UKaid
from the British people

ACWICT
technology transforming lives

Opwak
Uniting online workers

PERSPECTIVES ON

Locally Relevant Digital Content For Underserved Farmer Community

IN LAIKIPIA COUNTY OF KENYA

A Formative Study Report

Maudhui Digiti project is supported by the UK Government
Prosperity Fund Digital Access Programme
seeking to promote digital inclusion for underserved communities,
in collaboration with key local stakeholders and partners in Kenya.

DECLARATION

PROJECT TITLE: MAUDHUI DIGITI PROJECT

Perspectives on Locally Relevant Digital Content for Underserved Farmer Community in Laikipia County of Kenya.

REPORTING PERIOD: DECEMBER 2019 – JUNE 2020

SUBMISSION DATE: JUNE 2020

PREPARED BY:

The African Centre for Women, Information and Communications Technology (ACWICT) and Online Professional Workers Association of Kenya (OPWAK) Consortium

Contract Number: 204963-108

ACKNOWLEDGMENTS

This formative study was made possible through UK Government Prosperity Fund Digital Access Programme whose objective is to catalyse affordable, inclusive, safe and secure digital access for excluded or underserved populations. It was carried out under guidance of ACWICT and OPWAK Consortium's Technical teams. Many thanks to the County Government of Laikipia for strong partnership with the consortium and guidance to meeting the study respondents.

We appreciate farmers in Laikipia County who sacrificed their time and unreservedly provided their views and perspectives and the research team who supported the process to its finality. Thanks are due for ACWICT and OPWAK staff who were part of the evaluation team and contributed their time and views in refining and completing the report.

PROJECT SUMMARY

FCDO Programme & objectives:	Digital Access Program (DAP) that seeks to improve access to locally-relevant and development-oriented digital content, including e-government services in Laikipia and Nairobi Counties in Kenya
DAP Implementing agency:	ACWICT and OPWAK Consortium
Project Title:	Improving access to the locally relevant digital content for excluded women farmers in Laikipia County, Kenya.
Accountable Grant:	204963-108
Project Location:	Kenya (Laikipia County)
Submitted to:	FCDO – Digital Access Programme
Date of submission:	June 2020

PROJECT IMPACT

The underserved and excluded communities in including women in Laikipia County become digitally included and able to utilize available relevant local digital agricultural content for sustainable community development.

PROJECT OUTCOMES

1. Increased understanding of the user needs for digital content and barriers to accessing locally relevant, gender-sensitive and development-oriented digital content in agriculture
2. Increased capacity to access and use of locally relevant agricultural digital content.

CONTENTS

1. Introduction 11
1.1 Background Information 11
1.2 Context of the study 11
1.2.1 Digital content perspective 11
1.2.2 Vision 2030 and Digital Economy blue prints 12
1.2.3 Laikipia County 13
1.3 Theory of Change 14

2. Purpose, Objectives, Scope, and Methods 17
2.1 Purpose 17
2.2 Objectives 17
2.3 Scope 17
2.4 Method 17
2.4.1 Study design: 17
2.4.2 Sampling: 18
2.4.3 Data Collection & Analysis 18
2.4.4 Limitations of the study 19

3. Findings 21
3.1 Demographic characteristics of respondents 21
3.1.1 Age, gender, Educational, Marital and Disability status 21
3.1.2 Scale of farming 23
3.2 User Needs Assessment 23
3.2.1 Agricultural information preference 23
3.2.2 Agricultural information sources 24
3.2.3 Frequency of on-line information sourcing 25
3.2.4 Preferred on-line digital content language 25
3.3 Barriers to accessing Digital Content 26
3.4 Critical success factors for Digital content inclusivity 27
3.5 Agricultural Digital Models 28
3.5.1 Agricultural digital models farmers are aware of 28
3.5.2 Agricultural digital models ever-used by farmers 29
3.5.3 Agricultural digital models used in the last twelve month 30
3.5.4 Rating of Agricultural Digital Models 30
3.6 Opportunities available in digital content models & platforms 31
3.6.1 Government services used in the last twelve months 31
3.6.2 Access to digital models dealing with Money transfer, Savings and e-commerce 32
3.6.3 Access to social media platforms 33

4. Recommendation & Conclusions 35
4.1 Overview of Key Findings 35
4.2 Key Recommendations 36
4.2.1 Recommendation for increasing access and utility of relevant digital agricultural content 36

LIST OF TABLES

Table 1: Theory of Change 6
Table 2: Sampling framework 21
Table 3: Rating of Agricultural digital models 25
Table 4: Frequency of using on-line e-commerce opportunity 26
Table 5: Intervention matrix 31
Table 6: Shortlisted digital platforms 34

LIST OF FIGURES

Figure 1: Map of Kenya Showing Laikipia County 14
Figure 2: Distribution by Gender 21
Figure 3: Distribution by Age 21
Figure 4: Marital Status 22
Figure 5: Farmers living with Disability 22
Figure 6: Academic Qualification 23
Figure 7: Gender Schooling Level Comparison 23
Figure 8: Scale of Farming 23
Figure 9: Agriculture information preference 24
Figure 10: Agriculture information preference by gender 24
Figure 11: Preferred medium of information 25
Figure 12: Frequency of online information sourcing 25
Figure 13: Language preference for online content 25
Figure 14a: Perceived barriers of accessing digital content by female farmers 26
Figure 15: Critical factors determining access to digital content 27
Figure 16: Critical digital content access factors based on gender 28
Figure 17a: Percentage awareness of specific agricultural models 28
Figure 18: Models that farmers have used in Laikipia County 29
Figure 19: Agricultural models used by farmers within the last twelve months 30
Figure 20: Government services accessed 31
Figure 21: Use of online money services 32
Figure 22: Use of social media platform 33
Figure 23: Priority interventions to increase access to digital agricultural content 36

ACRONYMS & ABBREVIATIONS

ACWICT	African Centre for Women Information Communication and Technology
ACRE	Agriculture and Climate Risk Enterprise Ltd. (ACRE
ASDSP	Agricultural Sector Development Support Programme
CATI	Computer Assisted Telephone Interviewing
CIDP	County Integrated Development Plan
COVID	Coronavirus Disease
CSV	Comma Separated Values
CTA	Technical Centre for Agricultural and Rural Cooperation
DAP	Digital Access Program
FCDO	Department for International Development
GDP	Cross Domestic Product
D4Ag	Digitization For Agriculture
GSMA	Global System for Mobile Communications
KAOP	Kenya Agricultural Observatory Platform
KALRO	Kenya Agricultural and Livestock Research Organizations
KCA	Kenya Communication Authority
OPWAK	Online Professional Workers Association of Kenya
URL	Uniform Resource Locator
USSD	Unstructured Supplementary Service Data
TOT	Trainer of Trainers
CAK	Communication Authority of Kenya
SACCOs	Savings and Credit Co-operative Societies
URLs	Uniform Resource Locators
ICT	Information Communication Technology
UN	United Nations
SDGs	Sustainable Development Goals

EXECUTIVE SUMMARY

Improving access to locally-relevant and development-oriented digital content in Laikipia county project ('Maudhui Digiti' project) in Kenya is implemented by ACWICT and OPWAK consortium with funding from FCDO Digital Access Program (DAP) fund. The project commissioned a study to assess user needs, barriers, critical success factors common models and opportunities in the use and development of locally-relevant and development oriented digital content for excluded or underserved agricultural community and organizations in Laikipia County of Kenya.

Primary data was collected using interviews calls. Semi-structured pretested questionnaires was used to interview a sample of 404 farmers from Laikipia County over the month of April 2020. Sample size estimation was achieved using **Cochran formula** $n = z^2 pq/e^2$. The formula was considered appropriate as it applies to situations of large population (above 20,000) as was the case in this study.

Findings showed that 48 % of the farmers access internet at least once a week, while the rest (52 %) access it less than monthly or never. Only 1% relied heavily on digital on-line content as the main source of agricultural information. The rest dependent on other forms of information especially face-to-face, electronic and print media. Those accessing internet on agricultural often desired digital content on crop production (51.9%) and Agricultural engineering principles and practices of soil & water conservation, irrigation and farm equipment (19.31%). The rest were interested in Livestock production principles and practices, general agricultural information such as weather and floods, and Agricultural Marketing and Credit. 55.53 % of total respondent recommended Kiswahili as a preferred on-line language. Kikuyu and English were second and third at 21.58 % and 20.53 % respectively.

Key considerations for relevant agricultural platforms included; ease of access, information relevance and security. Digi farm, Kenya Agricultural observatory platform and Acre Africa were the three agricultural digital models most accessed ever and within the last twelve months. Cabi Bioprotection joined the three among the top four best agricultural digital models in terms of functional qualities.

The top three e-government services used over the last twelve month were iTax (15.84%), Driving license (6.19%) and Business registration (4.95%) fig a). Twice as many females than males had not accessed government service. Female farmers also scored less than male in all the top three most accessed e-government services.

Majority of the farmers in Laikipia County are yet to embrace and take advantage of opportunities presented by e-commerce and e-banking platforms. 67 % reported that they have never bought farm inputs or any product on-line while 88 % have not used on-line banking service.

The study found Social media to be more accessible to famers than other digital platforms. 52 % of farmers used mobile phones to send or receive short Message service (SMS), 56 % visited used social media such as Face book , Instagram and twitter to check or update the site, while 71 % of the farmers used social media such as WhatsApp and face book to post and read messages.

Lack of digital skills, high cost of internet and poor internet coverage topped the list of barriers to internet access by both female and male farmers. Conspicuous gender gaps were observed in internet access and usage with female being leading at 51.94% on lack of digital skills against that of male farmers who only 37% said they did not have requisite skills and knowledge of internet access.

Use of multiple approaches of creating awareness on relevant digital agricultural content platforms, increasing capacity of farmers to access and use internet, enhancing access to internet by expanding coverage and addressing affordability and providing relevant digital agricultural content are key recommendations to enhance digital inclusion. Collaboration with key players in agriculture, weather forecasting and markets is essential for concerted effort in expanding utilization of gender sensitive, relevant digital solutions to enhance agricultural productivity.

The formative study report presents the findings of the assessment and makes key recommendation for Maudhui Digiti project to consider in expanding access to digital content for farmers in Laikipia County of Kenya.

1 | Introduction

1.1 Background Information

This report covers the finding, conclusion, recommendations and lessons learnt for the digital content for Agriculture. The study was conducted in Laikipia County by ACWICT and OPWAK consortium contracted by FCDO on 12th December 2019 under the Maudhui Digiti Project supported by the UK Government's Prosperity Fund[1] with the objective of promoting digital inclusion for underserved communities like the rural farming communities and women, in collaboration with key local stakeholders and partners in Kenya. The report first provides the background and context of the program and a description of the theory of change.

1.2 Context of the study

1.2.1 Digital content perspective

Digitalization has developed rapidly since the adoption of the Tunis Agenda for the Information Society in 2005[2]. In 2018, the number of persons using the Internet exceeded half the global population for the first time. The capabilities of digital networks and devices are much greater today, and many new technologies and services have been developed[3]. The UN has underscored the central role played by Information and Communication Technology toward the achievement of the Sustainable Development Goals (United Nations, 2015). Similarly, Accenture strategy emphasized the fact that digital solutions can rapidly transform the world economies and generate positive impact to achieve the SDGs[4]. In this regard, digital-skills and digital inclusivity have become critical in attainment of the development goals in this century across all sectors.

According to Trendov, Varas, and Meng Zeng (2019)[5] digital transformation will change the structure of the labor market and the nature of work in Agricultural sector. It will redefine the role of farmers and agripreneurs and alter the skill set required. It may also transform how and where people work and is likely to affect both female and males farmers.

In the context of the Sustainable Development Goals, digital agriculture has the potential to deliver economic benefits through increased agricultural productivity, cost efficiency and market opportunities, social and cultural benefits through increased communication and inclusivity and environmental benefits through optimized resource use as well as adaptation to climate change.

In Africa, digitization of Agriculture has been perceived as a game-changer in the agricultural transformation process. There has been significant growth in digitalization for agriculture (D4Ag) over the last ten years. In 2019 both the European Union-African Union Task Force Rural Africa Report (TFRA) and the Communiqué from the Global Forum for Food and Agriculture (GFFA) highlighted the power of digitalization in transforming agriculture.

[1] The Prosperity Fund aims to reduce poverty through inclusive economic growth and development providing expertise and technical assistance in different sectors including trade, infrastructure, energy, finance, education and health care.
[2] The Tunis Agenda for the Information Society was a consensus statement of the World Summit on the Information Society, adopted on November 18, 2005 in Tunis, Tunisia. It called for the creation of the Internet Governance Forum and a novel, lightweight, multistakeholder governance structure for the Internet
[3] Trade and Development Board Sixty-sixth session Geneva, 24–28 June 2019 Item 2 (c) of the provisional agenda Digital development: Opportunities and challenges ,UNCTAD secretariat
[4] "Accelerating SDGs through ICT," [Online]. Available: https://www.huawei.com/minisite/gci/assets/files/Huawei_2018_SDG_report_en.pdf.
[5] Nikola M. Trendov, Samuel Varas, and Meng Zeng ; Digital technologies in agriculture and rural areas briefing paper ; Food and Agriculture Organization of the United Nations Rome, 2019

Over 33 million smallholder farmers and pastoralists have already been registered with digital solutions across Africa. However, the digital agriculture market in the continent is highly concentrated and uneven with a handful of countries accounting for the vast majority of research figures, while many countries have seen few deployments[6].

1.2.2 Vision 2030 and Digital Economy blue prints

Agriculture is recognized as a cross cutting sector playing an important role in fuelling other economic sectors in Kenya. The government, through the Kenya Vision 2030[7] blue print, seeks to promote an innovative, commercially-oriented, and modern agricultural sector. This will be accomplished through: (i) transforming key institutions in agriculture and livestock to promote agricultural growth; (ii) increasing productivity of crops and livestock; (iii) introducing land use polices for better utilization of high and medium potential lands; (iv) developing more irrigable areas in arid and semi-arid lands for both crops and livestock; and (v) improving market access for our smallholders through better supply chain management.

