

JAMBOMAISHA.LIFE

FINAL PILOT REPORT

Nov 2018-Aug 2019



NORWEGIAN CHURCH AID
actalliance

JamboMaisha.Life

Namna mpya ya kujenga jamii yenye manafanikio, weledi,
afya na maisha bora

afya na maisha bora

AUGUST 2019

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esoko

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LIST OF ABBREVIATIONS

Agri tips	Agricultural tips
Agri VAS	Agricultural Value-Added Services
App	Application
ASHC	Africa Soil Health Consortium
DAICO	District agriculture, irrigation and cooperative officer
DED	District Executive Director
DFS	Digital Farmer Services
E-extension	Electronic Extension
GAP	Good agronomic practices / Good agricultural practices
GPS	Global positioning system
GSM	Global System for Mobile communication
GSMA	GSM Association
ICT	Information and Communication Technology
Kplus	Knowledge Plus
Kplus App	Knowledge Plus Application
M-Learning	Mobile learning
MIS	Market Information System
MNO	Mobile network operator
NCA	Norwegian Church Aid
NGO	Non-governmental organization
RAS	Regional administrative secretary
SIM Card	Subscriber identity module card
SMS	Short message service
TARI	Tanzania Research Institute
TBD	To be determined
TMA	Tanzania Meteorological Agency
TOTs	Trainers of Trainees
VAEO	Village agricultural extension officer

EXECUTIVE SUMMARY

The goal of the JamboMaisha.Life Project is to create opportunities for small holder farm households to move out of hunger and poverty through sustainably intensified farming systems that improve food, nutrition, and income security, particularly for women and children, and conserve or enhance the natural resource base. For Africa RISING to succeed in its goal, it must produce knowledge products and communicate all its research results so that they can be available, accessible, and usable for its stake holders. The knowledge products contribute to the visibility of the Africa RISING Program and capacity building while still meeting its overreaching goals. The Program has an ICT platform through collaboration with Esoko for communicating, raising awareness and scaling up of some of the technologies it has validated.

Why was the use of ICT employed?

Traditionally, agricultural extension training was delivered through rigid channels such as print media, word of mouth using extension officers (using the visit and train approach). These channels had several shortcomings which include but not limited to:

- They did not allow for dynamic updating of the content
- Were very slow, hence information reaching the farmers could end up being time barred
- Were impossible to scale since extension officers could only reach a specific number of farmers per season limited by resources, morale and time

Use of ICT was geared at improving delivery (efficiently, affordably and timely) of extension riding on use of mobile technology which was growing rapidly not only in urban settings but also in rural communities. According to GSMA the current mobile phone ownership in Tanzania stands at 81.5% of the total population (GSMA 2019). Interestingly, this percentage was confirmed in this project which revealed a 90.94% mobile ownership out of which 27.69% was smartphone ownership. Use of SMS was crucial in delivering the extension information to the farmers as it ensured the smallholder farmers were getting content customized and personalized to their crop production and Agro-ecological zones.

Use of SMS ensured all registered farmers who had access to a phone -regardless of whether it was a **feature phone** or a **smartphone**- could receive the updated and certified Agri tips via SMS throughout the production season and post production period. Use of interactive videos for training was also employed as an add-on to improve the knowledge transfer to the farmers. The videos were developed involving the communities and were produced in Swahili language to ensure the literacy gap was bridged and involving the

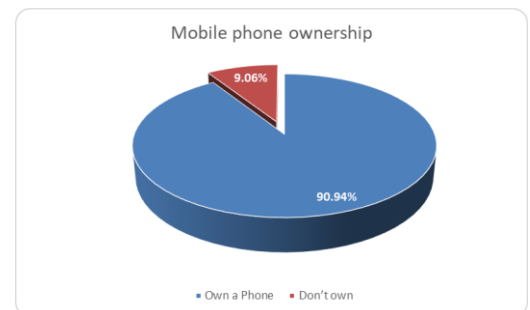


Figure 1: Mobile phone ownership chart

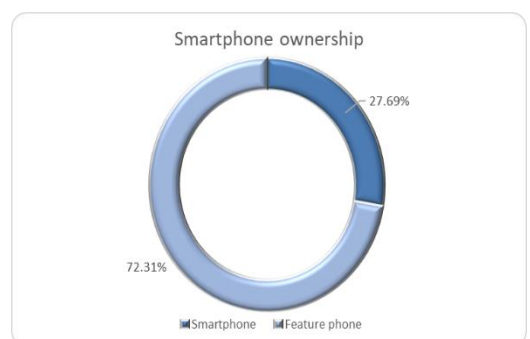


Figure 2: Smart phone ownership chart

communities gave them a sense of ownership. The video training ensured that even 9% of the SHFs who did not have mobile phones had access to training.

Overall 3,058 smallholder farmers (unique profiles) were reached using a combination of Video and SMS agronomy training of which 53.7% were Male and 46.2% Female. The lower number of registered female farmers compared to male may be attributed to social economic factors and a patriarchal society skewed in favor of men. Currently (August 2019) dissemination of SMS on agronomy is ongoing in trickles as the season winds down. SMS being disseminated is on Agronomy Tips centered on preharvest, harvest, post-harvest technologies, storage and marketing tips. Overall 56 unique Agronomy messages and 9 regular notification messages were delivered to the farmers with a total of 103,560 SMS messages sent out of the targeted 120,000.

