ICT4Agric Innovations in Uganda revealed the following outstanding challenges:

- i. Agriculture content development and distribution to farmer remains uncoordinated. This has a negative impact on the quality of information farmers receive to make critical decisions.
- ii. Existing content was mostly text based and in English yet majority of farmers preferred content in their local languages, which is multi-formatted.
- iii. Majority of farmers and other value chain actors lacked knowledge and skills to harness the power of ICTs, especially their application of ICTs in monitoring and evaluation on quality of service in the extension system and farm level processes.
- iv. Awareness and accessibility of Agriculture ICT innovations by farmers who need them was very limited.
- v. limited access to quality extension services among others

We noted that, as part of contribution of addressing challenges identified in the study and those emerging especially in the post COVID 19 era, UCC/RCDF is seeking to collaborate with a suitably qualified applicant (partner or consortium of partners) with the requisite qualifications, resources, competencies and experience as per the eligibility criterion and statement of requirements as presented in the call for proposals.

1.2. Objectives

The overall objective of this baseline is to establish baseline indicators for the agricultural sector stakeholders towards the ICT4farmers project.

The specific objectives include;

- a) To establish the social-economic status of the programme beneficiary
- b) To establish the current ICT usage and access patterns among the stakeholders
- c) Determine the baseline indicators for the implementation of the ICT4Farmers project.
- d) Identify the potential challenges and opportunities for the project implementing team.

1.3. Research Questions

To achieve the objectives of this research, the following were some of the key guiding research questions.

- a) What are the existing social and economic characteristics of the stakeholders?
- b) What are the current ICT usage and access patterns among the stakeholders?
- d) How appropriate are the different ICT mediated learning models proposed to be implemented by the project for different target groups?
- f) What are the key challenges the project is likely to face?
- g) What are the emerging opportunities the project can take advantage of?

1.4. Report Organization

The rest of the report is arranged in three sections. Section 2 presents the research approach and methodology, Section 3 provides a discussion of the study findings and Section 4 presents the emerging conclusions and recommendations.



2. CHAPTER TWO: METHODOLOGY AND APPROACH

2.1. Approach and Methodology

This chapter presents the approach and methodology which was used to conduct the research. Section 2.1 details the research approach and section 2.2 discusses the various methodologies which were used. Section 2.3 presents a discussion on the data collection and analysis procedures and highlights quality control processes followed.

2.2. Research approach

This study was conducted using a multi-dimensional mixed research method approach taking into account the consultative nature and flexibility demanded in engaging stakeholders at various stages of the study. The researchers used the methodology based on participatory action research because the proposed activities involved a significant social component.

The participatory action research approach is a means of addressing the gap between the researchers and intended beneficiaries of the research (Mirembe, 2015). The approach is cyclical with four inter-related stages (plan, act, observe, and reflect). Adopting this methodology enabled researchers identify the various issues that needed to be addressed by the project implementers but also calibrate indicators to measure the results of their actions (establish baseline indicators). To be more explicit, for the baseline survey, the researchers examined the interactions and relationships in social settings through; key informant interview, survey questionnaires, focus group discussions and observation. The study followed a systematic consultative approach from the assignment understanding phase, through tool design and data collection, to data analysis.

In the *understanding phase or plan*, the focus was to interpret the needs for baseline study and formulate a general approach to accomplish the assignment. This largely involved assembling the research team to undertake the study, team orientation on methodologies, and review of background documents.

The second stage codenamed "*the design phase*" was focused on defining the guiding research questions, development of the overall strategy of assignment implementation, sample space mapping, creation of team coordination, reporting structures and development of research tools. This phase considered issues such as data sources, sampling, data collection, and data quality control among others. It is during this phase that sources of both primary and secondary data were identified and their validity and reliability assessed. The schedule of activities was developed and agreed upon with concerned stakeholders.

The third stage focused on *data collection and observation*, sourcing and reviewing of relevant documents. It also involved collecting primary data through conducting interviews, administering survey questionnaires and conducting focus group discussions

The last stage "*data analysis and reflection*", involved data cleaning, analysis, report writing and validation of the findings among selected key stakeholders.

2.3. Research design

It was estimated that Uganda had about 3 million smallholder subsistence farmers, who own an average farmland area of 2.5 ha. The agricultural sector is dominated by the production of food crops, but cash crops, livestock, fishery and forestry are also important. Taking 3 million small holder farmers to represent the population size and the desired degree of precision (error margin) of 5% and confidence level of 99%, the estimated logical sample size is 666 respondents. To ensure sufficient convergence given the data stratification per region and respondent demographics, a sample size of 1,000 respondents was therefore selected. Respondents were selected from 5 regions of Uganda; **Eastern** (Jinja, Iganga, Pallisa, Kamuli, Budaaka, Soroti, Busia, Tororo, and Mbale), **West Nile** and **Northern** (Arua, Koboko, Nebbi, Zombo, Pakwach, Yumbe, Pakwach, Lira, karamoja), **Central** (Kampala, Wakiso, Mpigi, Mukono, Luwero, Kayunga, Mityana, Mubende, Kalangala, Kiboga, Kiboga and Nakasongola), and **Western** (Kasese, Kabarole, Kyegegwa, Kyenjojo, Bundibugyo, Kasese, Bunyangabu). The matrix below summarizes the research design.

Table 1: Matrix of Study Respondents as per the Region

No	Category of Respondents	Examples	Method of Soliciting Responses	Totals					
				Central	Northern	Eastern	Western	Rwenzori	
1	Smallholder farmer's	majority which are women and youth	Survey Tool Focus group discussions	150	200	150	200	150	850
2	Value chain actors (;	suppliers of farm input, produce aggregators, food processors among others)	Survey Tool	15	15	15	15	10	70
3	Policy makers, community leaders	(opinion, cultural, local and national leaders);	Literature, KII	10	10	10	10	10	50
4	researchers;	civic society organizations and journalists	KII & literature	10	5	5	5	5	30
	Total								1000

2.4. Data Collection

The researchers employed both qualitative and quantitative methods of data collection. The researchers used semi-structured survey protocols to collect the data. The first section of the survey tools captured the respondent's background and profile, access to call services for Agricultural, nature and number of devices used by the farmers. The second section focused on the farmer's ICT usage, internet and social media usage by the farmers, attention to

mass media, expenditure on airtime and data bundles and knowledge about various ICT farmer related services. The data collection tools were classified into two sets to enable an in-depth inquiry of the subject matter. These included: *i) Part One - Respondents Profile; ii) The usage of ICT among farmers. 3) Knowledge levels of ICT*

The questions were formulated based on the objectives of the study as well as initial expert opinions and observations from literature. To ensure that valid and quality data were collected, the data collection tools were tested for content validity. The tool validity focused on clarity of statements and relevancy to the research objectives (Mirembe, DP, 2015). The study tools were piloted using three experts who did not participate in the final study to assess the validity of the statements. Questions that were poorly phrased or found irrelevant for the study were corrected or deleted during this exercise, resulting into a valid tool. The data was collected using the following methods.

The targeted audience for the dissemination strategy included: smallholder farmer's majority which are women and youth; value chain actors (suppliers of farm input, produce aggregators, food processors among others); community leaders (opinion, cultural), policy makers (local and national leaders); researchers; civic society organizations and journalists.

Table 2: Description of Tools used in the Study

Tool	Description
Survey Questionnaires (SQ)	This was used to collect information mainly from; the Individual customers, Institutional customers, and wholesalers and retailers. The questionnaires included two sections <i>1) respondent demographics 2) ICT usage patterns 3) Knowledge levels of ICT</i> that were well explained questions and instructions with optional answers. The questionnaires were administered through one on one engagement to respondents by the researchers through a survey. The tools were digitalized and data submitted to the server in real time. The tools were first reviewed and pre-tested by the experts who did not participate in the final assessment. (Appendix A)
Key Infomart Interviews (KII)	KII protocol was used to collect opinions from; Policy makers, community leaders and researchers in the agricultural sector. These were administered to at least 10 leaders from each region. The responses from key informants were largely used to generate thematic issues in line with the objectives of the assignment and provide strategic direction as far as product positioning is concerned. (Appendix B)
Focus Group Discussions (FGDs)	Three (5) FGD comprising of at least 10 members each were carried out in each region. The FGDs broadly discussed the key <i>the knowledge level of ICT among the farmers and the skills need to enhance farming through ICT.</i>
Desk Research (DR)	Besides primary data, the secondary data was needed to understand the assignment. Key for desk research was understanding the farmers knowledge in ICT.