Kenya recognizes ICT and digitization as a driver of economic development across all sectors. The country views the Digital economy in the entirety of sectors that operate using digitally-enabled communications and networks leveraging internet, mobile and other technologies, and seeks to promote development and achievement of Vision 2030, and the SDGs through its Digital Economy Blue Print, whose mission is to oversee a nation where every citizen, enterprise and organization has digital access and the capability to participate and thrive in the digital economy.[8]

Mobile technology and mobile internet has rapidly expanded in Kenya. Recent data reports for Kenya shows mobile phone at 98% and internet penetration at 43% out of which 97% are mobile internet users[9]. Despite the rapid growth in the digital space, communities in limited resource settings (underserved communities) continue to lag behind particularly in the use of internet due to internet access and affordability challenges. Gender inequalities in accessing and using internet is common particularly in rural parts of the country.

In line with DAP objectives, Maudhui Digiti project seeks to supplement to the country's endeavor by addressing critical barriers to digital inclusion, in terms of relevance, accessibility and utilization of relevant local digital content to underserved communities which is in line with consortium overall objective of narrowing the digital divide and gender gap in development .

The Maudhui Digiti Project consists of action research with focus to undertaking user needs assessment, review of the current community based digital ecosystem (both at content delivery and platforms utilizations), stakeholder engagement and level of influence on the content and platforms. The project has adopted a user-centered approach with the individual users and local community playing a role in the identification of the needs, implementation and recommendations thereof.

Consistent with the above, the Maudhui Digiti Project undertook this formative study to understand user needs and barriers to access locally-relevant and development-oriented digital content as a catalyst to affordable, inclusive, safe and secure digital access ecosystem for excluded populations especially women and girls in Laikipia County of Kenya. The Laikipia research is focused on availability of relevant digital content and current content models around Agri-based solutions already developed to support the farmers and the actors in the value chain, having established that agriculture is the dominant economic activity with the majority of residents keeping livestock and growing different food crops such as maize, carrots, peas, potatoes, wheat and cash crops as well as horticultural crops.

---

[6] CTA,The Digitalisation of African Agriculture Report, 2018-2019, 1St Edition, June 2019

[7] Kenya Vision 2030 is the long-term development blueprint for the country and is motivated by a collective aspiration for a better society by the year 2030.

8 https://ca.go.ke/wp-content/uploads/2019/05/Kenyas-Digital-Economy-Blueprint.pdf

9 https://datareportal.com/reports/digital-2020-kenya

1.2.3 Laikipia County

The study was conducted in Laikipia County, one of the 47 counties in Kenya. Laikipia County lies between latitudes 0o18" South and 0 o51" North and between longitude 36o11" and37o24' East[10]

The county borders six counties namely; Meru and Nyeri to the south, Nyandarua to the southwest, Samburu to the north, Isiolo to the northeast and Baringo to the west. According to the Kenya Population Census 2019, Laikipia county population was estimated at 518,000. The county is cosmopolitan and inhabited with multiple ethnic communities; Kikuyus, Maasai, Borana, Samburu, Kalenjin, Meru, Somali, Turkana with European and Asian settlers.

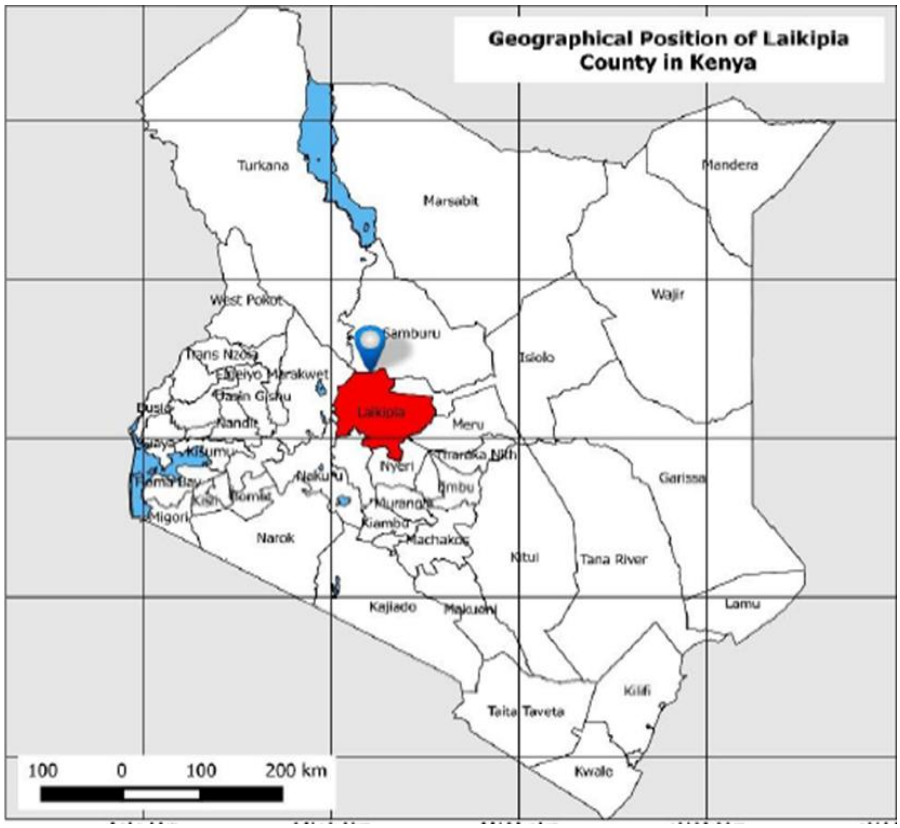
Agriculture is the dominant economic activity in Laikipia County. Majority of residents keep livestock and grow different food crops such as maize, carrots, peas, potatoes, wheat and cash crops as well as horticultural crops. The County is also known for its big open ranches like Solio, Borana and Oljogi which provide a significant source of beef for local consumption and export.[11] The Laikipia gross county product is Ksh. 81.095 Billion equal to 1.1% of national GDP with agriculture being the largest sector at KShs35.5 billion.[12] The average private farm size for small-scale holders is 2acres while for large-scale holders is 20 acres. Laikipia is dominantly a pastureland with 48 branches that are greater than 2000 acres in size.

Laikipia County covers an area of 9,462 square kilo meters, and is ranked as the 15th largest county in the country by land size[13]. Of the total land mass, arable land constitutes 1,984 square kilo meters. There are 5 distinct land use patterns heavily influenced by the climatic conditions and the ecological zones. These include: pastoralism, mixed farming, ranching, agro-pastoralism, and marginal mixed farming[14].

In view of the above, Maudhui Digiti project perceives Internet as an important means of communicating and finding information on various platforms whether social media, email or search engines to help fuel development in Laikipia county, especially because voice and SMS tariffs are more expensive in comparison with similar data offers across all regions and regardless of location.

[10] Laikipia County Integrated Development Plan 2018-2022
[11] https://laikipia.go.ke/4/agricultural-farming
[12] https://laikipia.go.ke/338/laikipia-economy
[13] Laikipia CDP, 2013
[14] Agricultural Sector Development Support Programme (ASDSP) 2014, Household Baseline Survey Report Laikipia County.

Figure 1: Map of Kenya Showing Laikipia County



Source: Laikipia County Integrated Development Plan (2018-2022)

1.3 Theory of Change

The Theory of change was adopted during the project inception period. The Maudhui Digiti Project goal is to improve access to locally-relevant and development-oriented digital content, including e-government services in Laikipia County in Kenya, through overcoming the barriers to digital inclusion.

The Maudhui Digiti Project is expected to make change along the following interrelated change pathways; digital content, accessibility and digital content platforms utilization relevant to underserved local communities. The Theory changes is built on the following assumptions:

1) **Stakeholder engagement change pathway:** If all stakeholders are involved will lead to more accessible, locally relevant and development oriented digital content for excluded or underserved communities and local organisations. It is expected with an established long term engagement local stakeholders and other development partners working in the county will lead to a more cohesive development of content and content delivery platforms that will be widely accepted. Whereas many partners may have particular focus area due to their expertise, a coordinated engagement will create synergies in different technical areas which will adequately respond to the dynamic needs of the local communities.
2) **Local-relevant content pathway:** If content is better tailored to the needs of typically excluded or underserved communities and local organisations and they are better able to access (and potentially also develop) this content, then they will be better able to leverage the developmental benefits of digital. The utility and ability of an application and its content is better achieved through user-centred analogy where the user plays pivotal role. Table 1 shows the expected outcome based on the theory of change assumption adopted in this project.

Table 1: Theory of change Assumptions

<table>
<tr><td colspan="2">Outcome and Impact of assumptions

1. Local stakeholder engagement leads to more accessible, locally relevant and development oriented digital content for excluded or underserved communities and local organisations

2. If content is better tailored to the needs of typically excluded or underserved communities and local organisations and they are better able to access (and potentially also develop) this content, then they will be better able to leverage the developmental benefits of the digital content and platforms</td></tr>
<tr><td>Stakeholder engagement change pathway

1. Better understanding of the user needs and functioning between donor and the community leading to better delivery and sustainable projects
2. Better understanding of local needs, barriers and gaps in accessing relevant digital content
3. Key stakeholders better informed on best practice and models for user friendly local digital content delivery
4. Stakeholders engaged, awareness created, content developed and user needs understood
5. Sustainable models of content identified and documented for dissemination.</td><td>Local-relevant content and platforms pathway

1. Easily adoptable and acceptable content that responding to the needs of the excluded and underserved locals.
2. Easily scalable platforms that are accessible and accepted by the local communities
3. Digital content providers including National and County Governments are aware of user needs
4. User-informed content delivery has a positive impact on excluded or underserved communities and local Organizations
5. More locally relevant and accessible content available to excluded or underserved communities and local Organizations.</td></tr>
</table>

2 | Purpose, Objectives, Scope, and Methods

2.1 Purpose

The purpose of Maudhui Digiti Project in Laikipia County is to promote digital inclusivity among underserved farming community and organization, and promote access to locally relevant and development-oriented digital content, through exploring the barriers to accessing, critical factors of successful digitization and available digital models and opportunities for on-line users and digital content developers.

2.2 Objectives

The aim of the project is to promote digital inclusivity for enhanced Agriculture by addressing barriers to accessing locally relevant and development-oriented digital content and platforms to excluded or underserved communities & local organizations in Laikipia County.

Specific objectives include;

1. Establish the user needs for locally-relevant and development-oriented digital content, including e-government services in Laikipia County in Kenya
2. Determine the barriers to accessing locally-relevant and development-oriented digital content and platforms including e-government services for excluded or underserved communities and local organizations in Laikipia County
3. Establish the critical success factors for generating and availing locally relevant and development-oriented digital content for excluded or underserved communities and local organizations in Laikipia County
4. Identify effective models and lessons for delivery of accessible and inclusive locally relevant and development oriented digital content & platforms for excluded or underserved communities and local organizations in Laikipia County
5. Analyze opportunities of developing and accessing locally-relevant and development-oriented digital content & platforms by the excluded or underserved communities and local organizations in Laikipia County

2.3 Scope

The project was designed to cover stakeholders engaged in Agricultural activities in Laikipia County. The study targeted Laikipia East, Laikipia Central and Laikipia West sub-counties where small and large scale farmers are mostly situated. The project focused on evaluating digital ecosystem in Laikipia County and implication of digital content among the farming communities and organization. Further, a documentation of top three models for sustainable creation and dissemination of locally relevant and development-oriented digital content, based on the assessments and stakeholder engagement across Laikipia County is recommended.

2.4 Method

2.4.1 Study design

A quantitative-based cross sectional research design was used. This method was considered adequate to understand current perspectives of the farmer community in Laikipia in regards to relevant digital information. Qualitative data collection used key informant interviews among key County Ministry of Agriculture staff, service providers, local administration and other stakeholders.

2.4.2 Sampling

The Cochran's formula was used to calculate an ideal sample size given a desired level of precision, desired confidence level, and the estimated proportion of the attributes present in the population. It is considered especially appropriate in situations with large populations exceeding 20,000 as is the case in Laikipia County. The Cochran's formula was used to arrive at sample size as illustrated below.

> The Cochran formula is given by; $\boldsymbol{n} = \frac{z^2 pq}{e^2}$
>
> Where:
>
> **n** is the desired sample size
>
> **e** is the desired level of precision (i.e. the margin of error),
>
> **p** is the (estimated) proportion of the population which has the attribute in question,
>
> **q** is 1 – p
>
> The z-value is found in a Z table

In the case of this study, the team has maintained the normal standards: Confidence Level 95%, Population size 20,000 – defined by finite large numbers, Z therefore 1.96, The margin of Error 0.05% and Response distribution set at 50%.

This sampling technique was applied to the known population of Laikipia County as shown in *Table 2* below giving a sample size of 385.

Table 2: Sampling Framework

Target Audience Counties	Sex			Population	Sample Size (Cochran Formula)
	Male	Female	Intersex		
Laikipia – Population	259,440	259,102	18	518,560	
Sample Size	154	231	-	-	385

2.4.3 Data Collection & Analysis

Questionnaire design and validity

Questionnaires, designed in English language (see attached appendix for the final questionnaire) were used to collect data. The questionnaire was translated into Swahili and pre-tested before roll out. The tool was checked for content validity which is the degree to which the instrument fully assesses or measures the construct of interest. To check that, the review team understood the study topic and went through the questionnaire to confirm captured the topic under investigation effectively. Secondly, the tool was pretested to ensure the content was understandable at consistent with skip patterns.

In aligning with government guidelines issued at the time with regard to control of COVID-19, that is minimize movements & observing physical distancing, data was collected through a virtual-call Centre platform allowing the field staff to make interview-calls from a designate call Centre. This was also consistent with the recommendations of the market research industry in

Kenya. The consultants obtained a database of approximately 1,600 farmers from the Ministry of Agriculture, Laikipia County. The data base was keyed into the Computer Aided Telephonic Interviewing (CATI) system and thereafter, the telephone number selected randomly for dialing by a software.

A total of 404 respondents were sampled with a 60:40 ratio of females to males respectively, given that the target respondents for the study were both male and female farmers in Laikipia. The sample was skewed towards female because the project's inclination to women empowerment and this quota was factored into the random dialing though the CATI System.