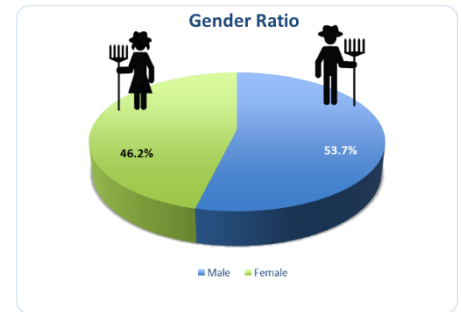
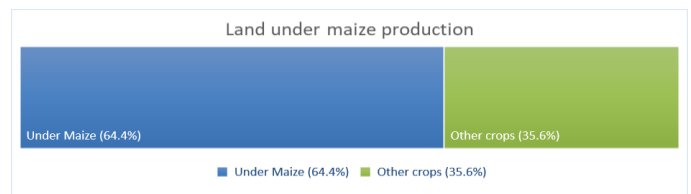


Figure 3: Gender ratio

On crop cultivation: Maize was found to be the important crop for the farmers with over 98.35% of the farmers producing it. The total land size owned by 2,441 farmers was 5400 acres with 3,638 dedicated to maize production representing 64.4%. The most important second crop was sunflower followed by rice, sesame, tomatoes, vegetables and beans.



One of the most amazing impact we found in such a short implementation time was an increase in use of fertilizer and improved/hybrid seeds. When we did the initial farmer registration -which acted as our baseline- 35.78% and 16.56% of the farmers were using improved/hybrid seed and fertilizer respectively and after training the numbers increased to 57.6% and 30.9% respectively.

The sharp increase in use of hybrid seeds may have partly been influenced by the delay in rains by one month hence the farmers were actively enquiring on what short maturing seed varieties they would use based on the TMA forecast rain forecast that indicated they would get less than average rains for only one month. This provided powerful evidence of how a combination of agronomy and weather information can help farmers to be resilient against effects of climate change.

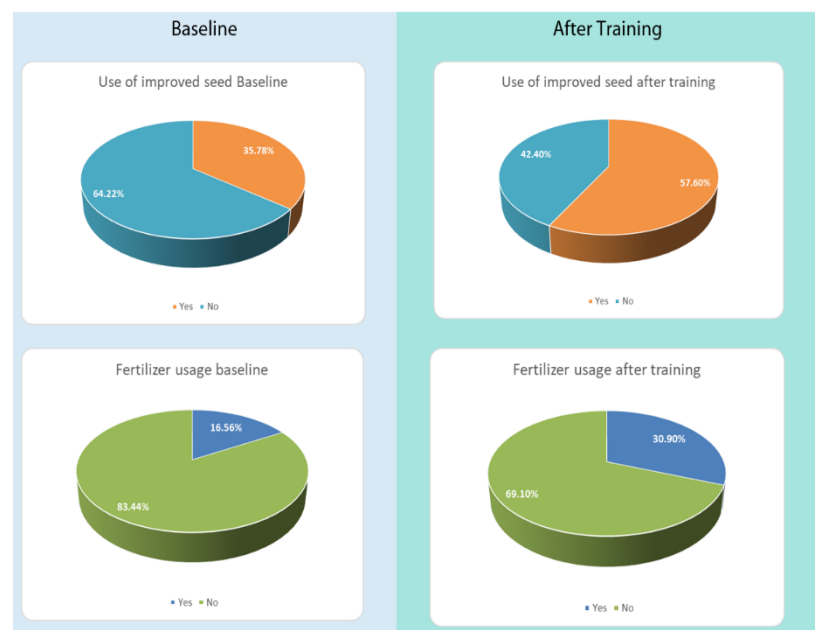


Figure 4: Use of improved seeds and fertilizer

1.0 BACKGROUND

1.1 Introduction

Norwegian Church Aid (NCA) works with Faith Based Organization in 22 regions and 38 districts. NCA has successfully mobilized around 92,556 women, men and youth to join and form more than 4000 Inter Religious VICOBA (IR VICOBA) groups as of June 2017. IR VICOBA is a vehicle for development through which over TZS 50 billion (USD 23 million) have been saved and often invested in small business for improved livelihoods. In realizing our empowerment goals, the program invented and continue to invent pilot projects collectively known as Small Holder Empowerment (SHE) which includes Mahindi Bora (Maize value chain intervention), Veggie (small scale irrigated vegetable production using drip irrigation technology), and Poultry production (also a value chain-based intervention).

NCA has also invested in digital innovations for quality data collection and performance management of their projects. However, the problem has been to implement these projects in an integrated manner where the rights holders can access bundled services. They released the potential of using digital platform to collect and disseminate information also, to provide products and services by bringing all stakeholders in one platform with the interest of serving rights holders. It's their believe that, these actors will be interested to come in because they are developing a market for their products and services as the number of rights holders increases while scaling the mentioned interventions. Preliminary discussions were made between NCA and potential technology providers including Esoko with an expectation that, such technology provider(s) would host the proposed JamboMaisha.Life platform.