2.5. Data Analysis

After the data was collected, it was cleaned, coded and analysed. The data was analysed qualitatively and quantitatively. A spread sheet application was used to analyse both quantitative and qualitative data and partly was analysed using thematic content analysis. This was done largely to improve the researchers understanding of the responses. The meanings and implications arising from study participants' responses were then explored and synthesized for presentation.

3. CHAPER THREE: STUDY FINDINGS

This section details the findings of the ICT knowledge and usage patterns. Section 3.1 presents general *respondent demographics*, Section 3.2 presents the *ICT Usage patterns among the respondents*.

3.1. Respondent demographics and comparisons

We observed that the analysis of respondent demographics was largely informed by secondary literature, key informant interviews and results of the survey.

a) General respondent Demographics

A total of 834 respondents participated in this study, of which 53.4% were male and the rest female. One in three of respondents (47%) were between the ages of (36-50) while (36.9%) were aged (26-35). About 33% and 26.7% attained primary and secondary level of education respectively as illustrated below; There these profiles are in line with the typical profiles of the farmers today.

Table 3: Gender Demographics from the study

VARIABLE NAME	GROUP	NUMBER	PERCENTAGE (%)
Gender	Female	389	46.6
	Male	445	53.4
	TOTAL	834	100
Age	18-25	37	4.4
	26-35	308	36.9
	36-50	392	47
	>50	97	11.6
	TOTAL	834	100
Region	Northern	321	38.5
	Western	79	9.5
	Eastern	195	23.4
	Central	229	27.5
	West Nile	10	1.2
	TOTAL	834	100
Highest Level of Education	Primary	278	33.3
	None	39	4.7
	Tertiary	150	18
	Degree	60	7.2
	Diploma	84	10.1
	secondary	223	26.7
	TOTAL	834	100

a) Comparison between the age of the respondents and their gender

Below is a comparison of the number of respondents and their gender per a particular age group. In order to establish the gender responsiveness to the study per age group *refer to figure 1* below;

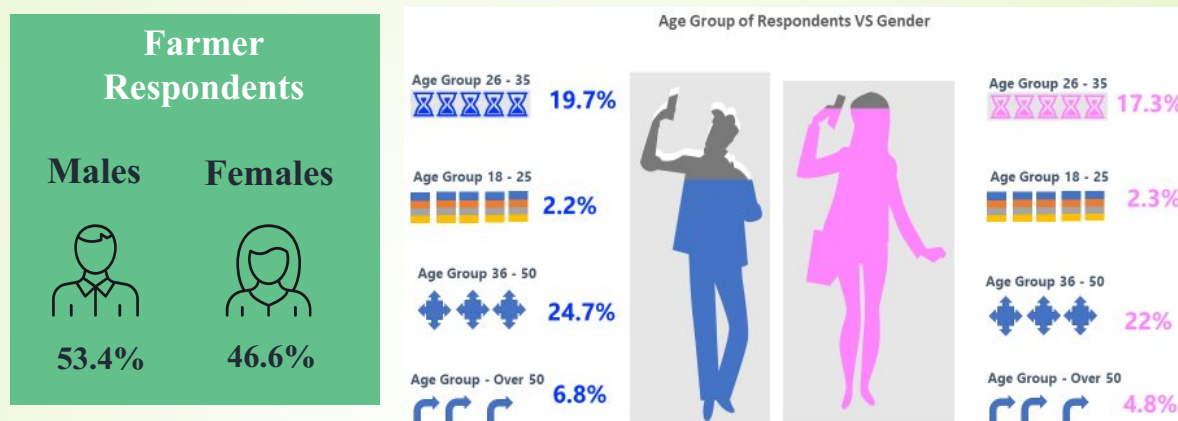


Figure 2: Comparison between gender and age group responsiveness

Figure 1 describes that there were more males (53.4%) than females (46.6%) reached during the study and the age group of 36-50 years were the majority in both genders. It was also noted that there are also young farmers between the ages of 18-25 but these were the least within the study for both genders.

b) Comparison between the age of the respondents, their gender and respective regions

The study also captured information concerning the regions where the participants in the research came from and are described in the figure 2 below.

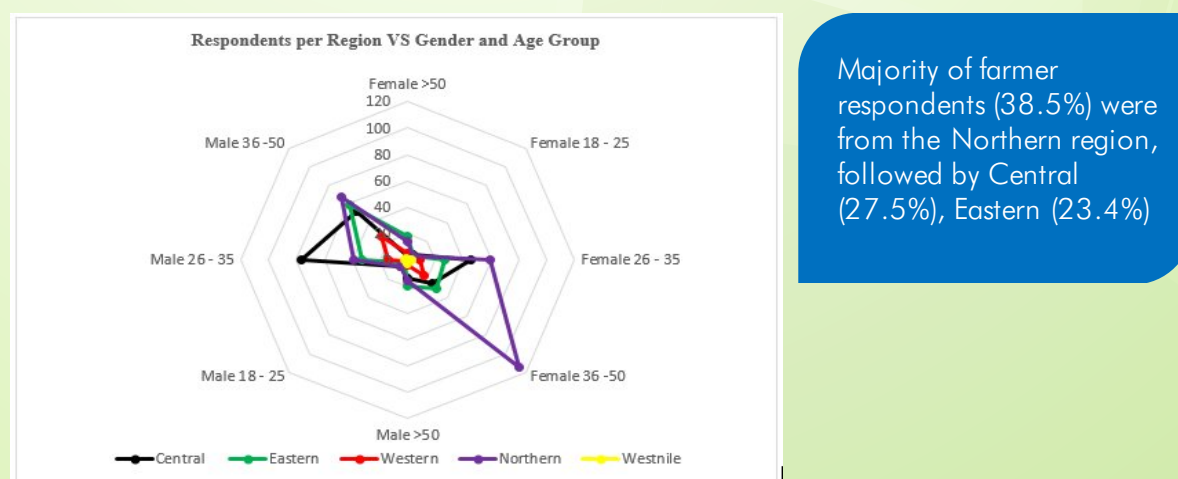


Figure 3: Comparison between the age of the respondents, their gender and respective regions

The results further reveal that majority of the participants were from the northern region and these were females (35.5%) followed by males (20.9%) all aged between 36 – 50. The west Nile region (1.2%) had the least participants followed by western region (9.5%) of

Uganda. The eastern region of Uganda had the oldest group of participants within the study hence had the oldest group of farmers as compared to the other regions.

c) Highest level of education

From the study, it was important to understand the levels of education for all the participants and hence data was collected correlated and presented in the figure 3 below.

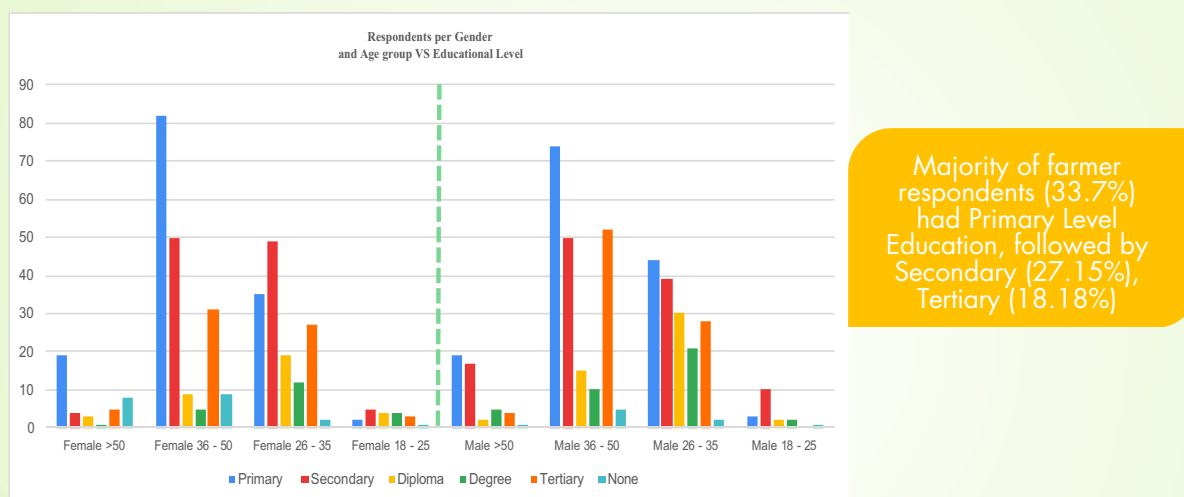


Figure 4: Comparison between the respondent's gender and age group versus Educational level

Majority of the farmer respondents who had lower education were from females aged 36-50 followed by Males aged 36-50. Most educated were from Male aged 36-50 and Females 36-50 respectively. However, it should be noted that this is the same age group that had the majority farmers who responded to the study. From this study, it can be concluded that majority of the farmers may not have higher levels of education since 60.85% of the total participants in the study had secondary or primary levels of education. Deducing further these statistics, lower levels of education have been found to adopt less of technology in other researches undertaken across the world.

d) Respondent Agricultural Enterprise Category.