A team of data collectors were recruited on the basis of their experience in data collection and good telephone etiquette. Majority of the data collectors were university graduates with a good command of English and Kiswahili language. In addition, over 60% of the data collectors were female. The team was trained on research ethics, study objectives, content of the questionnaire and how to interview respondents. Data was collected between 11th and 18th April 2020.

Research ethics

Ethical practice was maintained through-out the data collection process. The respondents were informed that their participation was voluntary and their responses anonymous. In addition, they were informed where the researchers obtained their telephone numbers. The ACWICT/OPWAK team engaged the county government team to introduce and explain the nature of the study, the benefit to the county before being provided with the farmers' data-base and contacts.

Data entry and analysis

The data was entered automatically on the CATI platform by the data collecting team as they made the calls (real time entry). Upon completion of data collection, the data was downloaded on CSV format and then analyzed using SPSS (a statistical software package). The open-ended questions were coded using a coding frame. Data was presented in form of proportions and disaggregated largely by gender.

2.4.4 Limitations of the study

With regards to data collection, telephone methodology was used. The inherent shortcoming is that the questionnaire needs to be shorter than Face-to-face (F2F) interview one in addition to losing the advantage of visual aids and the detection of social cues and body language. Also, with this type of interview, the interviewer can gain a deeper insight to specific answers by treating the questionnaire like a meaningful discussion and deducing the validity of each responses. The study sought to assess the farmers' experience with agricultural digital platforms. However, the farmers have had limited access to the internet and therefore there was no awareness of this platforms. This has resulted to limited platform service patronage and quality feedback on the platforms.

3 | Findings

3.1 Demographic characteristics of respondents

3.1.1 Age, gender, Educational, Marital and Disability status

A total of 404 respondents were interviewed. Figure 2 and 3 shows distribution of the respondents by age and by gender respectively. Youth farmers comprising only 10% of the respondent against 50% of the middle aged and 40% of elderly farmers. From Figure 2, it is evident that women form the largest group of farmers in Laikipia County.

Figure 2: Distribution by Gender

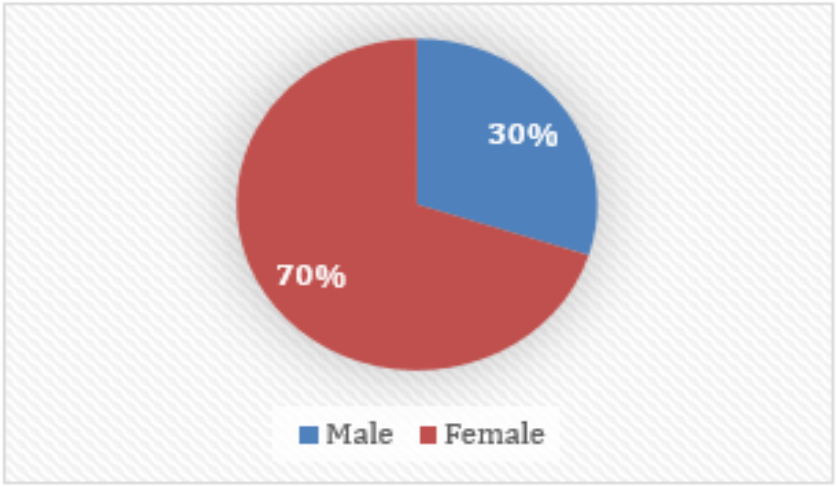
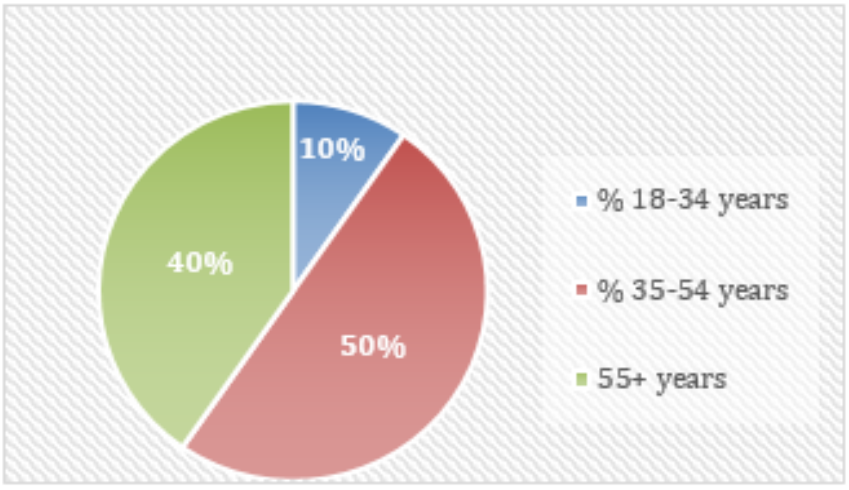
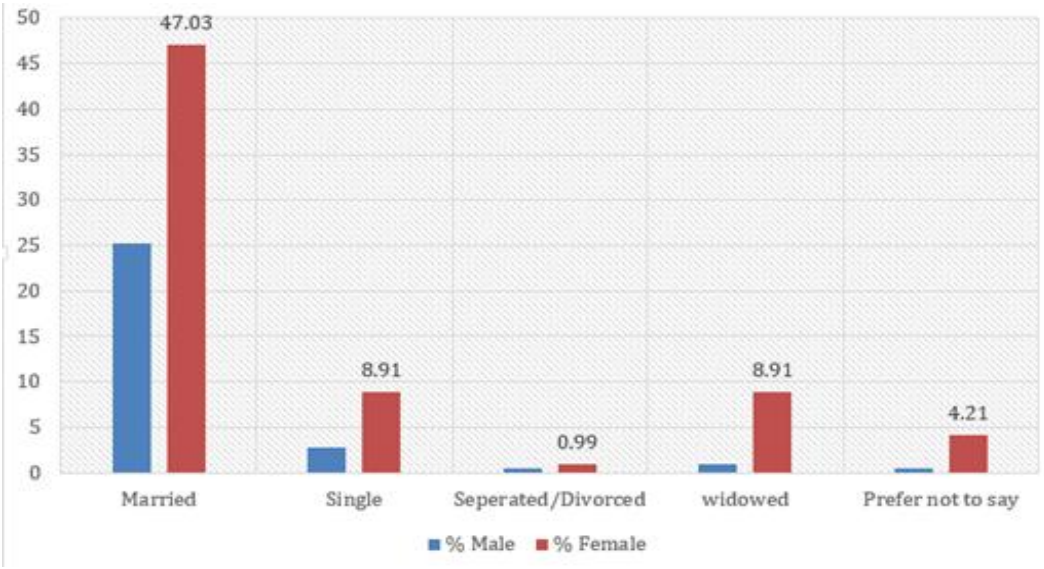


Figure 3: Distribution by Age



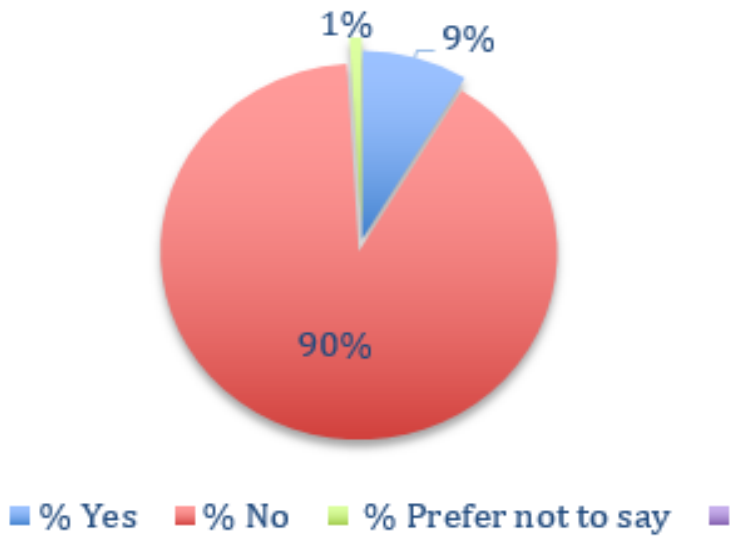
According to the study 47.03 % female farmers and 25 % of male farmers were married. The rest were either single, separated/ divorced or widowed (8.9 %). 4.21 % preferred not to say as illustrated on figure 4 below.

Figure 4: Marital Status



The study revealed that 9 % of the farmer perceived themselves as living with disability, while 1% preferred not to disclose their disability status as shown in figure 5 below.

Figure 5: Farmers living with Disability



In terms of academic qualification, 75.99%) of the farmers are holders of secondary school qualification and below, with 38.86 % being primary school certificate holders. Twice as much males (27%) have attained post-secondary education compared to female farmers (13%), revealing an education gap between men and women in the County as shown in figure 6 and 7 below.

Figure 6: Academic Qualification

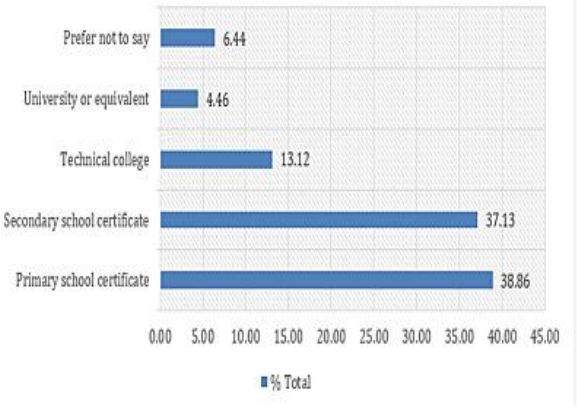
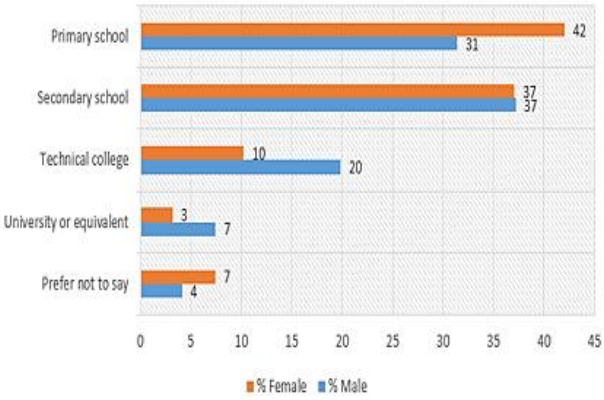


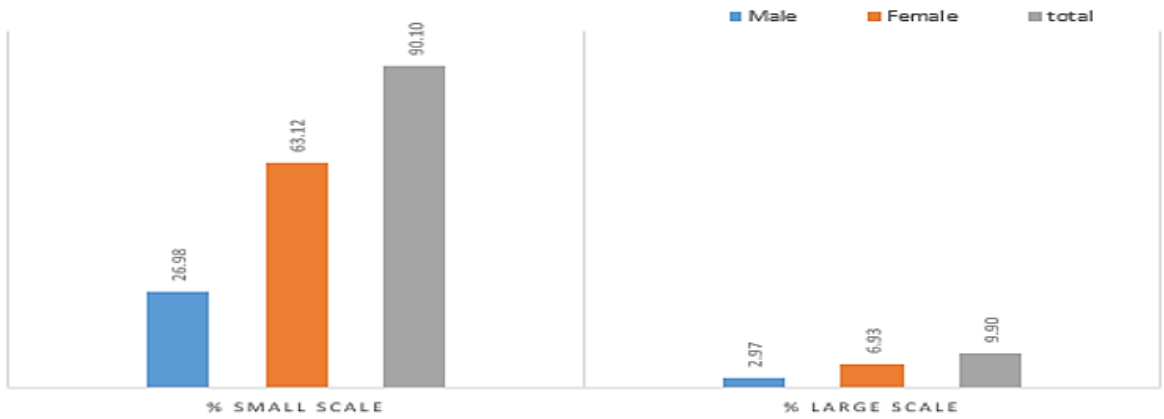
Figure 7: Gender Schooling Level Comparison



3.1.2 Scale of farming

Study showed that majority (90.1%) of the farmers practiced small scale farming as shown in Figure 8 below.

Figure 8: Scale of Farming



Based on Laikipia County CIDP data, most farming households in the county are small-scale holders whose average farmland size is two acres (0.8 Ha) mainly for food production. ASDSP (2014) house hold baseline survey [15] also reported an average farm size for small scale holders in Laikipia County as 0.8ha while for large scale holder's is 20.25 acres (8.1ha).

3.2 User Needs Assessment

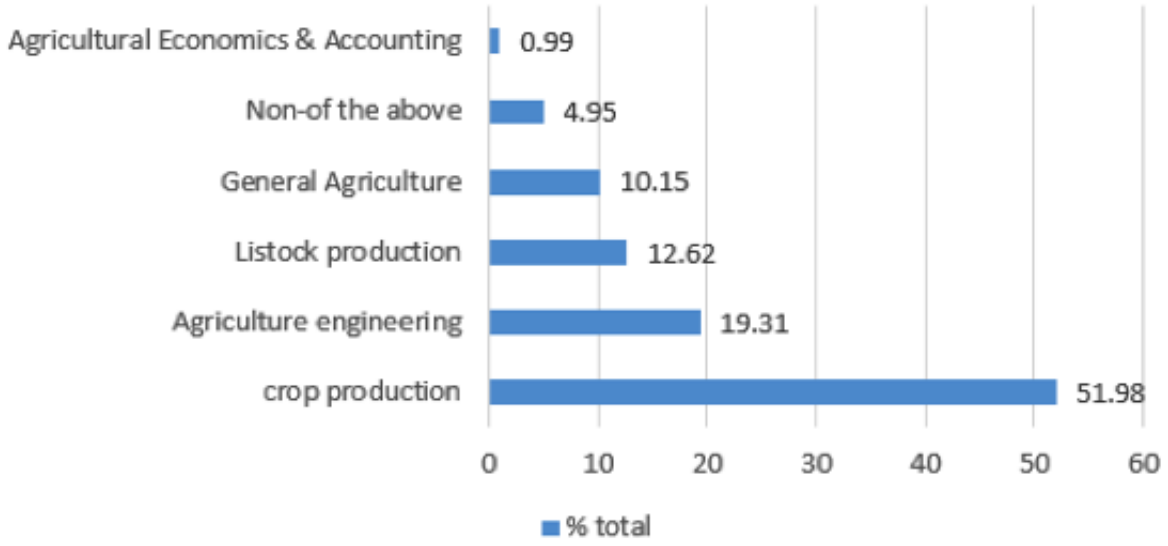
3.2.1 Agricultural information preference

According to the study, information on crop production, specifically Seed varieties, fertilizer, methods of weed, pest and disease control and general crop husbandry practices topped the list of their information need for digital agricultural content at 51.98 %. This is followed by Agricultural engineering digital content at 19.31%, specific interest being digital content on soil conservation, water management, irrigation, farm tools, equipment and machinery. Digital content on Livestock husbandry practices (livestock breeds & nutrition), General agriculture (weather, floods, new technology, disaster, methods of farming) and Agricultural Economics &

[15] Agricultural Sector Development Support Programme (ASDSP) 2014, Household Baseline Survey Report Laikipia County.