1.1.1 Scope of work and Objectives

The purpose of the consultancy was to provide NCA Tanzania Country Office with technical support on the use of Esoko digital solutions for farmers and other supported groups. However, the roll-out of the platform was to be deployed in phases and adding the number of members, partners, products and services would be increased progressively. Selection of the ultimate platform to use would depend on learnings and experience from these potential technology providers. Although NCA was open to engage both local and international tech provider, they expressed an interest to work with locally based tech provider for ease of deployment and customization of the product. The project would take the form of the two phases described below:

Phase I: The phase would involve the following: -

1. Engage Esoko to provide electronic enrollment and profiling of the farmers for the pilot phase of JamboMaisha.Life platform (2nd November 2018 – 13th November 2018)
2. Learn from other platforms. Initially this will involve going to a learning visit to N-Frnds. The goal is to learn the effectiveness of the USSD technology
3. Pilot Esoko digital products and services to farmers in the Mahindi Bora project in Kilosa and Mvomero districts (1st December 2018 – 10th August 2019)

Phase II (Based on lessons and choice of tech-provider after phase I)

1. Scale the number of beneficiaries accessing the platform (TBD)
2. Add more services, products, and partners (TBD)
3. Transitioning the ownership and management of the platform to the selected tech-provider (Example from JamboMaisha.Life to Esoko) (TBD)

1.1.2 Expected outputs and deliverables

Phase I / Item 3: ***Pilot Esoko digital products and services to farmers in the Mahindi Bora project in Kilosa and Mvomero districts*** (1st December 2018 – 10th August 2019)

Having successfully completed the electronic enrollment and profiling of the farmers for the pilot phase of JamboMaisha.Life platform on 13th November 2018, the consultant (Esoko) was expected to provide the following deliverables to the NCA Tanzania Country Office:

Deliverables/ Outputs	Estimated Duration to Complete	Target Due Dates
1. Web platform license, build, maintenance and customization	7 day	07.12.2018
2. Developing Extension content and updating the content - Develop interactive videos based on content provided by NCA and train lead farmers, VAEOs and NCA agronomist on how to use the videos in training other farmers in their respective groups.	9 months	10.08.2019
3. Equipment/Gadgets purchase – Tablet-projectors	30 days	31.12.2018
4. Kplus and farmer profiling Lead farmer training - Train community based VAEOs, NCA agronomist and lead farmers in profiling and training farmers using Esoko’s Insyte and Kplus applications respectively.	3 days	31.12.2018 and 31.01.2019
5. Support services	9 months	10.08.2019

1.1.3 Duration of the Work

The timeframe for the consultancy is expected to take 9 Months commencing on 1st December 2018 to 10th August 2019

1.1.4 Location of project

The contractor will be based at Dumila in Kilosa district for the duration of the consultancy. However, in the pursuit of the relevant activities, the contractor will be required to visit the following villages to collect information from the farmers. These areas include Dumila, Mabana, Mbigili, Mvomero, Mandra, Magole, Kilosa, Zombo, Mhenda, Kikongo, and Kisanga

1.2 Esoko background

NCA enlisted the services of Esoko to aid in developing and piloting dissemination of agronomy SMS and Video training modules content to the program beneficiaries through its ICT platform under the banner Jambo Maisha.Life. **Esoko** is a technology company, founded in 2004 as Tradenet, with offices in Ghana, Kenya and Tanzania and franchises/resellers in Malawi and Burkina Faso. It provides information and communication services for agricultural markets in Africa, i.e. Agri VAS. Esoko seeks to ensure that critical information reaches the 'last mile' through mobile technology, such as SMS for feature phones or via a training and extension smartphone application (Knowledge Plus). They also operate an innovative Digital Farmer Services (DFS) which helps digitize the entire value chain (providing visibility at each stage of the value chain), offering smallholder farmers a wide variety of other services including and not limited to Financial services, Insurance, social protection, Mobile payment services, access to input and output markets etc.

This DFS also enables farmers to save in advance for a package of inputs using mobile wallets, and then they can access agronomic advisory, discounted inputs and finance through a virtual marketplace. Through these platforms, they aim to provide advice to farmers on farming as a business training, market intelligence, weather forecasts and Agric tips to help them increase yields and profits. Solutions are also provided to government institutions, businesses and not-for-profit organizations which include: marketing products and services, monitoring activities and sourcing of commodities by helping them to connect with farmers.

The Esoko platform offers: automatic and personalized SMS alerts, buy and sell offers, bulk SMS, SMS polling, surveys, Interactive Video training modules and access to social economic products and services such as linkage to micro insurance in health schemes and access to renewable energy and natural resource management products. The bulk SMS option means that Esoko acts as an SMS aggregator, delivering SMS messages to subscribers' handsets through the MNO's short message service centre (SMSC). The information is delivered to all registered subscribers independent on which MNO they have affiliated to.

1.2.1 The role of Esoko in the project was:

1. To collect smallholder farmers profile information and develop a database of the program beneficiaries in Dumila, Mabana, Mbigili, Mvomelo, Mandera, Magole, Kilosa, Zombo, Mhenda, Kikatiti, and Kisanga (Morogoro region, Tanzania)
2. Develop maize agronomy videos for training maize farmers in Morogoro region
3. Disseminate to the beneficiaries Agronomy Video and SMS content co-developed with NCA partners and personalized based on farmer profiles
4. Report to NCA the beneficiaries' user experiences and regular feedback for monitoring and evaluation purposes
5. Align the agronomy SMS dissemination with the cropping season ensure SHF receive relevant SMS at each particular stage of the season

1.3 Main purpose under JamboMaisha.life

The **overall purpose** of NCA is to provide bundled ICT digital services to enable small holder farmers' have access to information, services and products in a quest to increase production, increase their incomes and improve their livelihoods.