In terms of the agricultural enterprise carried out, this research study shows that majority of the respondents **87.2%**, carry out crop production, 61.6% carry out animal husbandry (i.e. cattle keeping, piggery, goat keeping, etc.), **46.3%** carry out poultry, **8.7% are involved in forestry**, 2% fisheries and 1% are traders of the agriculture produce in that order of preference as illustrated in the table below.

Table 4: Respondent agricultural enterprise category

Enterprise	Number	Percentage (%)
Forestry	73	8.7%
Crop	728	87.2%
Trade	8	1%
poultry	387	46.3%
Animal Husbandry	514	61.6%
Fishery	17	2%

In terms of gender participation of the agriculture enterprises, the results revealed that: females between 36-50 are more involved in the crop husbandry (172), 26-35 carry out animal husbandry (89) and poultry (77) respectively, while males between 36-50 are more involved in animal husbandry (133), 26-35 in crop production (129) and poultry (70). A small number of farmers aged 18-25 who are from the youthful population who were females were most participating more in in the crop and animal husbandry as compared to the males who were participating more in the crop and poultry agriculture enterprises (refer to figure 4). However, the numbers of youth participating in agriculture are very low and this was backed up by a researcher who indicated that;

“the youth are not interested in agriculture since they regard it as an activity for the old people, rural people, poor and un educated”

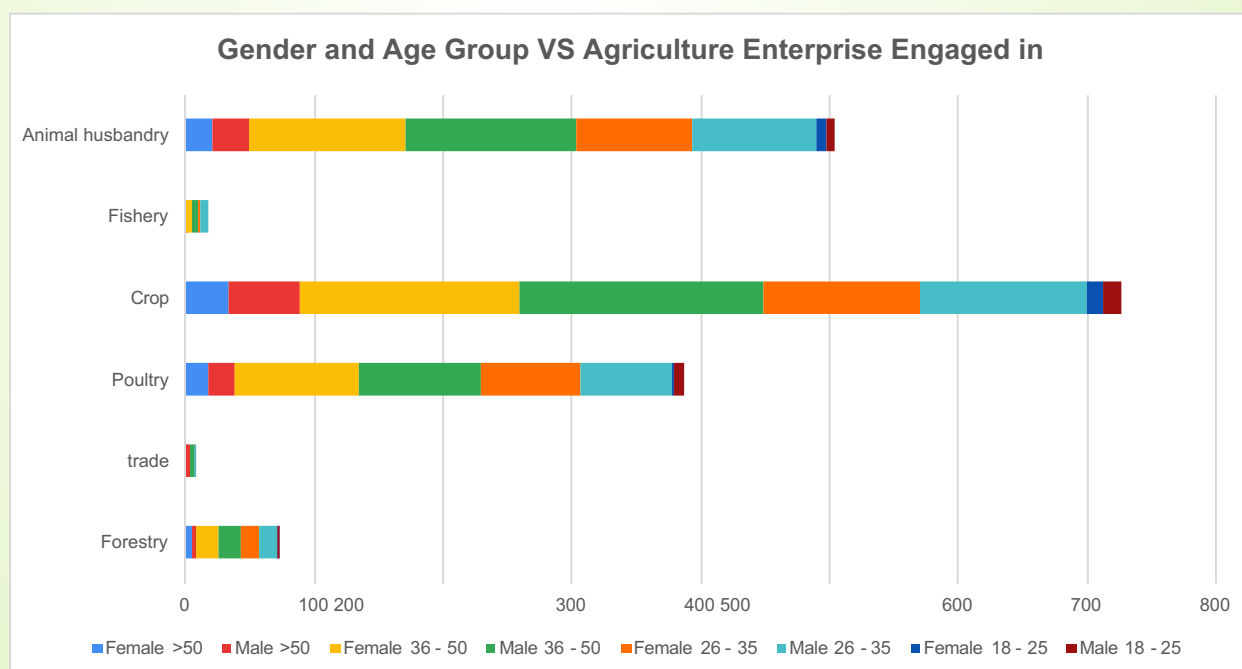


Figure 5: Comparison between the respondent's gender and age group versus Agricultural enterprise

Since there were some enterprises which were more pronounced than others, the study decided to focus on the 3 most pronounced ones to find out who is most involved. The figure 6 below describes the Animal husbandry, crop and poultry enterprises against the gender age groups.

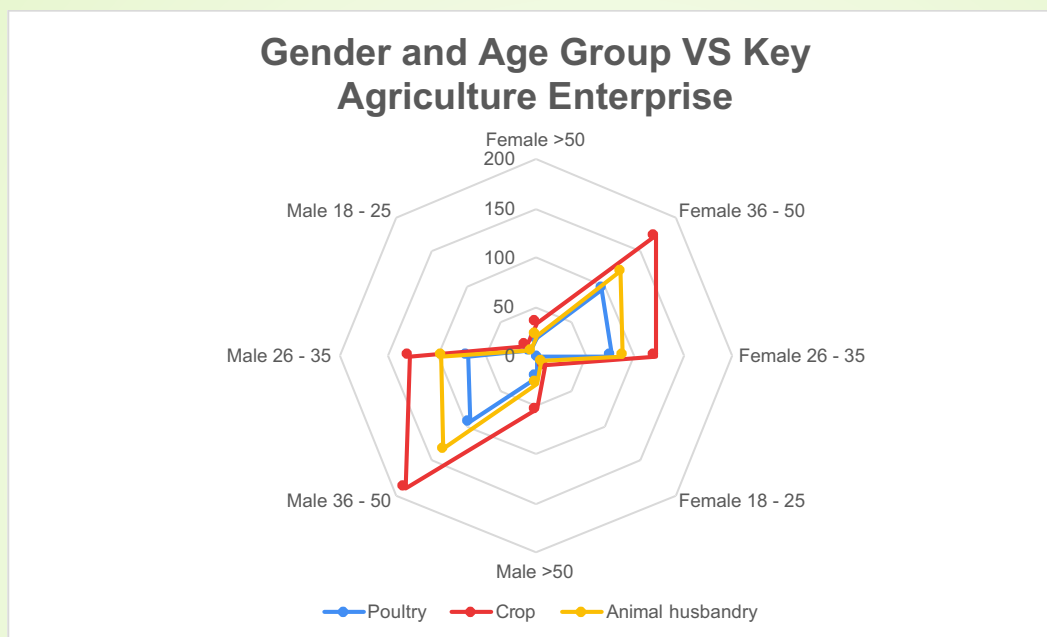


Figure 6: Key Agriculture Enterprises VS Gender Age Group

It is clear from figure 6 that the crop agriculture enterprise stands out amongst the other two (Animal Husbandry and Poultry). It should be noted that again the females within the age group of 36-50 are the majority crop farmers followed by males within the same age group. It should be noted that it is in the Animal Husbandry were the males within the age group 36-50 participate more than the females in the same age group.

e) Access to call centre services.

In terms of access to farmer call centre services the results indicated that; majority of the respondents **77.1%** declared that they currently have no any access to any call centre services and only **22.9%** of the respondents have access to call centre services for Agriculture. It is important for farmers to have access to the call centre services as indicated by one of the respondents below;

"Sometimes you want some information concerning where to sell our crop products but you do not where to do so. This has caused a lot of our products to get spoilt because of lack of market."

With such statements coming from one farmer it is an indication that the call centre is something very important that farmers need to access vital information. There is a lot of information that is very useful to farmers but not easily accessible to them. This is proof that an agriculture call centre is very important and needed to be developed.

f) Devices used.

The study sought to understand the nature of devices used by the farmers so as to acknowledge if the devices can be used for ICT integrations. And from the research, majority of the respondents **88.4%** use ordinary phones, **31.9%** use smart phones, **29.7%** have access to televisions, **6.1%** use laptops and **3.4%** use desktops in that order of preference.