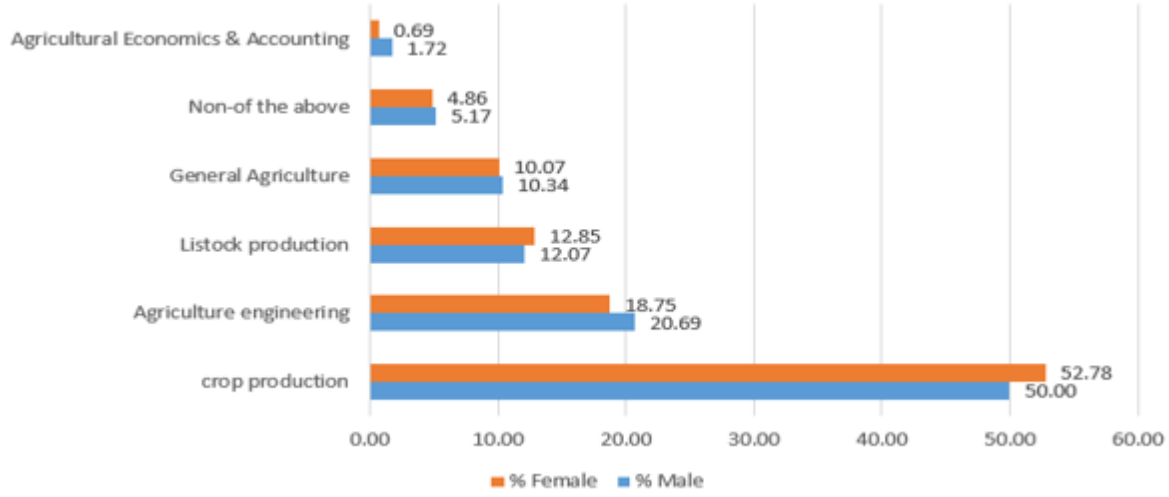
Marketing relating to Financing options, Entrepreneurship & market price information was last with less than 13% (See figure 9 below)

Figure 9: Agriculture information preference



The Study also revealed a correlation between male and female in terms of information preference. However, as can be illustrated in figure 10 below, women went for information in crop and livestock production more than men, while men went for Agricultural engineering and Agricultural marketing information more than women.

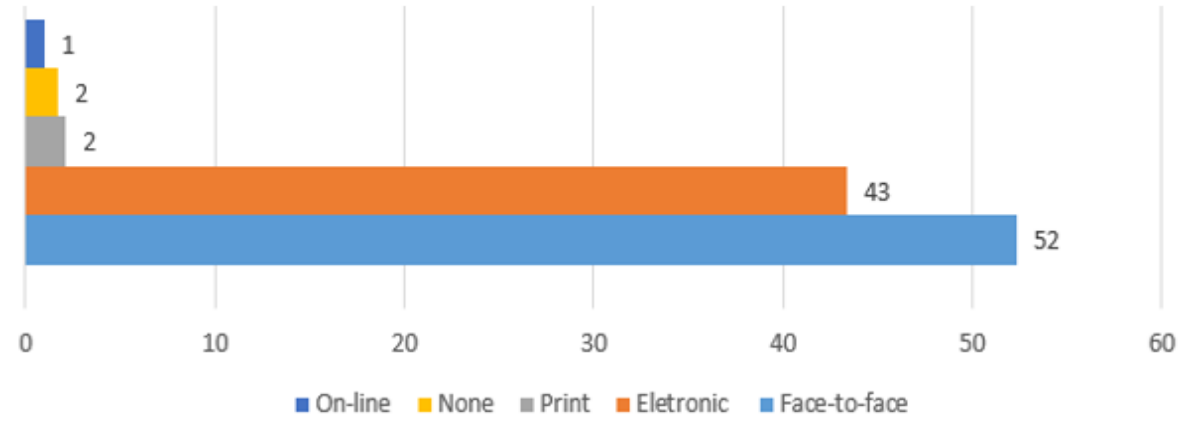
Figure 10: Agriculture information preference by gender



3.2.2 Agricultural information sources

As shown in figure 11, the study established that Face-to-face was a medium of sharing agricultural formation, relied upon by 52% of the farmers in Laikipia County. This took the form of discussions with relatives, friends, and fellow farmers as well as communication from local government leaders, church organizations, Agricultural extension offices one-on-one or in meeting or Barazas or seminars. Documented informations formats such as Electronic medium was the second, with 43% of the farmers depending on it for Agricultural information, mainly through Radio and television content while Print media format was third with 2% and last was on-line or Digital format 1%.

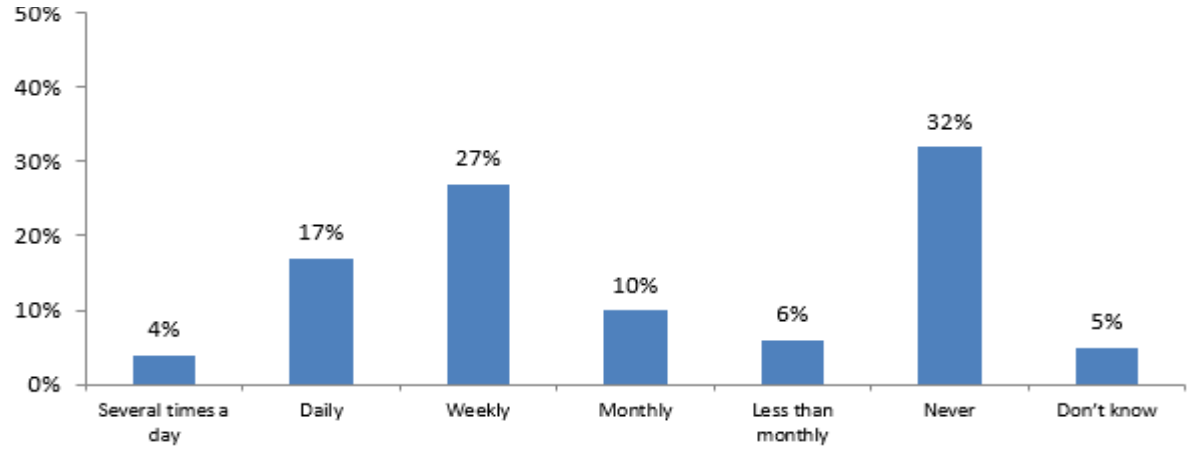
Figure 11: Preferred medium of information



3.2.3 Frequency of on-line information sourcing

The study viewed frequency and desire to go on-line for information as a need. The findings established that 48 % of respondents visited the inter-net in search of information at least once a week, while the rest (52%) visited the internet monthly or fewer times than that as per the figure 12 below.

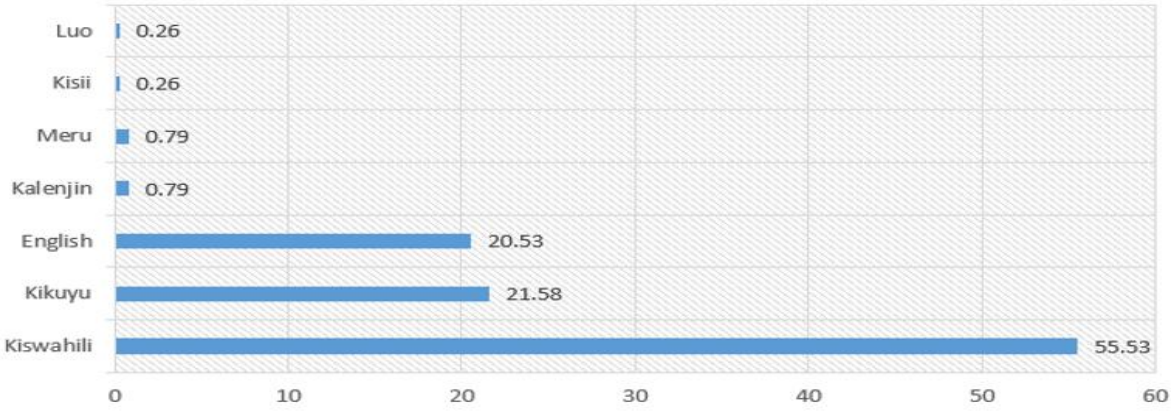
Figure 12: Frequency of online information sourcing



3.2.4 Preferred on-line digital content language

The study shows Kiswahili as the most preferred on-line language of choice among farmers Laikipia County with 55.53% recommending its use on-line. This is followed closely with Kikuyu and English at 21.58% and 20.53 % respectively. Other languages proposed scored below xyz % as can be seen on the figure 13 below.

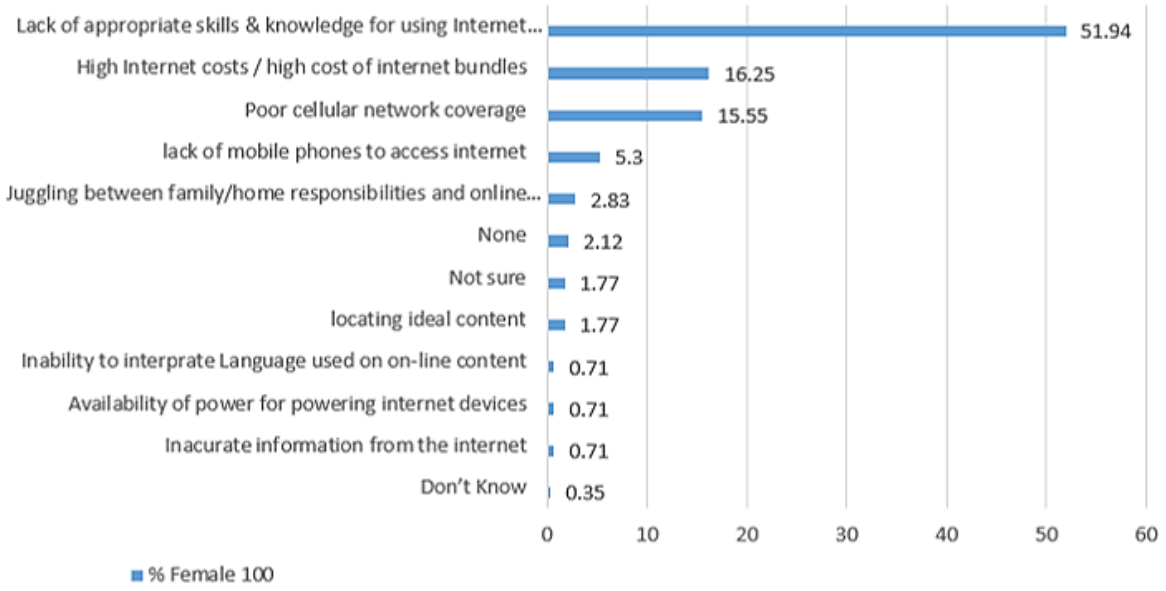
Figure 13: Language preference for online content



3.3 Barriers to accessing Digital Content

The Study explored various challenges or obstacles that hinder digital content access by farmers in Laikipia County. The study revealed that lack of skills and knowledge for use of internet (51.94% for females and 37% for Males), high cost of internet (16.21% for females and 21 % for males) and poor cellular network coverage (15.55% for females and 26 % for males) were the three leading barriers to utilization of on-line digital content by Farmers in Laikipia County. Affordability of mobile phone (5.3% for female and 3% for males) , juggling between family responsibility and on-line content (2.83% for females and 2 % for males), difficulties in locating ideal (local) content (1.7%), and availability of electricity were also found to be important in determining on-line access as shown in figure 14 (a) and (b) below.

Figure 14a: Perceived barriers of accessing digital content by female farmers



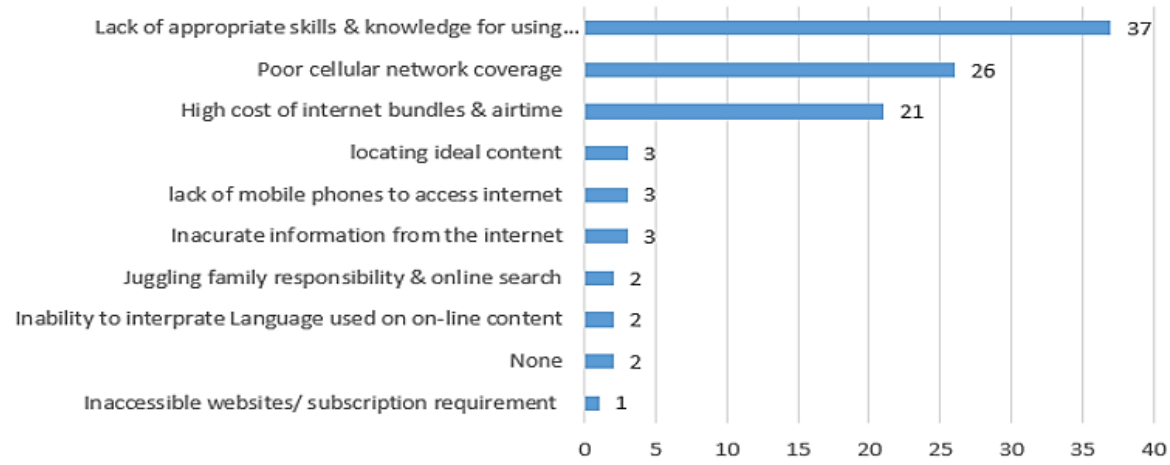
The findings were consistent with Chenai Chair (2017)[16] who also established that digital skills, illiteracy, lack of local content, poverty, power outages as factors affecting internet access. Similar studies also established that high cost and low speed of internet are common challenges in digital content access[17] .