1.4 Activities assigned to Esoko

- Provide a mobile and web-solutions that will enable the JamboMaisha.Life project to:
 - Register their beneficiary farmers in real time via SMS, web and smart phones.
 - Deliver vital and relevant agronomy information throughout the crop calendar to beneficiary farmers.
 - Centralize farmer information storage and management of project
 - Segment and group members based on gender, age, location and commodity ...etc.
 - Provide interactive video training for maize farmers in Kilosa and Mvomero districts
- To clean farmer profiles uploaded by TOTs and filter those without mobile phone numbers and upload to the JamboMaisha platform.
- Develop Maize agronomic SMS extension content for dissemination throughout the season customized to Kilosa and Mvomero districts
- Develop Maize agronomic interactive video extension content for dissemination throughout the season customized to Kilosa and Mvomero districts
- Purchase, configure the Kplus training app and deploy 15 tablet-projectors for training farmers in Kilosa and Mvomero districts
- Send Pre-set good agronomic practices information through SMS to the profiled farmers based on their respective Maize cropping calendars
- Generate reports using in built data analysis tools on the system

2.0 ACTIVITY IMPLEMENTATION PROGRESS

2.1 Progress Narrative

The first step involved setting up the four systems for JamboMaisha.Life:

- The MIS Web system
- The Kplus Web system
- The Kplus mobile Android system and
- The Insyd data collection system

2.1.1 The MIS Web System

This was the web interface for Database management and disseminating the agronomic information through SMS. Before the SMS could start to be disseminated, the sender Id “**JamboMaisha**” was registered for all Mobile Network Operators (MNOs) and activated. This was the sender name from which the beneficiaries would receive the agronomic information on their mobile phones and served to authenticate they were receiving information from the authentic source while providing a brand they could identify with. The MIS system was then setup for JamboMaisha.Life (Annex A) and topped up with SMS credit ready for SMS information dissemination.

Farmer Profiling cleanup, database development and segmentation

The pilot phase was a build up to the concluded profiling exercise carried out by Esoko and TOT farmers registering 3050 over and above the targeted set of reaching 2000 SHFs. 2414 profiles were eligible to receive SMS after cleaning and removing profiles with missing phone numbers and duplicates. The farmer profiles were uploaded onto the JamboMaisha.Life platform and using the built-in database management tools, the profiles were segmented and grouped by their location, crop cultivated and gender. This allowed more customized dissemination based on segmentation.

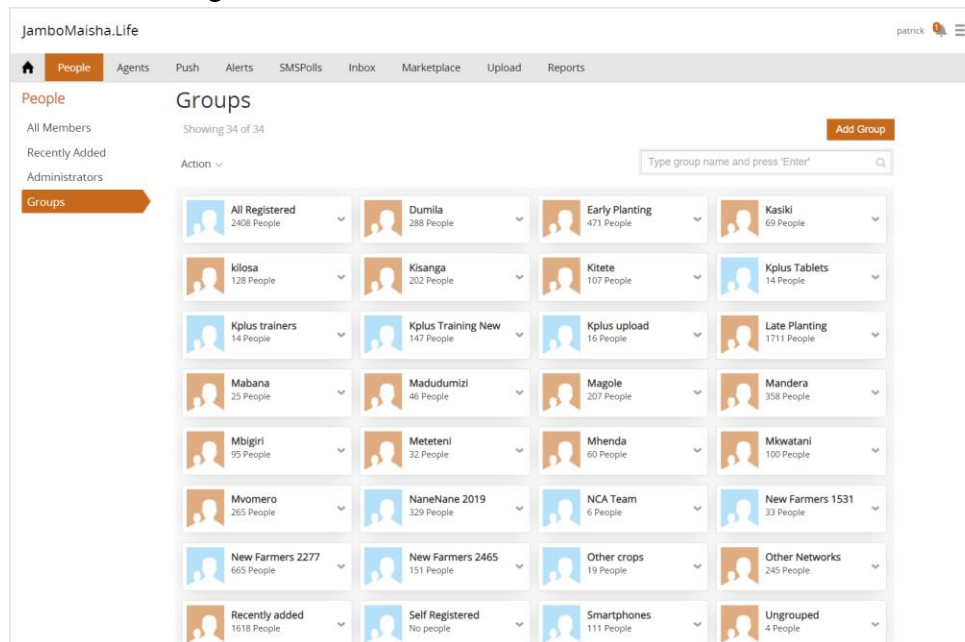


Figure 5: Screenshot of segmented and grouped farmer profiles on the JamboMaisha.Life platform

Agronomy SMS development

Good agronomic practices SMS were extracted from the maize content provided by NCA and TARI-Uyole. The messages were developed in collaboration with TARI-Uyole and run through the NCA agronomist for language and social cultural customization before final verification by TARI-Uyole. The agronomy SMS messages were then disseminated to the beneficiaries based on their agroecological zones, the crop they were cultivating and cropping stage based on progress of their season. The SMS messages were uploaded to the Esoko system and dissemination was done on a weekly basis sending 1-3 SMS messages to each farmer.

2.1.2 Use of Interactive Videos for training using the Esoko's Kplus Application

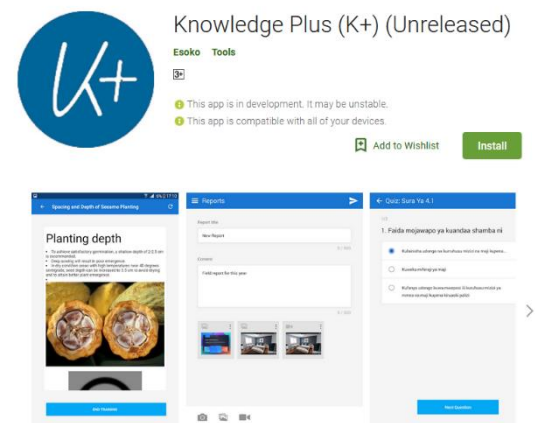
Background: Esoko had developed an innovative digital interactive video training application that allowed M-learning and E-extension training functionalities called Knowledge Plus (Kplus) App. The application was successfully piloted in Dodoma, Singida, Manyara, Pwani and Morogoro regions for training smallholder farmers in sesame and cassava QDS value chains. It's against this backdrop and incorporating the lessons learnt and success of deploying this method of training that NCA decided to pilot use the Esoko Kplus App for training the maize farmers in Dumila, Mabana, Mbigili, Mvomelo, Mandera, Magole, Kilosa, Zombo, Mhenda, Kikatiti, and Kisanga (Morogoro region, Tanzania). Use of these interactive videos were received by the communities with high enthusiasm.