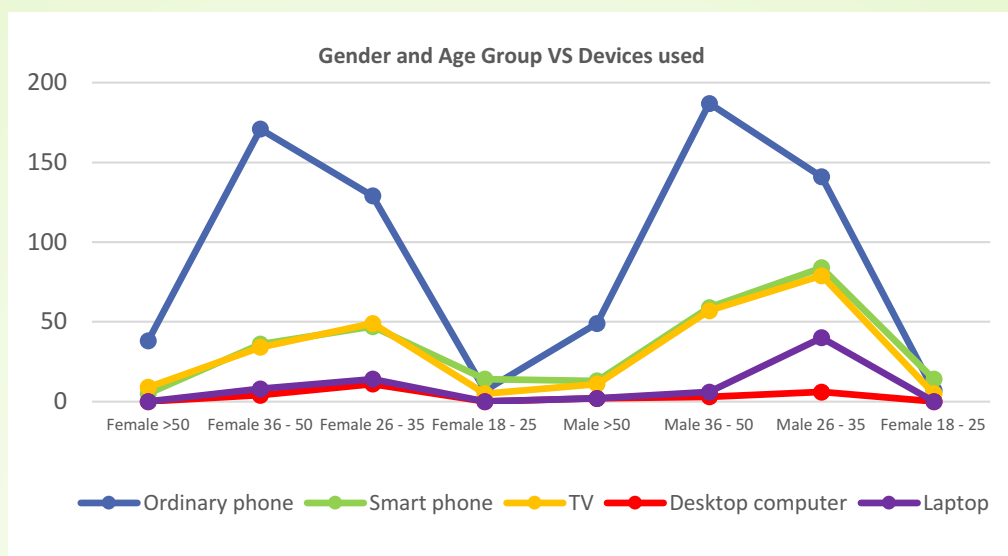


Figure 7: Comparison between the respondent's gender and age group versus devices used

It is important to note from the results in figure 7 that farmers' adoption to modern technologies is low since majority of them were using the ordinary phones in their day to day business. These ordinary phones cannot receive majority of the information that is currently being authored and hence there is need to avail more information that is can be easily accessible to majority of the farmers. Something else to note is that despite that majority of the farmers who owned ordinary phones were males aged 36-50 almost the same number were owned by the females from the same age group. The least farmers who owned ordinary phones were from the age group of 18-25 for both genders. Looking at those who owned smart phones it should be noted that males aged 26-35 were the majority followed by females from the same age group. Notably there are more males using smart phones than females amongst the farmers. However, what should be emphasised out of these results is that there are more female farmers than males of which they use majorly the ordinary phones. Therefore, more technology applications that target ordinary phones should be developed. Also, sensitization needs to be done more to encourage farmers to access more of the smart phones since there are a lot of applications already on market for use.

This study further sought to establish the number of devices owned by the different respondents and the results are as follows; majority of the respondents (85.6%) own one mobile phone, 77.7% own one radio while majority of the respondents 94.3% and 90.1% do not own any laptop and desktop respectively as described in table 5.

Table 5: Respondents number of devices used

Devices	1		2-3		None	
	No.	%	No.	%	No.	%
Mobile phones	715	85.6%	108	12.9%	7	0.8%
Laptop	67	8%	5	0.6%	752	90.1%
Desktop	34	4.1%	0	0	787	94.3%
Television	287	34.4%	5	0.6%	533	63.8%
Radio	649	77.7%	12	1.4%	166	19.9%



The results further reveal that despite of the majority of the farmers owning one mobile phone, there is a 12.9% which owned 2-3 and 0.8% owned none. This is an indication that some of the farmers have resorted to owning several phones in order to tap into the opportunities brought it in by the different types of phones. Also, it is an indication that majority of the farmers are not accessing computing technologies such as laptops and desktop computers. Further scrutiny of the farmers who responded indicated the lack of access to technologies such as smart phones as mentioned by one of them from the northern part of Uganda.

"I have 2 phones that I use during my business of which I bought one and the other was given to me by a team from Makerere University. I cannot afford buying a smart phone and also putting data all the time but with support from Makerere University I was able to use this smart to find out things concerning my produce."

The information coming from the farmer indicates that there are several projects within the country that focus on using ICT for Agriculture that have provided smart phones to the farmers. What should be noted that majority of the farmers may not be in position to purchase smart mobile phones to use in their day to day business and hence need support if technologies developed are to be easily adopted.

3.2. ICT usage patterns among the respondents

a) Community Access to devices as expressed by the Respondents

Since it was already known from the analysis above that farmers possessed some technologies they could use during their business, it was important to understand if such were accessible to the rest of the community. Therefore, the research sought to establish the farmer community access and use of the following devices; basic mobile phone; smart phone; television set; radio receiver; and internet enabled computer. The results revealed that; majority of the respondents (502) indicated that >50 community members had access to a basic mobile phone, that respondents (362) indicated that <10 community members had access to a smartphone, that respondents (318) indicated that <10 community members had access to a television, that respondents (338) indicated that >50 community members had access to a radio receiver, and that respondents (349) indicated that <10 community members had access to a computer in that order of preference as further described in figure 8. The information from analysis indicates that majorly they have access to mobile phones and therefore activities related to sensitization should be pushed more into that direction. However, the radio receivers were also popularly used by the community and hence should be used for the sensitizations campaigns.

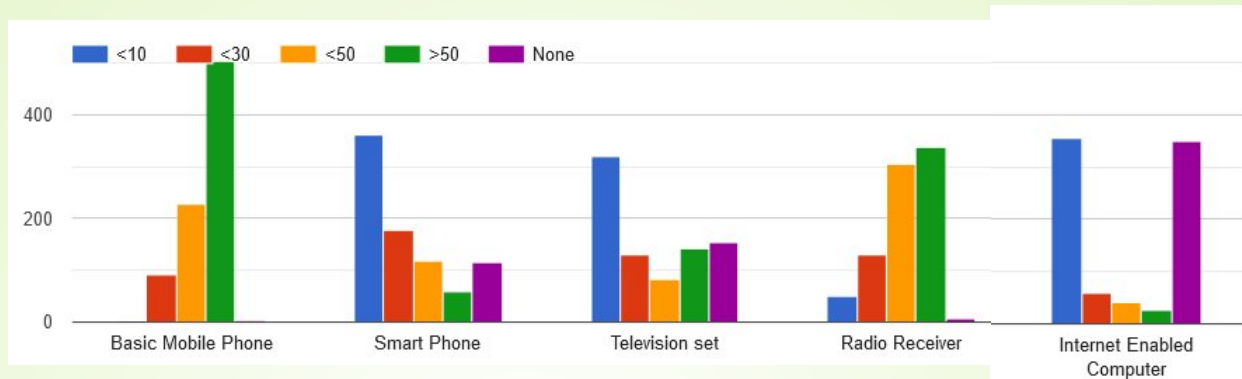


Figure 8: Figure 6: Community access to the different ICT devices

b) Social media platforms used

In terms of social media platforms used by the respondents, the results indicated that; the respondents use; **Facebook** (~44%) **WhatsApp** (~41%), and **YouTube** (32%) in that order. Results show that 22.3% of the respondents use **Twitter** while only 20.6% use **Instagram** and only 16.4% use the **UNFFE** and 16.2% use **MAAIF** websites as described in figure 9.



Figure 9: Use of Social Media Applications by the farmers

The use of WhatsApp was evenly spread across; gender, age group, region, and highest level of education. However, of the (186) respondents that indicated to use twitter, **57.5% were** people in the age group of 26-35 years and had attained a university level of education (**51%**- diploma and **12.8%** - degree). This indicates that Twitter is an application that is mainly by the well-educated farmers. Of the 365 respondents that agreed to have used Facebook majority **86.3%** were between 18-35 years of which **65.2%** did not acquire any university level of education. This results further indicates that the Facebook application is usable to mainly the youth and not necessarily educated youthful farmers. These results are further backed up in the Digital 2020 report that states that "there are approximately 10.67 Million internet users in Uganda, of these (2.5million) are social media users in as

of January 2020 representing a 5.6% penetration across the country which is still low compared to the 17% average usage across various countries on the continent.