Gender issues of patriarchy and power relations between men and women has also impaired internet use as it is perceived that time spent online takes women away from looking after their partners and fulfilling family responsibilities. Digital skills and illiteracy are demand-side issues that greatly[18] affect non-users as well – even those who have smart devices, limiting their internet use. Other barriers for internet access include cyber security[19] .

[16] Chenai Chair, (2017) Internet use barriers and user strategies: perspectives from Kenya, Nigeria, South Africa and Rwanda
[17] Jerry Bambi, (2010) OBSTACLES TO INTERNET GROWTH IN NIGERIA. Retrieved from: http://jerrybambi.blogspot.com/2010/08/obstacles-to-internet-growth-in-nigeria_06.html
[18] Internet society (2013) Lifting barriers to Internet development in Africa: suggestions for Improving connectivity. Retrieved from: https://www.sbs.ox.ac.uk/cybersecuritycapacity/system/files/Barriers%20to%20Internet%20in%20Africa%20Internet%20Society_0.pdf
[19] United Nations. Economic Commission for Africa (2014). Tackling the challenges of cybersecurity inAfrica. Policy Brief. No. 002, 6 p.. Addis Ababa:. © UN. ECA,. Retrieved from: http://hdl.handle.net/10855/22544

The world Economic forum (2016) summarizes the barriers and challenges to internet access as illustrated in the figure below.

Figure 14(b): Perceived barriers of accessing digital content by male farmers



3.4 Critical success factors for Digital content inclusivity

Critical success factors for generating and availing locally relevant and development-oriented digital content & platforms in agriculture. The Figure below shows the opinion of the farming community in Laikipia County with regard to successful generation and availing of relevant and development-oriented digital content for the farmers. 77.63% of the respondents said that awareness creation with regard to exiting platforms will help improve access to digital content. 10 % called for Training and Education programs that improve on skills and Knowledge of internet and digital content access and use. Other proposals were financial empowerment of farmers so that they are able to afford the cost related to on-line services, creation of community ICT hubs and Improvement of network coverage in all parts of the county. Demand for Awareness creation and training was higher among females than Males.

Figure 15: Critical factors determining access to digital content

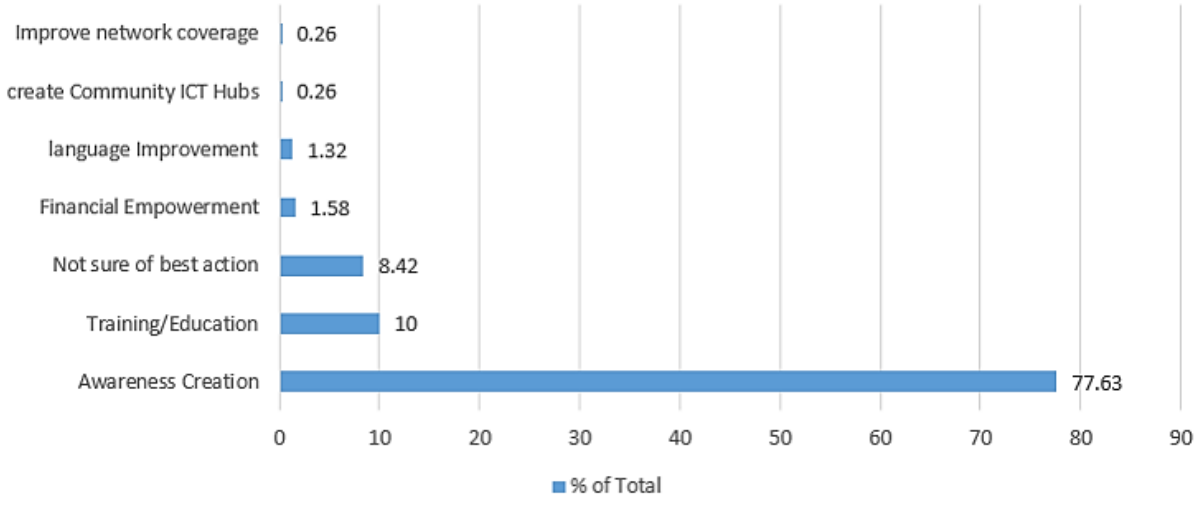
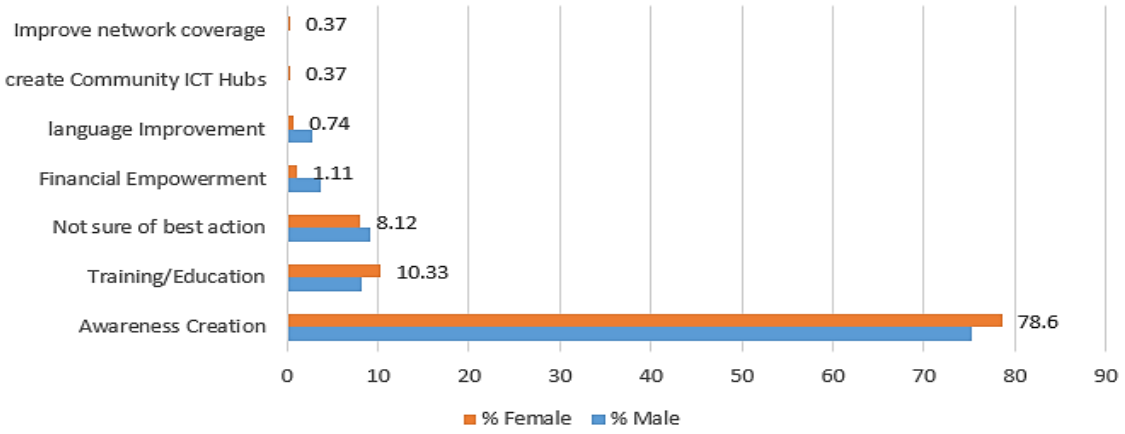


Figure 16: Critical digital content access factors based on gender



The findings also revealed that the respondents prefer use of language they understand most in the development and use of digital models. Asked which language they preferred most, 55.53 % of total respondent recommended Kiswahili, the lingua franca in Kenya and eastern Africa community. Kikuyu, a local language of majority farmers in Laikipia county and English were second and third at 21.58% and 20.53% respectively.

3.5 Agricultural Digital Models

The study surveyed several digital models and available to farmers with a view to find out levels of awareness level this models, use of the models

3.5.1 Agricultural digital models farmers are aware of in Laikipia County

The study revealed that nearly half of the farmers (46.78%) are not aware of any of the Agricultural Models presented (figure 17a). Digi Farm, An Agricultural model owned and operated by mobile phone service provider Safaricom was leading in terms of awareness of its existence by 27.48%. Digi Farm's digital platform is SMS service unlike the rest who are website based. Digital models can draw an awareness creation approach utilized by Digi Farm, by leveraging on SMS besides being website based.

Figure 17a: Percentage awareness of specific agricultural models

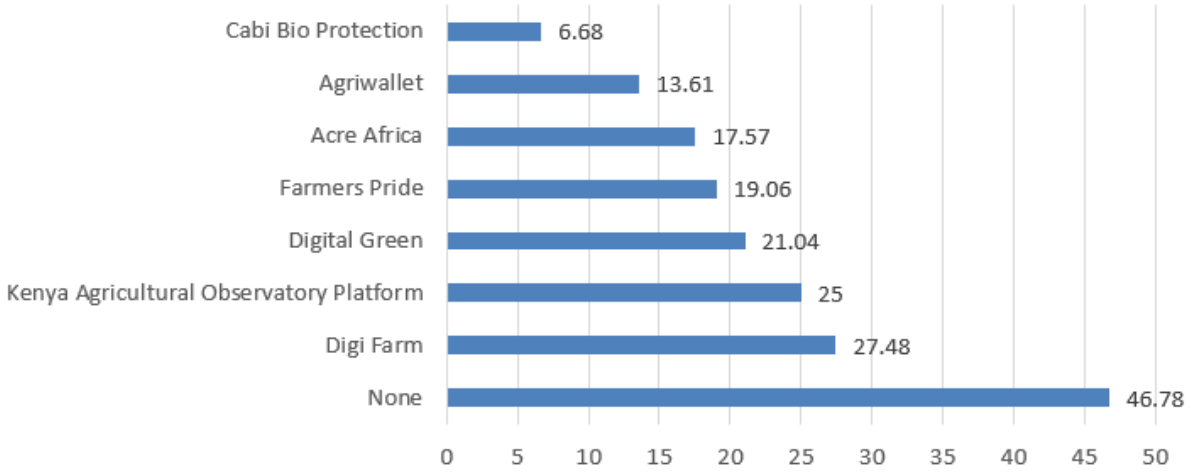
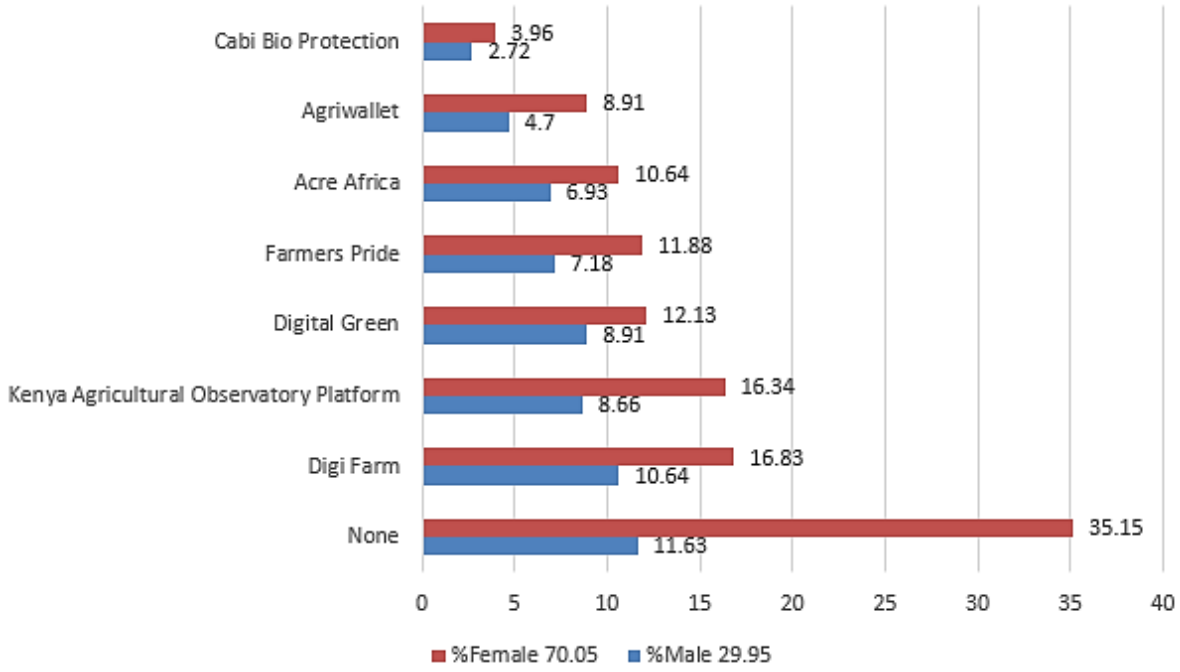


Figure 17 b (below) shows female farmer leading in awareness of all the Models. However, women also have a higher number of those not aware of any model (35.15%) compared to their males counter parts at 11.63%. Digital model developers may therefore find it more impactful to deliberately target female farmers for Awareness creation programs in the region in order to bridge the gender gaps.

Figure 17(b): Comparative awareness of models between male and female farmers

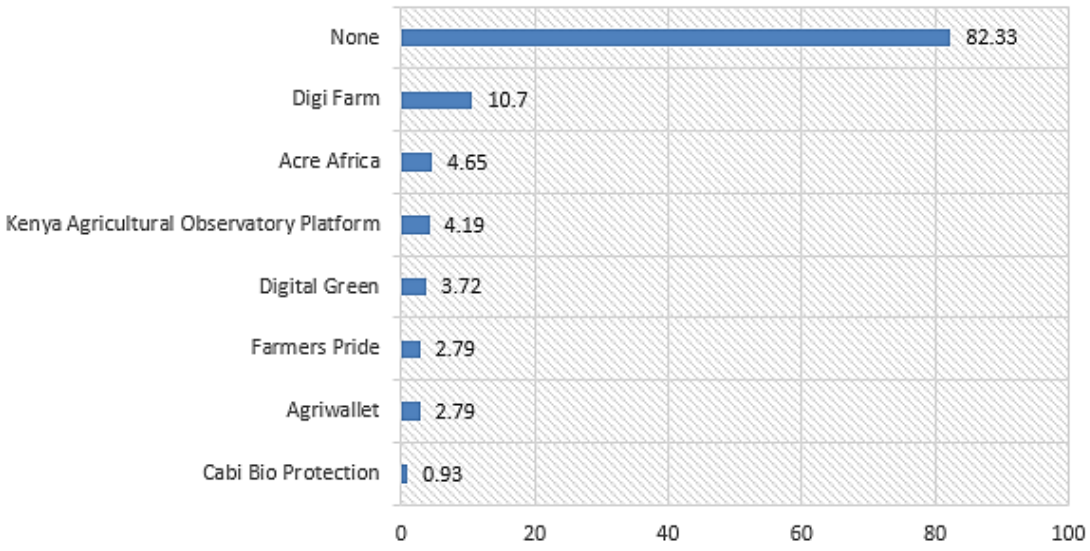


3.5.2 Agricultural digital models ever-used by farmers

This study revealed that 82.33% have never used the digital platforms listed. Leaving only 17.67% who have used at least a platform. This shows a huge opportunity for digital inclusivity interventions. The top three models based on this parameter were Digi farm (10.7 %), Acre Africa (4.65%) and KAOP (4.19 %). Appendix 3 details the profile of each model. Based on the profile, some lessons may be drawn, though not conclusively, that there is a correlation between the category of agricultural information most farmer showed need for (see 3.1 under need assessment) and the ranking of the models ever used.