The Knowledge Plus (Kplus) App

From experience we realized no amount of technology can replace a human to human interface training and communication of ideas. This is because there is more to just reading text or even simply listening to a radio. Visualization aids in better understanding and helps in clarification of complex explanations.

For that reason, Esoko engineered a Digital interactive video training App dubbed Knowledge Plus or simply Kplus. The idea was to bring the human to human training interface in a more cost-effective way and enabling farmers to get technical knowledge on how to do complex activities by visualizing how they are done by experts through video. This App enables different experts to train farmers virtually increasing the chance of understanding and adoption of the technologies being promoted.

Kplus was engineered bearing in mind the rural setting is plagued with issues of low GSM or internet coverage. For that reason, it was built to work completely **offline** where one needs to sync new content and can continue training completely offline in hard to reach communities. Kplus allows you to quickly log in to the web portal add new content, save your work and publish, the TOTs get an SMS notification



The extension to farmer ratio in Africa ranges between 1500 to 30,000 farmers for each extension officer. Knowledge calibration amongst extension workers is rarely done which results in various version of agricultural practices. Knowledge+ would enable calibration of knowledge amongst extension workers and enabling them with a tool which delivers updated information to a set of extension workers and in some cases farmers via the web & android channel. Updates on new practices & methodology can now be accessed via Android devices enabled by Knowledge+.

Figure 6:Kplus on Google play store

that there is new content available, they can then switch on their internet, sync the new content to their devices and continue training.

Kplus also enables trainers to register farmers they train and the system continuously captures information on which modules each farmer was trained on. The training reports can then be extracted using the web interface to determine targets reached by the TOTs or ascertain which modules are more popular hence more important to the farmers. Repeating of the same module may also indicate difficulty in understanding and therefore additional videos can be developed for the said modules to simplify the module.

The web interface is user friendly hence there is no need for an IT professional with advanced skills to run it, all one needs to deploy their content is basic Word Processor programs (Microsoft Word, Open Office, WPS...etc.) knowledge, with this one can add Text, Videos, Photos, Diagrams, and audio to create the training modules.

E-extension training / Kplus App deployment

The deployment of the E-extension involved 6 steps

i. Video capture areas identification:

Based on the progress of the season some of the areas where the videos would be captured were identified and the communities there sensitized and engaged.

ii. Establishing training requirements

Based on farmer interactions when collecting the videos, the following areas were identified as key focus areas when developing the videos

Some focus areas when developing videos

Pre-Planting phase

- Crop rotation (minimum period rotation)
- Things to consider when selecting land for production
- Seed varieties selection
- Method of planting (Pros and Cons of each method)

Planting and Growth phase

- Crop spacing / Density
- Gap filling (The best time for gap filling)
- Nutrient requirements and important of fertilizer application
- Soil health
- Pest and diseases: Common pests that infest the crop
- Pest and diseases: How to manage these pests and diseases
- Safety when using pesticides

Post-harvest and sales

- Harvesting (How and when to harvest)
- Packing, transportation and storage of produce
- Value addition – ensuring produce is clean
- Marketing Tips and market identification techniques.

Record keeping

- Records management
- What records to keep
- How to manage expense and profit tables

iii. Video and Audio capture

Several field visits were carried out for video and audio capture. These videos were captured to reflect actual processes on land preparation, planting and weeding. Additionally, more videos were captured on mature crops for a broader content coverage on pest and diseases and harvesting practices. Knowledgeable farmers, a researcher, Agricultural Extension Officers and a seed expert were interviewed to provide the video and audio for the training modules.

- Quality assurance was done by Mr. Leonard Sabula a maize researcher from TARI-Uyole to ensure the videos aligned with the good agronomic practices guidelines. Based on provided feedback, more content was incorporated by making additional field visits to capture information that was missing, needed correction or needed customization to the community.
- Videos were edited and then compressed to mobile viewing optimized formats and sizes while ensuring the video quality was maintained
- The content was then uploaded to the Kplus web platform which included the video, text, photos and diagrams content to produce a sequence of training modules from land preparation to post harvest and marketing
- When the modules were further evaluated and approved, they were published on Kplus App ready for download on the trainer's Android gadgets

iv. KPlus Training

To finalize the process of actualizing Kplus training deployment, the JamboMaisha.Life staff, VAEOs, Agronomist and TOT farmer/trainers were trained on how to access and use the Kplus for training. The NCA implementing partner assisted in identifying the TOTs. After training the TOTs engaged the communities on the ground. The KPlus training included: -

- KPlus Basics
- How to use the tablet projectors
- A walk through the maize crop production Training Modules
- How to Register farmers before the training is conducted
- How to update the tablets with new training content
- How to train other farmers

v. How the TOT farmers would engage other farmers in training

TOT farmers were allowed a week to use the M-learning functionality on Kplus to familiarize themselves with the training content by reading through and viewing the videos before embarking on training other farmers using the E-extension functionality. Each TOT farmer subsequently trained other members of the group during their weekly / bi-weekly farmer group meetings or conducted peer to peer training at their leisure time. 15 training gadgets were purchased for the pilot. The gadgets were provided to the 15 trainers distributed in 15 villages to ensure adequate reach. Farmers and staff with Android smart phones were also linked to the service to able them learn straight from their smartphone devices.

vi. Monitoring and updating of content

Periodic reviews and checks were performed by the JamboMaisha.Life implementing partners (Anglican Diocese of Morogoro Agriculture Extension Officers and Esoko) for verification of the trained farmers and troubleshooting issues arising from the field.