According to the Social Media statistics for the month of April 2020 released by Global Stats¹, Facebook is the most used platform in Uganda accounting for 53.87%, with Pinterest following in at 23.03%. While social media platforms most used by corporate classes like; Twitter account for 15.31%, YouTube 6.36%, and Integra had only 0.69%. It emerged from the study that, majority of the Facebook users access the platform via their mobile phones (64.76%), while 35.24% access the platform via desktop computers. On the other hand, there are more Pinterest, Twitter, and YouTube users via desktops than those that use their mobiles to access the services.²

As noted by one key informant

"Twitter is largely used by middle class corporates, while Facebook is for teenagers and University students. I have a Facebook account which I hardly update, I can spend 5-7 months without logging in"

c) Purpose of the social media platforms and time spent while using them

In terms of purpose for which the respondents used social media, it was established that social media use cuts across various areas i.e. communication, entertainment, news, business, education among others and the results revealed that; **25%** is used for communication, **17%** is used for news updates, **16%** is used for education, **15%** is used for entertainment, **14%** is used for business purposes and **13%** is used it for none in that order of preference (described in figure 10).

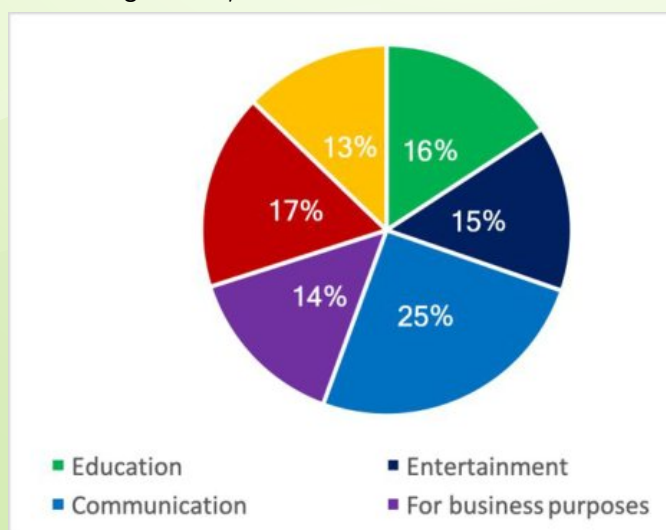


Figure 10: Respondent Purpose/use of social media

The results further reveal that social media application are majorly used for communication since it is the easiest and cheaper way of reaching out to each other. By form of communication, it believed that Facebook and WhatsApp are the notable application in use. There was also a sizeable number of farmers who expressed to have used the

¹ <https://gs.statcounter.com/social-media-stats/all/uganda>

² <https://techjaja.com/ugandans-use-facebook-more-than-twitter/>

applications for news updates and education. Therefore, such applications are very important to transfer information in form of news and educational resources to the farmers.

d) Respondents time spent on social media platforms

In terms of time spent on social media, the results indicated that majority of the farmers (61.6%) spent less than 30 minutes using social media. However, of these 61.6% who spent <30 minutes, 34.5% of them were from the age group of 36-50, followed by age group 26 – 35 with 17.4% and least used by the age group 18 – 25 with 1.2% as further described in figure 11.

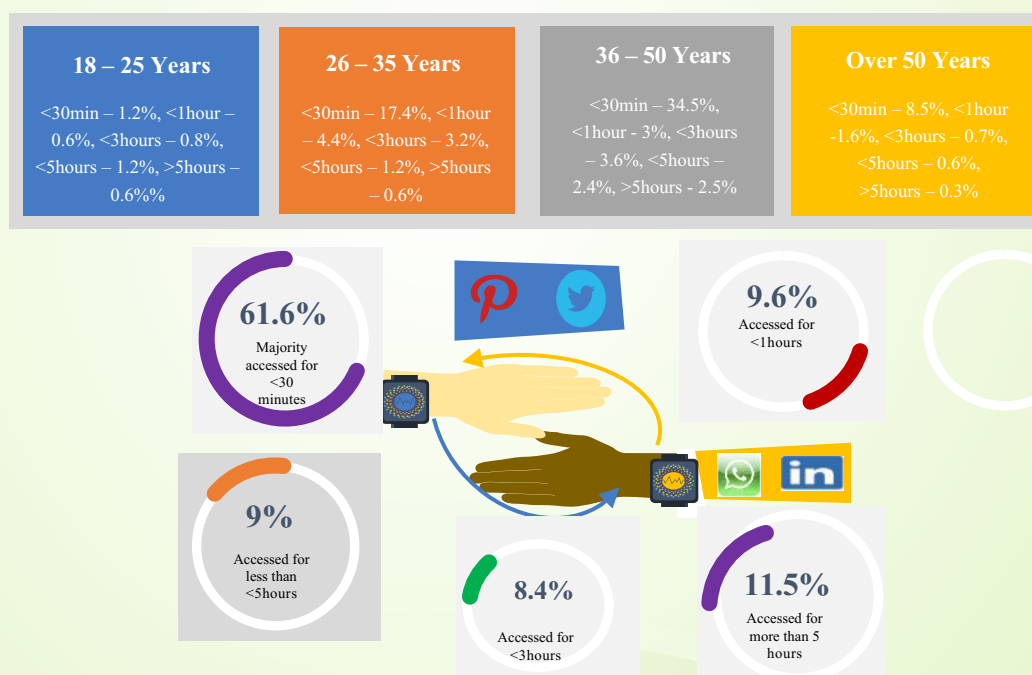


Figure 11: Respondents time spent on social media

The results in figure reveal that the age groups between 26 – 50 years are the most users of the social media applications and reasons could be attributed to the fact that this is mainly the working and stable class of farmers. They can easily afford to have access some resources which they can use for social media access. But also, something that should be noted is that the use is still low amongst farmers since majority of them used social media for less than 30 minutes only. There is need of developing innovative ways through which farmers can have access to some social media applications and use them for their agriculture business. One of the farmers who used social media indicated that;

“I use WhatsApp to communicate to my fellow farmers in the association where we discuss about prices to sell our produce and sometimes how we can collect funds to buy pesticides. It is easy for us but cannot afford all the time to have it working.”

The message we extract from the farmer is that affordability to access social media applications is huge and hence affecting them from carrying out some business. It would be good for government to develop innovative strategies with Internet Service Providers (ISPs) to support farmers in accessing internet at zero rates for agriculture purposes.

e) Respondents amount of money spent on airtime

As means to estimate the farmer sustainability, respondents were asked to indicate their average month expenditure on telephone bills (voice calls and data bundles). As far as expenditure on voice calls, results show that; **24.1%** spend on average less than 5,000/=, **22.8%** spend on average less than 10,000/=, **20%** spend less than 15,000/=, **18.9%** spend on average more than 25,000/=, and **14.4%** do spend less than 25,000/= per month.

The analysis of data on expenditure on data bundles, revealed that of the 835 who responded to the question, **(25%)** spend <5,000, **2.9%** spend on average less than 10,000/=, **1.2%** spend on average less than 15,000/=, **0.6%** spend on average more than 25,000/=, **0.4%** spend on average less than 25,000/= per month as illustrated in the Figure 12.

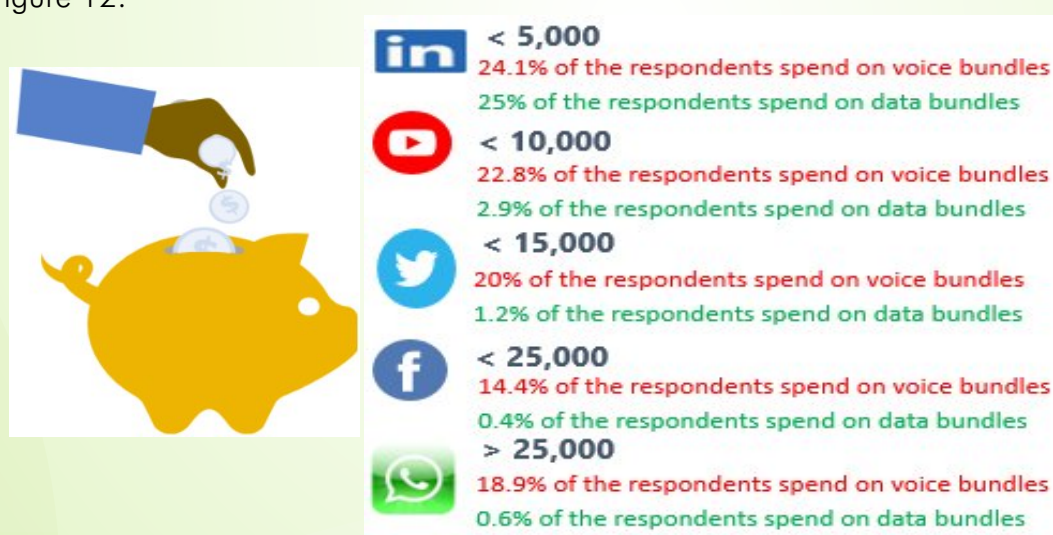


Figure 12: Respondents average monthly expenditure on airtime

There is no doubt from the analysis that farmers cannot easily afford to access resources for both voice and data. However, it should be noted that the country has agriculture as its back bone and greatly relies on it. Its significance to the economy is so huge but there seems not to be enough efforts to support farmers in making sure they have maximum output from their different agriculture sectors.