Models that had highest user are more concerned with crop and livestock production than financing and marketing. They are also models with a broad coverage of services. This provides both a challenge and an opportunity for Agricultural Finance & marketing models like Agriwallet, and Cabi Bioprotection, to leverage on other needs of farmers, even as they introduce their products and services

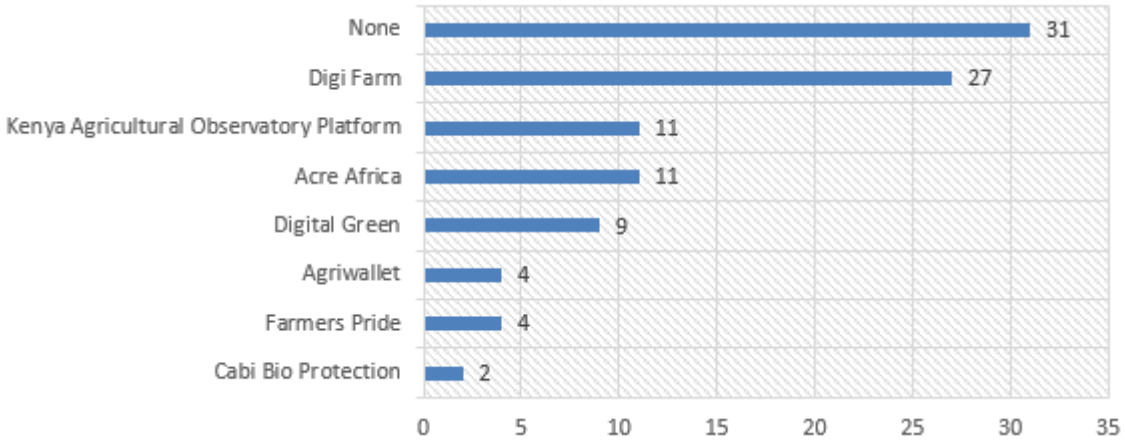
Figure 18: Models that farmers have used in Laikipia County



3.5.3 Agricultural digital models used in the last twelve months

Agricultural digital models farmers have used within the last twelve months in Laikipia County showed Digi Farm, KAOP and Acre Africa lead by 27%, 11% and 11% respectively.

Figure 19: Agricultural models used by farmers within the last twelve months



3.5.4 Rating of Agricultural Digital Models

The study sort to establish the rating of models based on the functional attributes with a view for improvement of such models and lessons for development of new models. The rating was based i) Ease of registration ii) Trust that personal information is safe iii) Availability of platform when needed iv) Accuracy and updated information v) Easy to use vii) use of language that is easy to understand and viii) has locally relevant content. A scale of 1-5 was used, where 1-Very poor, 2-Poor, 3-Not sure, 4-Good and 5-Very good.

The table below represents the findings of the study. Kenya Agricultural Observatory Platform (KAOP) is a head with 3.9 based on the average. KAOP was also rated highest regarding relevance of their content. Acre Africa, Cabi Bioprotection and Agri wallet followed with getting an average of Good (3.5 -4.4).

Table 3: Rating of Agricultural Digital Models

Agricultural Digital platforms	Ease of Registration	Availability	Trust with personal information	Accuracy of information	Ease of use	Understandable Language	Recommendable	Likeable	Relevance of content	Average Rating of platforms
Kenya Agricultural Observatory Platform (KAOP)	3	4	4	4	4	4	4	4	5	3.9
Acre Africa	4	4	3	4	3	4	3	5	3	3.6
Cabi Bioprotection	3	4	3	4	4	4	5	3	4	3.6
Agriwallet	4	4	4	3	4	3	4	4	3	3.5
Digital Green	3	3	3	3	4	4	4	4	3	3.3
Digi farm	3	3	3	3	3	3	3	3	3	3.0
Farmers Pride	3	3	3	4	3	4	1	3	3	2.9
Average Rating of Attributes	3.2	3.5	3.1	3.6	3.6	3.7	3.2	3.5	3.3	3.4

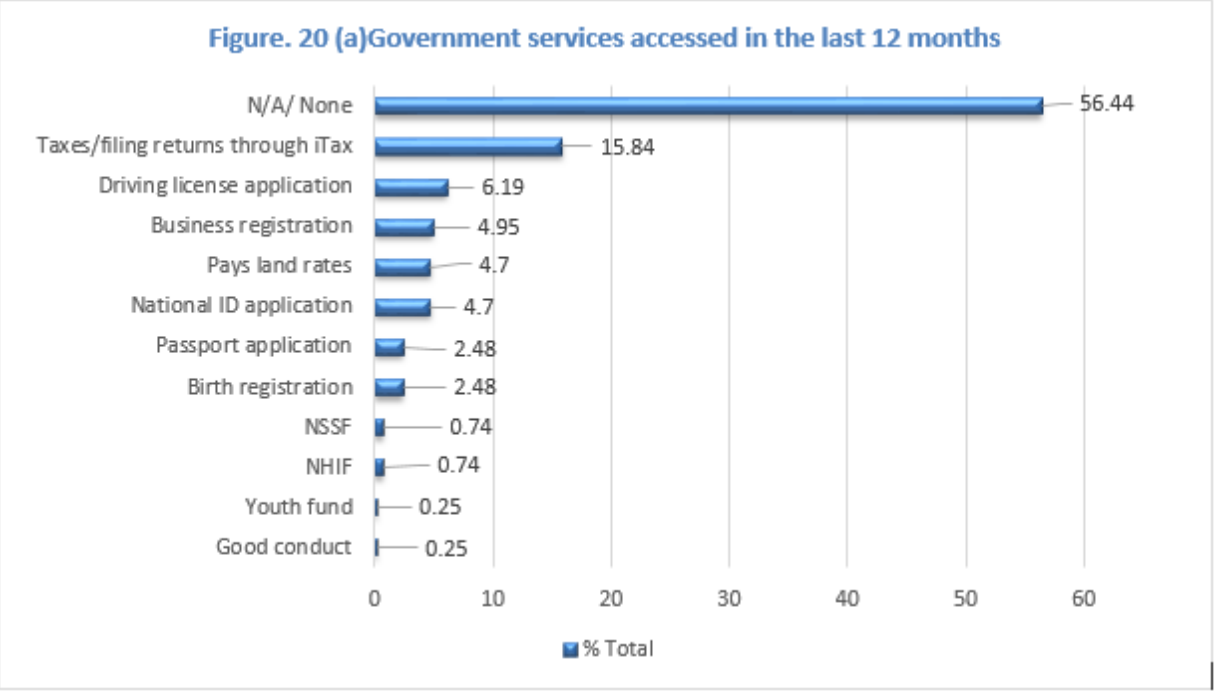
3.6 Opportunities available in digital content models & platforms

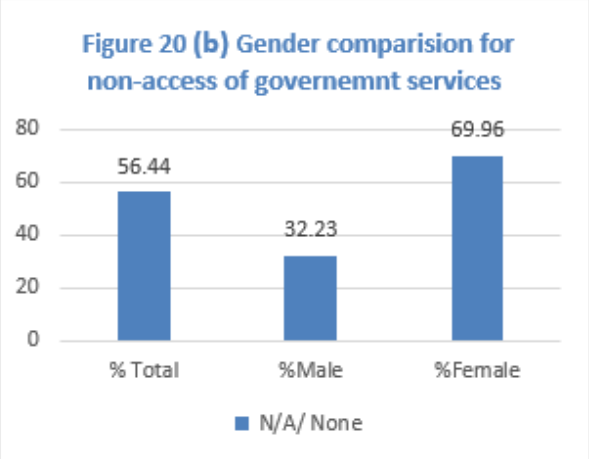
The study explored the opportunities presented by various digital models and platforms that farmers and developers may exploit. Government services, e-commerce, and social media was explored.

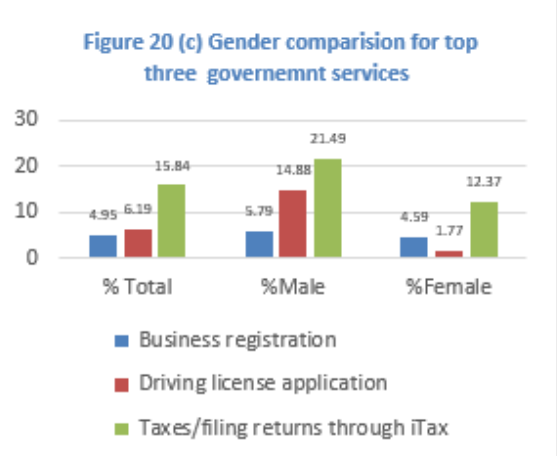
3.6.1 Government services used in the last twelve months

The top three e-government services used over the last twelve month were iTax (15.84%), Driving license (6.19%) and Business registration (4.95%) fig a). Twice as many females than males had not accessed government service (figure 20 (b), and female farmers were also below males in all the top three most accessed e-government services. Driving license access had the largest gender gap.

Figure 20: Government services accessed

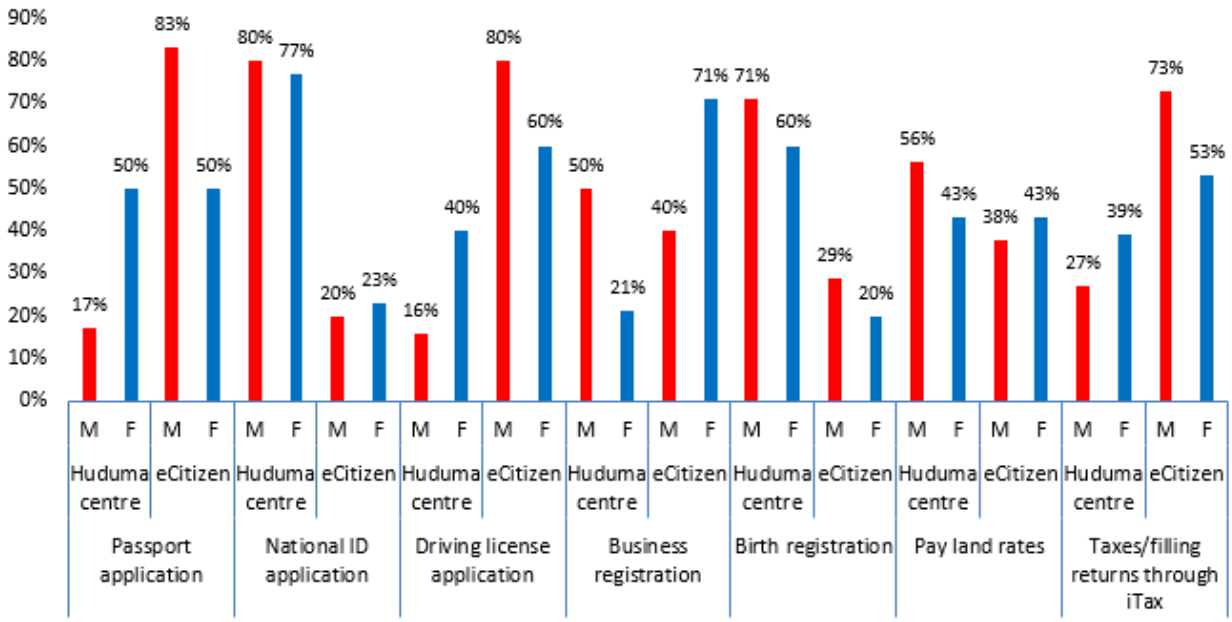






Both Huduma centers and ECitizen platforms were used by the respondents to access the government services. The rate of used varied depending on the service as shown in the figure 20(d) below.

Figure 20 (d): Preferred provider for Government services used in the last twelve months



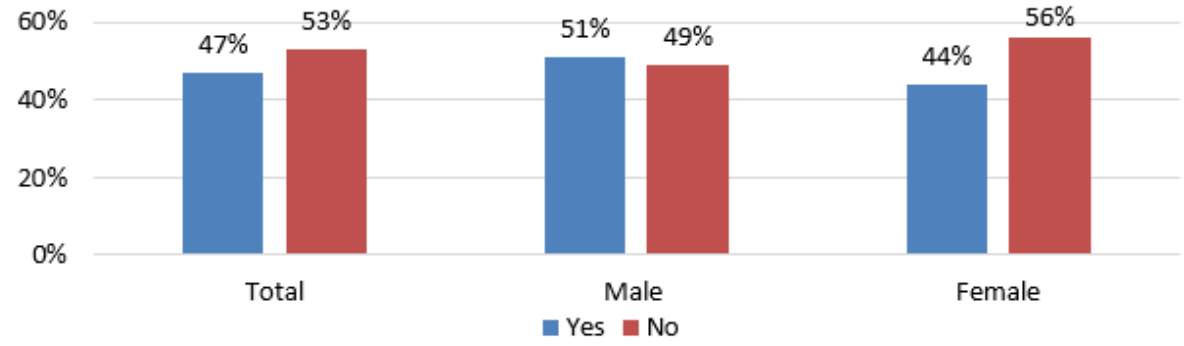
Earlier studies showed that Huduma centers have helped improve government services for Kenya in terms of increasing the number of people served, reducing time of service delivery, increasing accountability and transparency and finally improving public understanding of government activities[20]. Given that Huduma services are available in every county in Kenya, sensitization of communities in the rural areas particularly farmers could result in increased access to the services, saving them time and money which in turn, could be channeled to agricultural productivity

3.6.2 Access to digital models dealing with Money transfer, Savings and e-commerce

The study explored use of digital platforms for transactions or saving money. Respondents were asked if they had saved money or bought something online or managed their money using online services. As shown in Figure 3.5.6 a below, over half (53%) of farmers don't use online services to buy goods or as a mode of saving money.