A provision for updating and adding new content will be available and once new content is added and published on Kplus web portal it will be available to be synced in real time to the devices and thereafter be available for use offline on the devices.

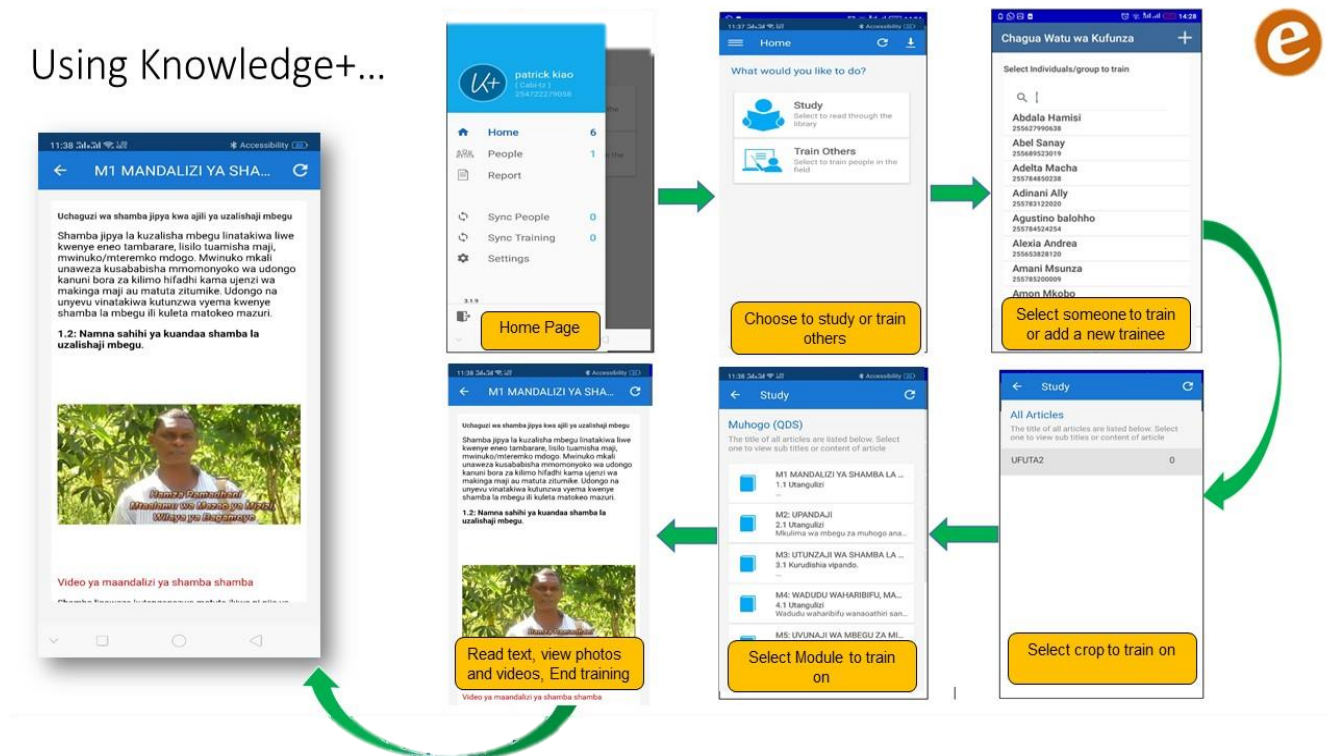
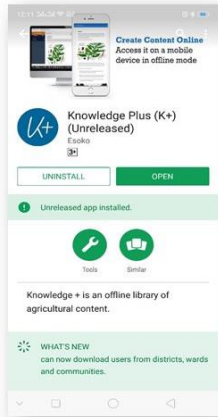


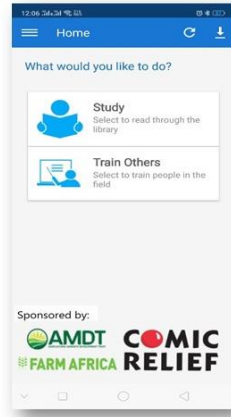
Figure 7: Step by step using Kplus training App

Kplus sustainability

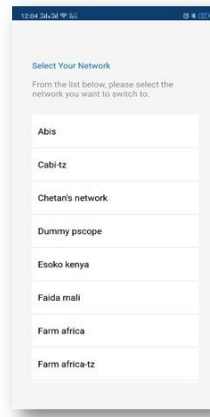
The idea behind Kplus is to ensure it's a gateway to accessing a wide range of information services including crop, inputs, financing, output markets, latest innovations, insurance...etc. The following developments will ensure sustainability and updating of content on Kplus:



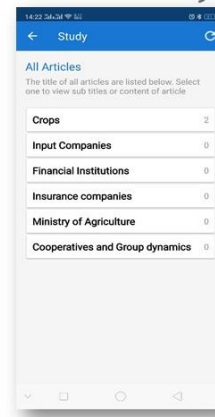
1. Knowledge Plus is now available on Google play store



2. Logos for organizations / Agribusinesses supporting the content (Agribusinesses will sponsor the content)



3. Content from different networks and for different crops will be available indefinitely



4. Wide range of Content will be available. (organizations will pay to support the content)

2.1.3 The Insyt data collection system

The Insyt App is a web and mobile based data collection tool ideal for collecting data from the field regularly or periodically. Its application varies from organization to organization with some using it for farmer profiling, others using it to conduct M&E surveys and the likes of UNICEF are using it to conduct household surveys for social protection programs.