As a means to establish ways ICT can be enhanced among the farmers, this research also sought the factors that constrain farmers' ability to use ICTS and they were highlighted as follows;

1. Lack of reliable and cheap internet service connectivity to the people, most parts of the country are still underserving, especially rural areas where majority of the farmers live. Even in places where it is accessible, the costs are still high and that is why majority of them used it for less than 30 minutes only.
2. Limited information access and most especially for the farmers in rural areas that are not aware of the ICT tools to use and how they can be used to enhance service provision along the agriculture value chain.
3. High costs charged for the purchase, maintenance and use of the ICT devices for example the phones and computers.

4. Lack of electricity supply especially in the rural areas which makes it hard to maintain the devices in terms of battery life to last for longer hours.
5. High rates of computer illiteracy among the farmers of which has been caused by the lack of sensitisation to the farmers about the significance of such ICTs in agriculture.
6. Limited regulation of internet use which results into cyber bullying, spread of false information, criticism among others.
7. High taxes imposed on the use of the device i.e. Introduction of the OTT tax for all internet users further widened the accessibility gap of the farmers
8. Limited support from government and Non-government organisations to farmers in order to access and enhance their skills in the use of ICTS.

3.3. Knowledge sharing and content delivery methods

a) Content delivery models

This research further sought to establish the respondents' opinions towards their preferred models of remote content delivery and the results revealed that; majority of the respondents **57.7%** indicated a very high preference for farming radio programmes, **45%** for farmer call centre, **29%** for farming TV programmes, **14.1%** farmers magazine, **11.8%** SMS platform e.g. WhatsApp, in that order of preference. However, the respondents indicated a low preference on the following models; **30.5%** social media platforms, **26.8%** Digital media platforms in public places like markets, **24.4%** Online (e-workshops), **24.2%** Web based content platform and **20.6%** Custom UNFFE mobile application. Refer to figure 13 below.

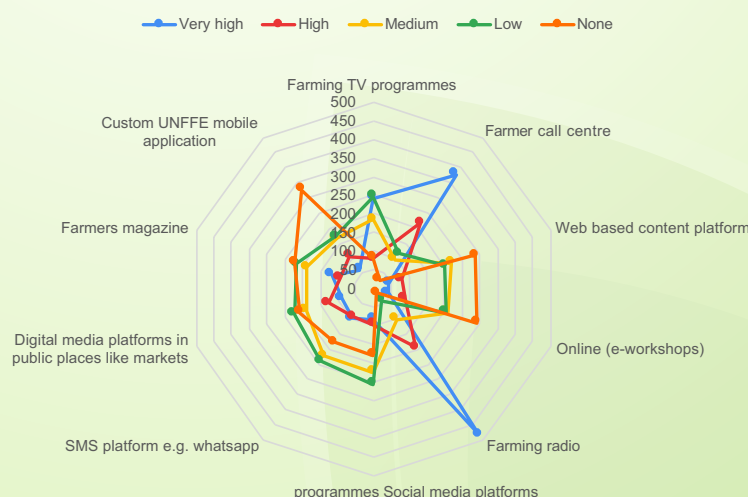


Figure 13: Respondents preferred content delivery models

The results in figure 13 revealed that the farmers were more interested in the traditional means of reaching out to them since they did not add too much daily cost to them as compared to the new technologies such as social media. It is therefore, important to sensitize these farmers on the usefulness and support that the new technologies can bring to them such as the ubiquitous access to information and their fellow farmers. In terms of the preferred language for delivery of services to the farmers, majority of the respondents **90.9%** preferred their local languages (Luganda, Lusoga, Rukiga, Runyakitara etc.), **50.2%** preferred English language, **26.9%** Swahili in that order of preference. This result signifies

that in all support provided to the farmers, the issue of localisation should be taken very serious for easy absorption of any innovation brought into the community. The applications developed should be localised including the content resources that is disseminated via the innovative technologies that will be developed. One of the respondents indicated that;

"My friend tried to access some information on where we could sell our Soya Peas but because both of us did not know how to read very well we could not find what we wanted. We gave up and waited for the agent who usually buys from us to take the Soya beans but at a less price."

The information above is an indicator that many of the farmers are falling victims of being cheated due to the fact that there is a language barrier within the agriculture sector. Several stakeholders speak and use languages they do not understand which creates a gap between the producers and final consumers. There is need to localise information to send to the farmers, through call centres, community radios among others, such challenges can be removed easily and faster.

b) Access rate to the content delivery platforms

In terms consistency of access to the following services that can be used for content delivery; watch television, listen to the radio, read a newspaper or magazine, surf the internet, or use social media. The results revealed that the most used service on a daily basis was listening to radio (635 respondents) followed by television (235 respondents) and social media (155 respondents). However, the service that was rarely used generally was the surfing the internet (526 respondents), followed by social media (447 respondents and then Newspapers (325 respondents) as described in figure 14.

What the results reveal is that any service that required extra cost from the original one that was used to purchase the technology from which the service is being offered was generally avoided by the farmers. This further reveals the fact that the farmers do not have too much resources to use on the technologies to acquire services but would prefer the free services offered such as TV and Radio programmes aired out. Therefore, such media should be used more often to reach out to the farmers or the other media services should be subsidised or offered for free if accessibility is to be encouraged.

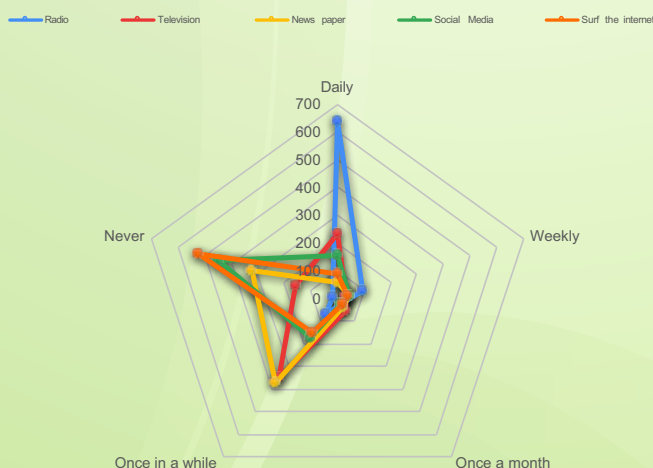


Figure 14: Respondents access rate to the content delivery platforms

c) Preferred time to run online farmer programmes and adverts

This study further sought to establish the respondents preferred time during the day (morning, afternoon, evening, night, weekend) and also the specific day of the week (Monday, Tuesday, Wednesday, Thursday, Friday, Saturday and Sunday). These were meant for running live broadcasts for farmer programmes and advertisements on radio and television. The results revealed that; majority of the respondents (493) preferred to receive radio and 418 preferred television broadcasts in the evening time of the day. The morning and afternoon time of the day was less favourable and the deduction from this is that at that time the farmers are busy with their farms. Further analysis showed that the preferred days of broadcast tended to improve from Monday towards Sunday. The least preferred day by the respondents for radio broadcast was Tuesday with 186 and 72 for television. The most preferred day by the respondents for radio broadcast and television was Saturday with 453 followed by television broadcast on Sunday with 446 and then radio broadcast with 376. These results clearly described in figure 15 below;