Figure 21: Use of online money services

Figure 20: Use of online money services or e-commerce



[20] Doris Wambugu (2016), The Effect of Innovation On Service Delivery in the Public Sector in Kenya, Daystar University

Table 4 Frequency of using on-line e-commerce opportunities

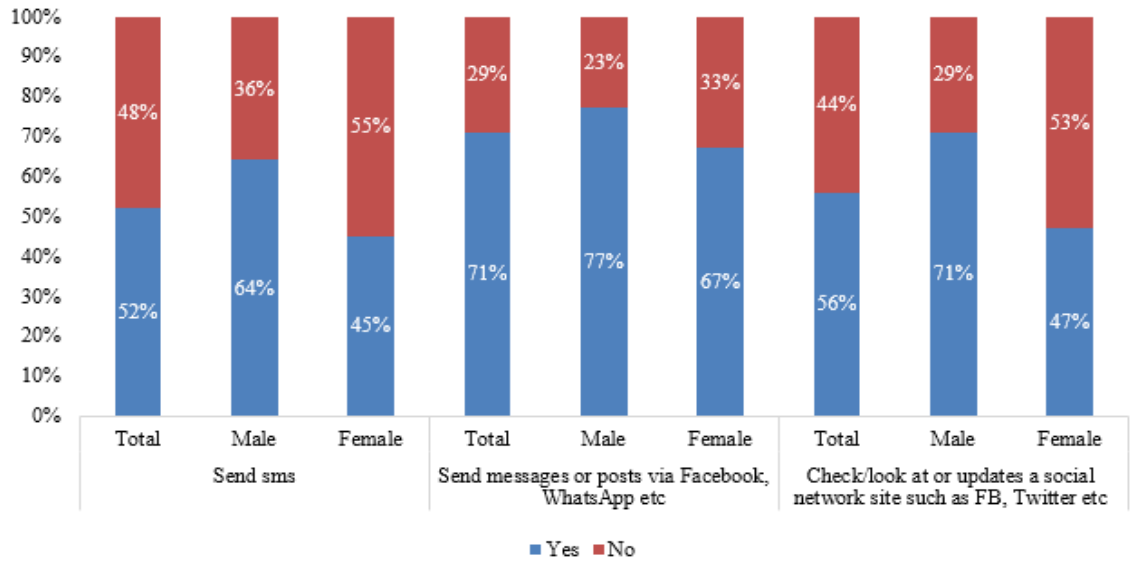
Purpose	Several times a day	Daily	Weekly	Monthly	Less than monthly	Never
Buying a farm inputs /product online	2%	8%	4%	12%	8%	**67%**
Selling farm produce online	2%	1%	3%	4%	3%	**88%**
Using your bank's online services	1%	7%	9%	16%	5%	**62%**
Comparing products and services	2%	6%	8%	9%	6%	**69%**
Ordering groceries or food online	1%	0%	4%	6%	3%	**87%**
Finding location of; house, office, store or restaurant	2%	1%	3%	6%	11%	**77%**

According to the Communications Authority of Kenya[21] uptake of mobile money transactions were as follows: Safaricom M-Pesa commands 80.8%, Airtel money 11.9 %, Equitel 6.6%, T-cash 0.4% and Mobi Pay 0.3%. The cashless transaction opportunities have attracted banks, SACCOs, schools, government and private sector players especially through the pay bill numbers that facilitate direct payments. These and other online money/trading options present opportunities that could be exploited fully by women famers in Laikipia to enhance agricultural productivity.

3.7 Access to social media platforms

The study showed that use of social media networks such as Facebook and WhatsApp was most popular (71%) amongst farmer internet users in Laikipia County. Majority use the internet to send messages. Overall, the usage of the internet is higher amongst male than in female farmers as shown in *figure 22* below.

Figure 22: Use of social media platform



Anecdotal findings have indicated accelerated growth in popularity and use of social media platforms such as WhatsApp groups and Facebook for sharing agricultural information about pests and diseases, getting markets, how to grow various crops, fertilizer application and certified seeds among farmers in Kenya. While accuracy of information shared may not be verified, it depicts a positive attitude that points to the assumption that social media is beneficial as a source of agricultural information and growing culture of seeking information through such networks.

This culture of information seeking can be enhanced among farmers but this time towards seeking agricultural information from reliable agricultural digital sources or platforms.

[21] Communication Authority of Kenya (CAK), Third Quarter Sector Statistics Report for the Financial Year 2018/2019 (January –March 2019)

4 | Recommendation & Conclusions

4.1 Overview of Key Findings

The formative assessment study was conducted to understand the digital landscape and user needs for locally-relevant agricultural content among farmers in Laikipia County of Kenya. The study generated useful insights on needs, gaps, barriers and opportunities for adapting planning and implementation of *Maudhui Digiti* project that would result in relevant accessible, gender sensitive and digitally inclusive content for agricultural value chain productivity among underserved farmer community.

The following are the key highlights of the study findings:

Gender inequalities in internet access and usage

The study found out that internet access and usage is significantly lower amongst females as compared to males. Gender gap in other access and usage indicators is also high. Low access and use of internet could be driven lack of relevant skills, general lack of awareness, poor information seeking culture, poor network connectivity and high cost of voice and data. Disparities in access to digital technologies and services mean there is a risk of a digital divide. The female smallholder farmers are particularly at risk of being left behind, not only in terms of e-literacy and access to digital resources but also in terms of productivity and aspects of economic and social integration.

High interest in digital agricultural content and social networking

Amongst the internet users, there is high interest in agricultural information and as a result, the farmers are searching for it from the internet. This is evidenced by close to 64% of farmers who have sought agricultural information from the internet, 21% of them seeking often. There was high level of perception (87%) that internet made their lives easier among internet users. In addition, a high usage of the internet for social reasons through messaging applications (71%) was registered. Refocusing this passion into an information seeking culture for relevant development oriented agricultural content could translate in better utilization of relevant content to improve the agricultural value chain opportunities especially for women farmers.

Low usage of digital agricultural platforms due to lack of knowledge

The high interest in online agricultural content and usage of social media platforms does not translate to usage of the agricultural digital platforms. Evidence from this study showed that 47% of the farming community were not aware of the existence of these platforms and hence the lean on traditional ways of agricultural information such as TV and radio and agricultural extension services which may not provide real time answers to their needs. Low usage was driven by low awareness of the digital platforms and also lack of know-how on how to access and use digital platforms.

Key barriers to internet access and usage are network challenges, limiting finances and skills gaps

The key barrier to internet access for both males and females is lack of effective communication devices, costly and poor network, (cost of for internet bundles) and skills gaps (inability to use the internet and digital platforms). Notably the mention of the skills gap is higher amongst females and this points to the wider digital gaps facing women. Perceived ability to use internet among respondents reporting to use internet was 64% in male and 56% in female. About 41%

of respondents who sought agricultural information couldn't find the information they were looking for meaning they couldn't navigate well through the internet and or the information sought was unavailable.

Considerations for relevant agricultural platforms include; ease of access, information relevance and security

Farmers prefer that the platforms can easily be accessed online either by phone or computers. The platform should have localized information including on general cultivation of common crops, inputs, pest controls, livestock farming information, market among others. The platform could come with easy to memorize URL and navigation within the site easy. Respondents are concerned with safety of personal data hence this is a factor which should be considered especially when it comes to transactions.

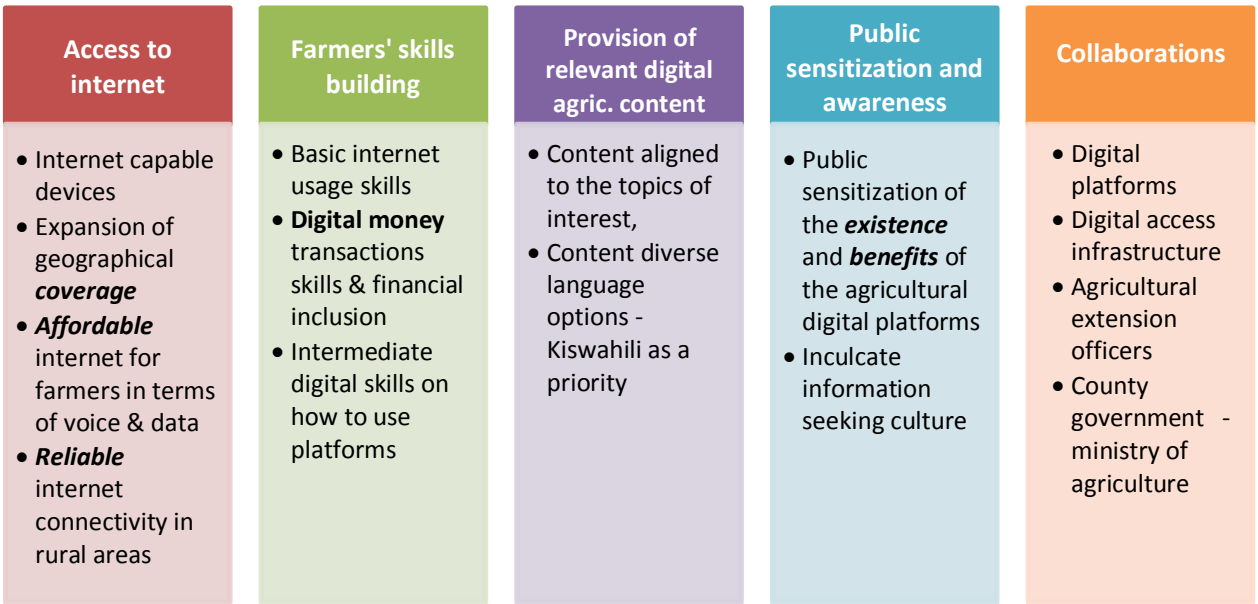
4.2 Key Recommendations

Given the potential for economic growth presented with digital opportunities such as mobile internet, e-government services and e-commerce, farmers in the rural underserved communities need not be left behind. Rural underserved farmers need localized, digitally relevant agricultural information they can apply in their daily farming activities to increase productivity. Critical interventions to address barriers in access and use of relevant digital content are needed and require multi-stakeholder collaboration for greater inclusive impact. Based on the study findings, key recommendations to address specific user needs and expand access are brought forward.

4.2.1 Recommendation for increasing access and utility of relevant digital agricultural content

Maudhui Digiti project should focus on increasing digital access of agricultural content among famers in Laikipia. The minimum conditions required to increase access and usage of agricultural platforms includes: Enhancing connectivity (access to the internet), digital skills building, and harnessing provision of relevant digital content. In addition, there is a need to create awareness on the digital platforms and opportunities therein. Digital platform owners need to collaborate with key stakeholders such as agrochemical and farm input manufactures, agricultural logistics, weather forecasters, SME financiers, as well as agricultural produce markets. This will be critical in creating and delivering relevant digital agricultural information to farmers. *Figure 16* below illustrates the summary of priority intervention;

Figure 23: Priority interventions to increase access to digital agricultural content



Access to the internet: A well-developed supportive digital infrastructure, especially in rural areas, is a precondition for sustainable digital agriculture and food systems. Although the mobile Internet service providers and other players are available in Laikipia, there still exists a gender digital divide. Addressing this will require a gender sensitive intervention that expands coverage of internet networks including establish women-friendly internet access points, a reduction of the cost of internet, devices and reliable network.

Farmers' skills building: To increase access to the internet, there is a need to improve the basic internet skills of farmers. This will require basic training on how to use the internet to access relevant agricultural information, take advantage of digital opportunities with a good level of interest/ information seeking behaviours. Low ability to use platforms will require not only basic internet skills but additional capacity building how to timely access and utilize relevant information uploaded in the digital platforms. *There will be a need to develop a training curriculum for farmers, manuals for training of trainers (ToTs) that meet the gender sensitive content needs of Laikipia farmers.*

Relevant content: The study has highlighted the information needs for farmers. The key priorities are general crop and livestock farming methods, fertilizers (type, how to use and pricing), pesticides (type, how to use and pricing) and effective marketing of agricultural information and produce. The content should be packaged in local and national language. There is a significant number of farmers who do not have smartphones and there is a need to provide alternative access channels for example USSD in addition to linkages to subsidized partnerships/offers.

Awareness: The low awareness of digital agricultural platforms warrants public grassroots awareness and advocacy campaigns on the platforms existence, content and benefits that could be achieved through existing information sharing platforms such as radio stations and village barazas, among others. Collaboration with the model owners will enhance model adjustments, improvements, integration and or simplification based on the user needs identified.

Table 5: Intervention Matrix

Challenge	Suggested intervention
More women than men lack awareness on how to use the internet as well as skills to access and use digital platforms to get agricultural information	• Create awareness to women on existing platforms and online sites with relevant agricultural content • Build digital literacy skills among women on the use of the internet. Basic skills such as how to search relevant information on the internet including using the mobile phone, navigating through the content to obtain needed information. • Address gender disparities on digital agricultural information through sensitizing more women on the importance of using internet to increase agricultural productivity
Respondents highlighted poor network coverage and the high cost of data/ bundles as the one of the key impediments in using internet to get agricultural content	• Advocacy for digital inclusion for underserved communities particularly women farmers in the rural Laikipia County. • Internet service providers and platform owners need to understand that they have a role in addressing digital disparities in order for them to contribute by expanding network coverage to unreached communities and reduce data costs.
Alternative sources of agricultural information such as media platforms (radio and television), county extension officers among others exist and are currently being used by	• While these sources are indeed educative, they could be limited in scope and unable to provide real time solutions or guidance to famer needs. There is need to expose farmers to the opportunities presented by digital sources of agricultural information and its capacity to

Challenge	Suggested intervention
farmers	provide real-time answers to agricultural answers they could be seeking.
Farmers prefer a range of agricultural information such as; on variety of crops cultivars, livestock farming information, input and pricing; use pesticide, insecticide and fertilizers; and market access information	• It will be important that agricultural platforms encompass information that farmers consider relevant for their agricultural productivity. Discussions with platform owners will be key in ensuring that the platforms carry comprehensive information and localized to reflect farmer needs. For maximum use the platforms should; be easy to access, have relevant content, be secure in reference to personal data and use easy to remember URLs. • Consider integrating information on agricultural insurance information: While insurance information may not have been highlighted, it may be important to integrate it within the agricultural information as an added value for farmers to consider in managing agricultural risks.
Gap in using available online opportunities for transactions. Over half (53%) of farmers don't use online services for saving money, agricultural trading, or making transactions. More women (56%) than men (44%) do not use the mentioned services.	• Tailor awareness creation activities to also provide information on ecommerce for example online banking, mobile banking, online trading including opportunities to market and sell agricultural produce online.
Use of social media networks such as Facebook and WhatsApp was most popular (71%) amongst internet users in Laikipia County	• The project could consider guiding women famers to exploit social media opportunities e.g. for farmer to farmer experience sharing which the digital platforms may not provide. Such opportunities could also be used to build famer social networks which can be channels for disseminating information on existing agricultural platforms to access and mentorship on its use. • Inculcate a culture of seeking relevant agricultural information in famers to improve agricultural productivity
Low uptake of e-government services among the famer community and especially women.	• Integrate information on e-government services in with digital agricultural information awareness.