Specific to this project the system was setup for farmer registration and enrollment and was used to capture and analyze all the data provided in this report. The ease of deployment and friendly user interface enabled the TOTs to achieve very high rates of success in registering other farmers. Although the TOTs were drawn from the farming communities and were not Tech savvy, they managed the farmer registration exercise with minimal issues after a very short initial training. A screenshot of the Digital data collection tool, web and mobile is available on Appendix A(iv)

2.2 Equipment / Gadgets purchase

The order for 15 training tablet-projectors was placed with a manufacturer and delivery done in January 2019. The tablets were configured and deployed to the field after the TOT training. (photo of the Tablet-projector and the TOTs in (Annex D)

2.3 Offering of business and technical support services

Esoko assigned a Business advisor for providing technical and business support for the project. The role of the Business advisor was to provide technical backstopping and periodic reporting on the progress of the project.

2.4 Implementation Status of Activities

2.4.1 Current status of Implementation

Deliverables	Due Dates	Status	Details
1. Web platform license, build, maintenance and customization	07.12.2018	Completed	Completed System Setup (Kplus, Insynt and MIS system)
2. Developing Extension content and updating the content - Develop interactive videos based on content provided by NCA and train lead farmers, VAEOs and NCA agronomist on how to use the videos in training other farmers in their respective groups.	10.08.2019	Completed	70 messages developed for preharvest, Harvest, postharvest, storage, aflatoxin
3. Equipment/Gadgets purchase – Tablet-projectors	31.12.2018	Completed	Farmer database cleaned, uploaded and segmented on the JamboMaisha.life platform
4. Kplus and farmer profiling Lead farmer training - Train community based VAEOs, NCA agronomist and lead farmers in profiling and training farmers using Esoko's Insynt and Kplus applications respectively.	31.12.2018 and 31.01.2019	Completed	Interactive Video Content development for Kplus (Video collection, editing, compression and uploading to the Kplus web platform)
5. Report on Analytics around platform performance	10.08.2019	Completed	Final report with learnt lessons for use in scaling up

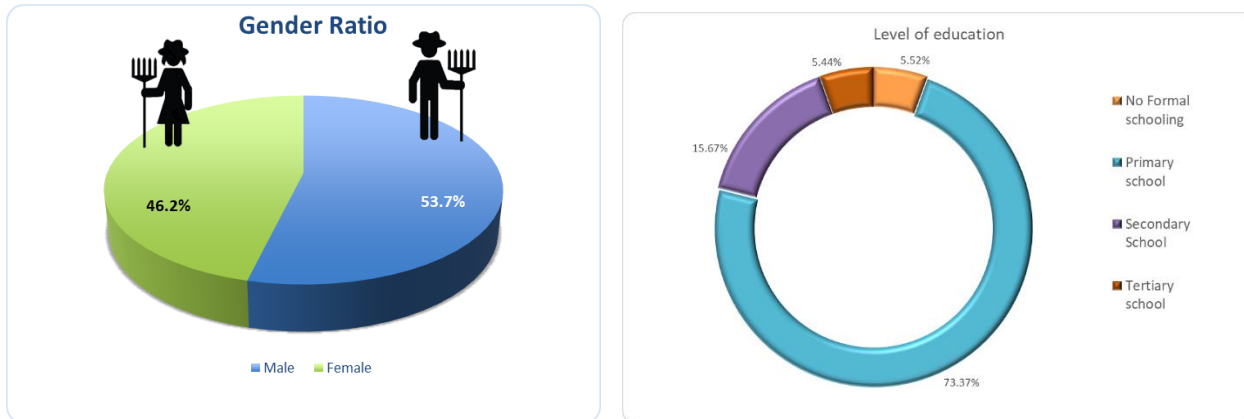
This following table outlines the status of specific activities that were scheduled to be carried out:

Activity	Status	Comment
System set up for the SMS dissemination (MIS) and E-Training (Kplus) -Both web and Android	Completed	Screenshots Annex A
NCA maize content review for Text, photos and videos that are available	Completed	Done
Maize content summarization for SMS and video content	Completed	Done
Development, review, selection and prioritization of SMS content	Completed	70 messages developed for land preparation, seed variety selection, planting, soil health, record keeping, pests and diseases, preharvest, Harvest, postharvest, storage, aflatoxin...etc.
Upload of text content to Kplus	Completed	Summarized content uploaded on Kplus Web – Screenshot Annex D
Registration, testing and deployment of the "JamboMaisha" sender Id for SMS dissemination	Completed	Screenshot Annex D
Video, Audio and Photo collection	Completed	Videos, photos, audios have all been collected
Video editing and upload to Kplus App	Completed	Video developed for land preparation, seed variety selection, planting, soil health, record keeping, pests and diseases, preharvest, Harvest, postharvest, storage, aflatoxin...etc.
Full Video content review and upload on Kplus App	Completed	Done by TARI-Uyole researcher