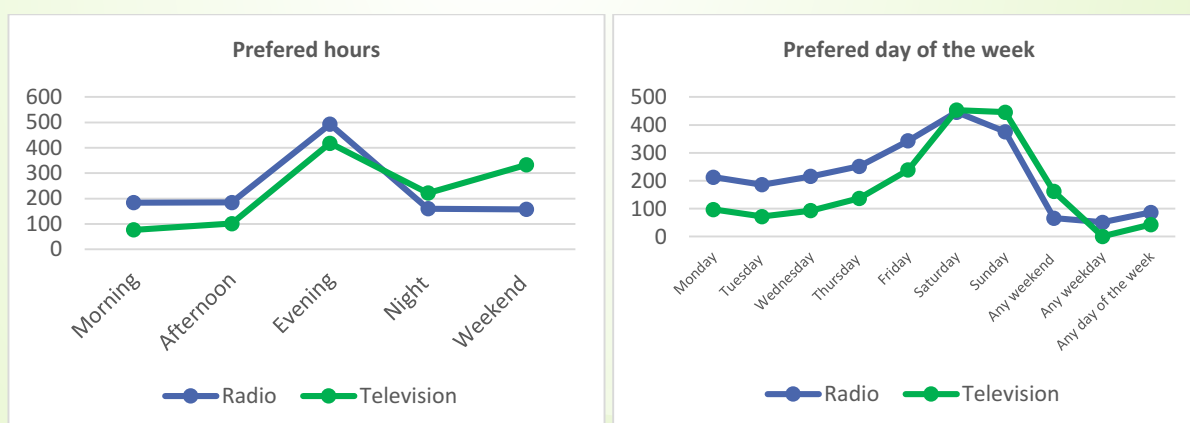


Figure 15: Respondents preferred time to run online farmer programmes and adverts

These results were backed up by a respondent from Masaka who indicated that;

"The evening hours are more favourable for listening to radio and watching TV while relaxing from the hard day's work. Sometimes we listen with our friends while taking some community beer. The morning and afternoon hours are meant for work with the rest of the family members"

The preference for the radio broadcast listenership was higher in the females in all the days of the week but this trend changed during TV broadcasts in the morning and weekend where the males had the highest preference. These results are further revealed in the figure 16 below. The weekends are the most preferred by both genders for having the live broadcasts on both radio and TV.

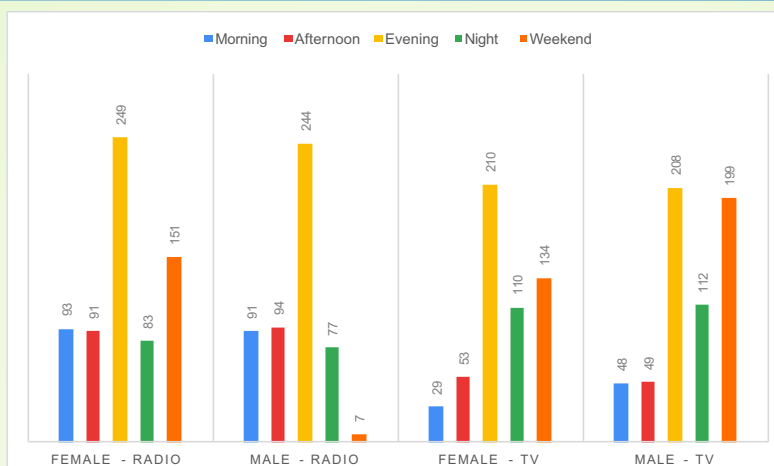


Figure 16: Time of day access against gender and broadcast media

On terms of desired services to be enhanced using the ICT the respondents indicated a high importance (very important) in acquiring of pests and disease management services (417), Farmer call centre services (396), marketing information and linkages (329), wealth information (230), farm records management services (224), farming enterprise selection advisory services (213) and continuous learning services (204) in that order of preference as shown in figure 17.

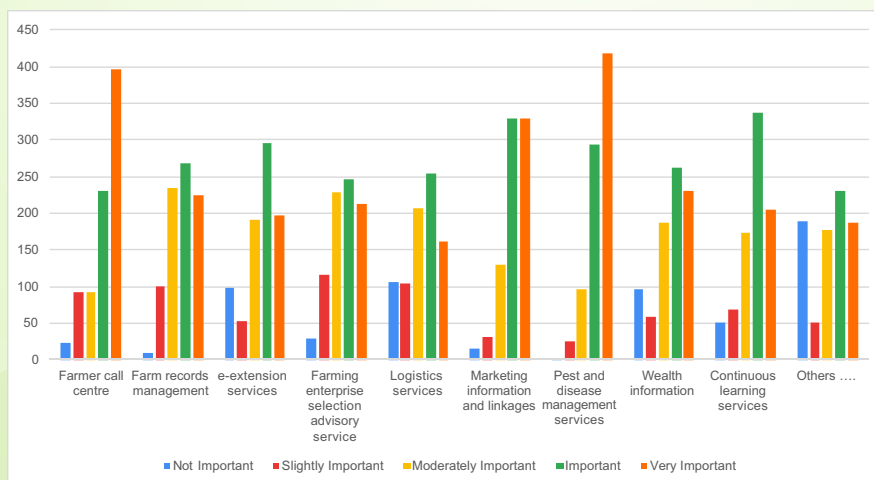


Figure 17: Desired services to be enhanced using the ICT

In terms of awareness of the ICT regulators of the sectors and services, a few of the respondents 22.9% correctly indicated they were aware of Uganda Communications Commission as the regulator. However, there were a significant number of respondents who indicated they were not aware of E-granary, MAAIF Agriculture cluster development, Digital Vision Uganda, Cyber security, Internet privacy and digital rights, E-waste management policy and E- Extension services. This is proof that there is a lot of information unknown to the farmers despite that it is very useful to them as they undertake their day to day activities.

The farmer respondents were also asked how they could deal with some of the challenges they were facing as they undertook their business and below is what was mentioned;

- Increased mass sensitization of farmers and training towards the use of ICT devices
- Provision of ICT devices to the farmers to enhance their ability to learn and use



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- Extension of electricity services especially in the rural areas
- Provision of reliable and cheap internet connectivity
- Availing localised digitised content that is freely accessible to all



4. CHAPTER: CONCLUSIONS AND RECOMMENDATIONS

This chapter provides a discussion of the emerging conclusions from the study and makes some recommendations.

4.1. Conclusions

From the baseline study, a number of observations have been made and accordingly a number of conclusions have been deduced. Below are some of the conclusions that have been made;

1. Use of ICT varied across different things such as the age, gender, type of ICT, region of the country among others. It is therefore important to rethink what to use when availing any agriculture content to the farmers. It was evident that the elder people preferred more of the traditional media while the youth preferred the smart phones.
2. It was evident that accessibility to ICTs varied against things like age, region, day, hour and gender. It was noted that majority of the farmers preferred to use more of the TV and radio over the weekend and in the evening because that is when many of them are free from the normal routine work.
3. Generally, there are a several ways through which farmers access vital information across the different levels of the agriculture value chain. The ICT in use include radios, TVs, ordinary and smart phones among others. The farmers seemed to appreciate more the traditional media avenues such TVs and Radio since they did not incur extra cost while accessing them like they would when using the phones.
4. We noted that currently agriculture localised content development is uncoordinated and unregulated because it is undertaken by several organisations. Various actors including MAAIF, research institutions and civil society organisations (CSO) develop and distribute content to farmers and other value chain actors without having the content validate and certified. Most of the content is developed in text format in form of information leaflets, posters and production guides but not very appropriate to share to the farmers. Also, the content is mostly authored in English, yet majority of farmer prefer content in their local language given their limited comprehension of English language concepts. Generally, there is lack of a central point of reference for authentic content for various value chains.
5. From the study, it was clear that they are various efforts promoting the integration of ICT in agriculture. It was observed from this study that there is lack of a coordination mechanism (integration framework) in the sector to drive ICT integration. The lack of this framework is resulting into duplication of efforts and minimal sharing of experience, resulting into suboptimal impact on the sector.
6. One of the greatest challenge of the agriculture sector is poor information management and poor quality of extension services. Because the information is defragmented in different projects and organisations, farmers are faced with a challenge of accessing the right and most appropriate one. Therefore, government should expend significant efforts to profile sector players to ensure effective planning, and development of information and knowledge products for various actors. Government needs to promote information access and invest in extension services that can be accessed ubiquitously.



4.2. Recommendations

It was observed from the baseline study that the use of ICT in agriculture differs by stakeholder age, gender, region and integration also changes as per the type of ICT being adopted for the specific service.