4.2.3 Digital platforms short-listed

Based on the level of awareness by the respondents, needs of respondents, priority services and potential quality of information, the study recommends the following agricultural digital platforms for further analysis and engagement with the project.

Table 6: Digital platforms short-listed

Model & Link	Organization Owner	Sighted Opportunities
Digifarm www.safaricom.co.ke/business/digifarm/what-is-digifarm/digifarm	Safaricom	Integrated mobile platform that offers convenient one stop access to product, financial and credit services supporting agri-business and smallholding farmers to share information and transact easily.
Kenya Agricultural Observatory Platform https://www.kaop.co.ke/dashboard.php	KALRO	This is a national platform with valuable insights for farmers around weather, agronomics and analytics. Provides information up to ward level
Digital Green https://www.digitalgreen.org/	Digital Green	Has digital solutions, digital news, focused on providing content to marginalized communities though not very popular. Agricultural extension services.

Note: Engagement of digital platform owners could employ strategies such as: 1. Webinar with three platform owners to share the findings of the study, 2. enlisting their suggestions to increase digital access for agricultural platforms, 3. enlisting them to review of their digital content in line with the needs of farmers

Appendix 1- Questionnaire

SECTION 1: INTRODUCTION

I am calling you from ACWICT (African Centre for Women, Information and Communications Technology) an organization that promote women and youth access to and knowledge of ICT.

With support from the UK Government, ACWICT is conducting a study to understand users' experience of various agricultural digital platforms. Your feedback will be used to identify areas of improvement and interventions in digital content especially in agriculture platforms.

I would also like to assure you that all the information that you share with use will be treated with confidentiality. The interview will take about 15-20 minute of your time. Do you want to continue?

Yes – want to continue > continue with the interview

No – do not want to continue > terminate interview

SECTION 2: DEMOGRAPHIC CHARACTERISTICS

1. Please state your gender
   - ❑ Male
   - ❑ Female
2. Which category below includes your age
   - ❑ 18-34 year
   - ❑ 35-54 years
   - ❑ 55 & above years
3. Which marital status in the list below best applicable to you?
   - ❑ Single
   - ❑ Married
   - ❑ Separated
   - ❑ Divorced
   - ❑ Widowed

4. What is the highest level of academic qualification have you achieved?

- ❑ Primary school certificate
- ❑ Secondary school certificate
- ❑ Technical College (Certificate/Diploma)
- ❑ University Degree
- ❑ Prefer not to say

5. Do you have a disability?

- ❑ YES
- ❑ NO

6. Which of the following describes your area under Agriculture activity(s)

- ❑ Small scale (below 10 Ha or 25 acres)
- ❑ Large scale (above 10 Ha/ 25 acres)

SECTION 3: USER NEEDS FOR LOCALLY- RELEVANT AND DEVELOPMENT-ORIENTED DIGITAL CONTENT & PLATFORMS IN AGRICULTURE / FARMING

7. What information do you often need to enhance your Agriculture/ farming activities?

- ❑ Crop production (e.g. Varieties, fertilizers, weeds, pest & disease control)
- ❑ Livestock production (e.g. breeds, Parasites, Diseases, Nutrition)
- ❑ Agricultural Economics /Accounting (e.g. Enterprises, credit, banking)
- ❑ Agriculture Engineering (farm tools, equipment, Machinery, Soil & water management)
- ❑ Agricultural Marketing (e.g. Demand, Supply, Pricing)
- ❑ Agriculture general (Weather, Technology, Trainings/Shows, Disasters & Legal)
- ❑ Non-of the above

8. Identify information media you rely on most for sourcing above information.

- ❑ Print media (books, Flyers, New papers, print journals)
- ❑ On-line sources (Digital media)
- ❑ Electronic sources (Radios, Television)
- ❑ Face-to-face verbal/non-verbal (Barazas /Shows/field days, fellow farmers, friends)

9. How often do you go ONLINE to look for information on agriculture?

- ❑ Daily
- ❑ Weekly
- ❑ Monthly
- ❑ Not sure

10. Which is your most preferred on-line language in on-line content?

- ❑ English
- ❑ Kiswahili
- ❑ Others (Specify)

SECTION 4: BARRIERS TO ACCESSING LOCALLY- RELEVANT AND DEVELOPMENT-ORIENTED DIGITAL CONTENT & PLATFORMS IN AGRICULTURE / FARMING

11. Identify challenges you experience in sourcing for Agricultural digital content in various internet platforms

- ❑ Poor cellular network coverage
- ❑ High Internet costs / high cost of internet bundles
- ❑ Lack of appropriate skills for using Internet and platforms
- ❑ Inability to interpret the content in different languages
- ❑ Cyber bullying
- ❑ Locating the ideal content
- ❑ Others (specify)

SECTION 5: CRITICAL SUCCESS FACTORS FOR GENERATING AND AVAILING LOCALLY RELEVANT AND DEVELOPMENT-ORIENTED DIGITAL CONTENT & PLATFORMS IN AGRICULTURE

12. a) Which of the following will help promote the accessibility of Agricultural digital content and e-government digital services and platforms in your location?

- ❑ Community websites
- ❑ Use of local language like Kiswahili in content development and in the platforms
- ❑ Public content access points/Public open data policy
- ❑ Open platforms
- ❑ ICT training opportunities
- ❑ Platforms with automated/virtual help mechanism
- ❑ Use of mixture delivery of content (audio, visual , graphics)
- ❑ Alternative accessible format for persons with disabilities
- ❑ Reliable Internet connectivity
- ❑ Affordable Internet
- ❑ Change of attitude and building trust on online platforms
- ❑ Others (specify)

12. b) which is your preferred on-line language

- ❑ English
- ❑ Kiswahili
- ❑ Others (specify).....

SECTION 6: MODELS AND LESSONS FOR DELIVERY OF ACCESSIBLE AND INCLUSIVE LOCALLY -RELEVANT AND DEVELOPMENT ORIENTED DIGITAL CONTENT IN AGRICULTURE

13. Which of the following Agricultural digital Models a) are you aware of b) Ever used c) Accessed with in the past 12 months? Tick (√) the correct column.

	a) Easy to register on the platform	b) Ever Used	c) Accessed within the 12 months
Acre Africa			
Cabi Bioprotection			
Digi farm			
Digital Green			
Farmers Pride			
Kenya Agricultural Observatory Platform (KAOP)			
None			

14. Rate the digital Agricultural Models you have accessed in the last 12 months on a scale of 1-5, where 1-Very poor, 2-Poor, 3-Not sure, 4-Good and 5-Very good based on the functional attributes of the platforms using the table given below.

	Easy to register on the platform	Trust your personal information is safe	Platform is available when needed	Has accurate and up to date information	Easy to use the platform	Uses a language that is easy to understand	Information is locally relevant & Helpful in your development
Acre Africa							
Cabi Bioprotection							
Digi farm							
Digital Green							
Farmers Pride							
Mkulima young							

	Easy to register on the platform	Trust your personal information is safe	Platform is available when needed	Has accurate and up to date information	Easy to use the platform	Uses a language that is easy to understand	Information is locally relevant & Helpful in your development
M-farm							
Kenya Agricultural Observatory Platform (KAOP)							

SECTION 7: OPPORTUNITIES OF ACCESING AND DEVELOPING OTHER LOCALLY RELEVANT AND DEVELOPMENT-ORIENTED DIGITAL CONTENT & PLATFORMS

15. Which of the following government services have you ACCESSED in the last 12 months, AND did you access them through Huduma Centres or through ecitizen platform yourself?

Services	Accesses in the last 12 months	Mode of access		
		Huduma Centre	eCitizen	Not sure
Passport application				
National ID application				
Driving license application				
Business registration				
Birth registration				
Pays land rates				
Tax returns iTax				
Others (specify)				
None of the above				

16. Have you ever saved money/ bought farm inputs online or managed your money using online services (e.g. bill payment, online banking)?

❑ Yes

❑ No

17. Within the last year, how often have you gone online for the following purposes?

	Several times a day	Daily	Weekly	Monthly	Less than monthly	Never
Buying a farm inputs/other product online						
Selling farm produce/other items things online						
Using your bank's online services						

	Several times a day	Daily	Weekly	Monthly	Less than monthly	Never
Comparing products and services						
Ordering groceries or food online						
Finding the location of a house, office, store or restaurant on line						

18. a). Do you often go online for to send or check emails from friends?

❑ Yes

❑ No

b) Do you often go online to send messages or post messages in social media such as Facebook, WhatsApp, and Yahoo! Messenger?

❑ Yes

❑ No

c) Do you often do you go online to check, look at or update a social network site such as Facebook, Twitter YouTube, Instagram, LinkedIn?

❑ Yes

❑ No

Thank you for your participation

Appendix 2 – Summary of Key Indicators

Study digital indicator	Total	Male	Female	Gender gap
Proportion of respondents who use internet	41%	56%	35%	21%
Percent of respondents using mobile internet	38%	56%	35%	21%
Proportion of respondents who use internet often (very often/often)	23%	32%	22%	10%
Perceived ability to use internet (respondents who state that their ability to use internet is excellent/good	59%	64%	56%	8%
Perceived confidence in the use of internet (respondents stating that they are very confident)	77%	80%	76%	4%
Proportion of respondents who think internet makes life easier for them	87%	90%	84%	6%
Proportion of respondents who feel internet is important for them (very important/essential and important).	88%	93%	85%	8%
Proportion of respondents who seek digital agricultural information from the internet	64%	69%	61%	8%
Proportion of respondents who seek digital agricultural information often (very often/often) from the internet	21%	26%	17%	9%
Proportion of respondents who found the agricultural information sought on the internet	59%	67%	54%	13%
Proportion of respondents who found the online information sought helpful for agricultural productivity	94%	98%	91%	7%
Proportion of respondents who are aware of at least one agricultural platform	53%	61%	50%	11%
Proportion of respondents who have ever used any named agricultural platform	14%	10%	4%	6%
Percent of respondent internet users who use social media platforms such as Facebook, WhatsApp etc.	71%	77%	67%	10%
Percent of respondents reporting use of selected e-government services (iTax, diving license application, National Id application, business registration, pay land rates)	40%	64%	26%	38%

Appendix 3 – Mapping digital agricultural platforms

Below is a list of existing digital platforms that delivers or have potential to deliver relevant and actionable digital agricultural information to farmers.

Platform or provider	Information type farmer can access	Link
Digifarm	Provides small-scale farmers with information on agricultural financing, information on crop varieties and animals, and discounted farm inputs. Input recommendations are data driven and specific to farmer's locality, informed by climate, current weather conditions and soil types and soil fertility. Developed by Safaricom and other partners and farmers enroll by dialing *283#	https://www.safaricom.co.ke/business/digifarm
Kenya Agricultural Observatory Platform	Provides localized real time information on weather patterns to help famers including short weather forecasts. This is important to address challenges with unpredictable weather patterns to help them plan and minimize negative impact of climate variability. Farmers are able to register online for SMS Developed by KALRO	https://www.kaop.co.ke/
Digital Green	Collaborates with grass root partners and rural farmers and Identifies rural farmers in collaboration with grassroots partners and trains them to produce and disseminate relevant videos. The videos are meant to share knowledge with one another that build resilience and increase productivity and improve nutritional status It also nurtures village-level entrepreneurs to recruit farmers, assess daily produce volumes, determine which nearby market offers the best price, arrange transport based on volume, and sell farmers' produce directly to wholesale buyers.	https://www.digitalgreen.org/
Farmers Pride	Targets rural small-holder farmers and agro dealer, women and youth through structured education and training programme on Agriculture and Livestock best practices. Provides a one stop online-to-offline marketplace platform that connects village level farmers to relevant information, quality inputs and credible agriculture services in local community to ensure sustainable increased farm production and mitigate effects of climate change	http://farmerspride africa.com/
Agriculture and Climate Risk Enterprise Ltd. (ACRE Africa	Links farmers in Kenya. Tanzania and Rwanda with insurance products for them to confidently invest in farming. Provides farmers with access to finance and agricultural insurance to enable them recover from harsh climatic conditions Uses weather data to approximate on-farm experience	https://acreafrica.com

Platform or provider	Information type farmer can access	Link
Agri Wallet	It is a mobile business account to save, borrow and pay for income generating activities to increase food security. Helps farmers to save and in turn enables them to access short term loans through Rabobank without conventional paperwork	www.agri-wallet.com
Cabi Bio Protection	A free web-based tool to enhance the awareness and uptake of biocontrol and bio pesticide products by growers and advisors It also works with small-holder farmers to produce and compete for global markets	www.cabi.org
We Farm	Uses machine learning technology to respond to farmer questions though crowd-sourced information that helps farmers increase yield gin insight on pricing, tackle effects for climate change, source for quality seeds, fertilizer and loans	https://wefarm.co
M-Farm	Website where farmers access information on how to plants and farm for fruits and nuts such as ground nuts giving the farmers the information they need on the type of seeds which will do well in their area as well as the planting method and technique as well as how to harvest them avoiding losses. They also provide information about how best to rear livestock and poultry and the methods of how to do the best farming in your area depending on the climate.	https://www.mfarm.co.ke/