1. To address the challenge related to lack of capacity to use ICT more ably, it is recommended that more capacity building trainings among the farmers on the use and benefits of ICT should be offered.
2. For the lack of ICT devices amongst the farmers, there is need to develop coordination mechanisms with the government and other NGOs to provide ICT devices to enhance the farmers knowledge and use of the devices either cheaply or freely.
3. Network connectivity was an issue amongst the farmers and it is recommended that government and telecom companies should ensure network connectivity issue is resolved in the rural areas of Uganda.
4. Since the traditional media means were most preferred and majorly in use, reach out to the farmers in terms of capacity building farmer programmes, advertisements and alerts, they should be used more.
5. UCC should regulate the proliferation of fake news and misinformation on the internet so that the farmers do not get wrong information to affect the agriculture sector since it is the backbone of the country.
6. To address the challenges associated with poor extension service delivery by extension workers, the government of Uganda through relevant MDA like MAAIF, should establish digital call centres so that the extension workers can provide services ubiquitously. This will allow extension workers to provide feedback and guidance to farmers through the established digital call centres within the regions and local languages that can easily be understood.
7. To address the issues of lack of quality localised content in extension service delivery, the Government of Uganda through MAAIF and other bodies should develop more localised content across the agriculture value chain to support extension services.
8. To increase accessible of agriculture content to farmers, Uganda Communication Commission (UCC) should ask media houses to support in airing out the content freely as part of community outreach. Furthermore, UCC can explore the use of digital advertising boards in strategic public spaces like government markets, hospitals among others to deliver the digitised and localised agriculture content.
9. Since there is a big group of farmers that have no access to smart phones, it is important that agriculture application developers also focus on developing applications that are not internet connectivity intensive and those that can be used by non-smart phones.



Appendix

Appendix 1: Survey questionnaire

UNFFE ICT4Farmer Baseline Indicators Survey Tool

Uganda has witnessed a rapid growth in the uptake of ICT services and the associated use of consumer information communication electronic devices (device) like; phones, television sets, radio receivers, computers among others. However, there is limited information on the level of ICT penetration among smallholder farmers who form the backbone of our economy. This academic research is conducted within a research collaboration framework between Uganda Communication Commission (UCC), Eight Tech Consults and Uganda National Farmer Federation that seeks to document the level of ICT usage and associated indicators within the membership of UNFFE as part of evidence-based decision making to support the implementation of the UNFFE ICT4Farmer initiative implementation.

Disclaimer: The information provided shall be strictly used for purposes of the study and any personal identifiable information shall be held with utmost confidentiality and shall only be used for verification of facts by the researchers where necessary.

Part one: Respondent Profile Information.

1. Gender [Male/Female]
2. Age group in years
 - ☐ 18-25
 - ☐ 26-35
 - ☐ 36-50
 - ☐ >50
3. Region [Central/Eastern/Western/ Northern/WestNile]
4. District Farmer Association [DFA]
5. Highest Level of Education attained [None/Primary/Secondary/tertiary/Diploma/Degree]
6. Agriculture Enterprise category [crop, animal husbandry, poultry, forestry and fisheries]
7. Do you currently have access to any call centre services for Agriculture [Yes/No]
8. Devices Used

Ordinary phone	Smart phone	TV	Desktop computer	Laptop
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9. How many of these devices do you own

	None	1	2-3	4-5	More than 5
Mobile Phone	☐	☐	☐	☐	☐
Laptop	☐	☐	☐	☐	☐



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	None	1	2-3	4-5	More than 5
Desktop Computer	☐	☐	☐	☐	☐
Television	☐	☒	☐	☐	☐
Radio	☐	☐	☐	☒	☐

Part Two: ICT Usage

1. In your opinion, what percentage of farmers in your community have access to the following devices?

ICT tool	<10%	<30%	<50%	>50%	None
Basic Mobile Phone					
Smart Phone					
Television set					
Radio Receiver					
Internet Enabled Computer					

2. How often do you use the following internet and social media applications

Application	Never	Rarely	Sometime	Very Often	Always
Facebook					
WhatsApp					
Youtube					
Twitter					
Pinterest					
Instagram					
Vkontakte					
UNFFE website					
MAAIF website					

3. In your opinion, which model of remote content delivery would be most effective for you

Application	None	Low	Medium	High	Very High
Farming TV programmes					
Farmer call centre					
Web based content platform					
Online (e-workshops)					
Farming radio programmes					
Social media platforms					
SMS platform e.g. whatsapp					



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Digital media platforms in public places like markets					
Farmers magazine					
Custom UNFFE mobile application					

4. How often do you watch television, listen to the radio, read a newspaper or magazine, surf the internet, or use social media?

	Daily	Weekly	Once a month	Once in a while	Never
Radio					
Television					
News paper					
Social Media					
Surf the internet					

5. What would be the most appropriate day of the week to run live radio and TV programmes for farmers

	Mon	Tues	Wed	Thu	Fri	Sat	Sun
Radio							
Television							

6. What would be the most appropriate time to run live radio and TV programmes for farmers

	Morning	afternoon	Evening	Night	Weekends
Radio					
Television					

7. Rate the purpose for which you use social media on a scale of 1-5 with 5 being highest?

Purpose	1	2	3	4	5
Education					
Entertainment					
Communication					
For business purposes					
News Updates					

8. How often do you access social media per day? (Select one from the range)

Option	<30min	<1hour	<3hours	<5hours	>5hours
Response					

9. In what language would you prefer the agricultural content to be delivered to you?

	No	Yes
Local language		
English		

10. How much in Uganda shillings do you spend on airtime per month

Option	<5000	<10,000	<15,000s	<25,000	➤ 25,000
Response					

11. How much in Uganda shillings do you spend on internet bundle per month

Option	<5000	<10,000	<15,000s	<25,000	➤ 25,000
Response					

12. For how long do you use the following devices

	< 6 months	1 year	2 years	5 years	More than 5 years	N/A
Mobile Phone	☐	☐	☐	☐	☐	☐
Laptop	☐	☐	☐	☐	☐	☐
Desktop Computer	☐	☐	☐	☐	☐	☐
Television	☐	☒	☐	☐	☐	☐
Radio	☐	☐	☐	☐	☐	☐

13. To what extent are you aware of any of the following

Statement	None	Very Little	Somewhat	To a Great Extent
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Uganda Communication Commission
 E-waste management policy
 Digital Vision Uganda
 Cyber security
 Internet privacy and digital rights
 E-granary
 MAAIF Agriculture cluster development
 E-extension services



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14. State any factors which could be constraining your ability to use ICTs

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15. Which of the following ICT services would be important to you

Service	Not Importa nt	Slightly Importa nt	Moderate ly Important	Important	Very Important
Farmer call centre					
Farm records management					
e-extension services					
Farming enterprise					
selection advisory service					
Logistics services					
Marketing information and linkages					
Pest and disease management services					
Wealth information					
Continuous learning services					
Others					

16. Provide any comment on how challenges and opportunities of using ICTs in farming can be addressed

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.....

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Thank you for participating in this study



Appendix 2: Key Informants tool

UNFFE ICT4Farmer Baseline Indicators KII

Uganda has witnessed a rapid growth in the uptake of ICT services and the associated use of consumer information communication electronic devices (device) like; phones, television sets, radio receivers, computers among others. However, there is limited information on the level of ICT penetration among smallholder farmers who form the backbone of our economy. This academic research is conducted within a research collaboration framework between Uganda Communication Commission (UCC), Eight Tech Consults and Uganda National Farmer Federation that seeks to document the level of ICT usage and associated indicators within the membership of UNFFE as part of evidence-based decision making to support the implementation of the UNFFE ICT4Farmer initiative implementation.

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1. Region [Central/Eastern/Western/ Northern/WestNile]
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4. Devices Used

Ordinary phone	Smart phone	TV	Desktop computer	Laptop
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Part Two: ICT Usage

1. In your opinion, what percentage of farmers in your community have access to the following devices?

ICT tool	<10%	<30%	<50%	>50%	None
Basic Mobile Phone					
Smart Phone					
Television set					
Radio Receiver					
Internet Enabled Computer					

2. Give reasons for your answer in 1 above

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3. In your opinion, which model of remote content delivery would be most effective for you

Application	None	Low	Medium	High	Very High
Farming TV programmes					
Farmer call centre					
Web based content platform					



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9. Which of the following ICT services would be important to the farmers

Service	Not Importa nt	Slightly Importa nt	Moderate ly Important	Important	Very Important
Farmer call centre					
Farm records management					
e-extension services					
Farming enterprise selection advisory service					
Logistics services					
Marketing information and linkages					
Pest and disease management services					
Wealth information					
Continuous learning services					
Others					

10. Provide any comment on how challenges and opportunities of using ICTs in farming can be addressed

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Thank you for participating in this study



ICT4Farmers baseline indicator report 2020.