2.5 Results and Findings

2.5.1 Demographics

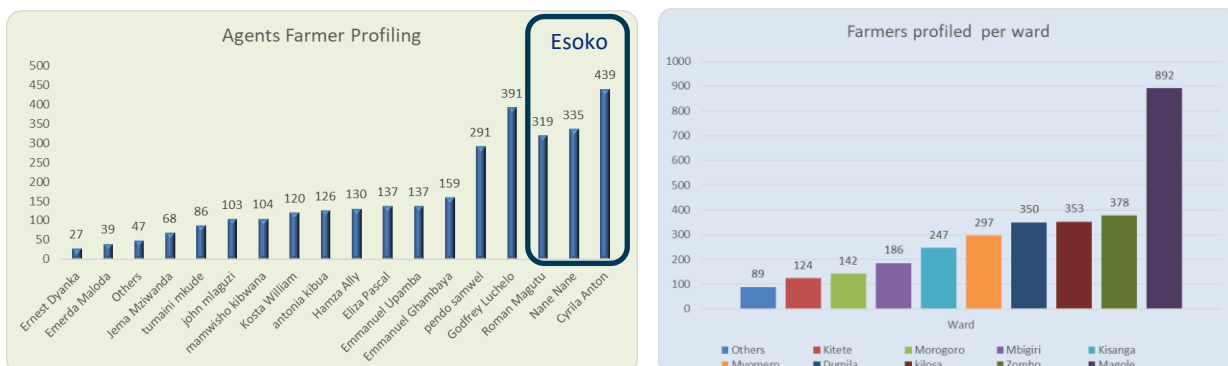
Overall **3,058** smallholder farmers (unique profiles) were reached using a combination of Video and SMS agronomy training of which **53.7%** were Male and **46.2% Female**. The lower number of registered female farmers compared to male may be attributed to social economic factors and a patriarchal society skewed in favor of men. In terms of the level of education most of the farmers about 73.37% have primary school education with about 5.52% not having any formal schooling as represented in the graphs below.



2.5.2 TOT farmer profiling

14 TOTs were trained and equipped with the training tablets. Their role was to register new farmers to receive GAP information as SMS through their mobile phones and to use Kplus to train all the farmers in their respective villages using video training modules. The TOT farmers did an outstanding job in registering and training farmers, altogether they were able to register 1689 new farmers bringing the total of farmers reached and trained to 3050.

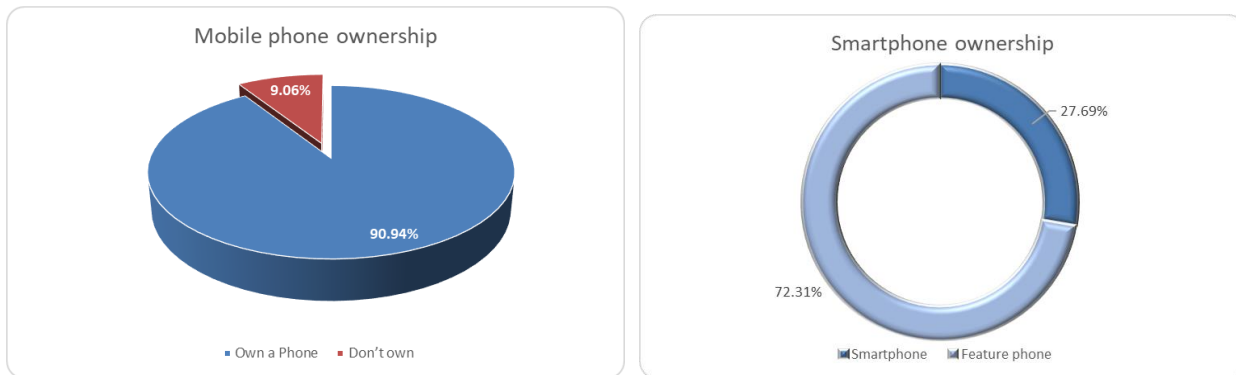
Below is a breakdown of farmers reached by individual trainers and those reached per an administrative ward. The most outstanding performance from the TOTs was from Godfrey Luchelo, Pendo Samwel and Emmanuel Ghambaya who were able to register 391, 291 and 159 SHFs respectively. Magole ward had the highest registered farmer with 892 followed by Zombo, Kilosa, Dumila and Mvomero with 378, 353, 350 and 297 farmer registrations respectively. Although Morogoro Urban district was not originally a target area it was added due to great interest generated when we showcased our work at the NaneNane farmers show.



2.5.3 Mobile phone ownership

Due to the fact that these technologies are disseminated through mobile technology, it was imperative to understand the level of mobile phone penetration for current and future projections. We also went a notch further to understand the level of smartphone penetration because this is core in the development of current and future scale up in dissemination of the video training modules.

According to GSMA the current mobile phone ownership in Tanzania stands at 81.5% of the total population (GSMA 2019). Interestingly, this percentage was confirmed as slightly higher in this project which revealed a 90.94% mobile ownership out of which 27.69% were smartphone devices and 72.31% were feature phones. Below is the graphical representation for this.



2.5.4 SMS Dissemination:

Use of SMS was crucial in delivering the extension information to the farmers as it ensured the smallholder farmers were getting content customized and personalized to their crop production and Agro-ecological zones. Currently (August 2019) dissemination of SMS on agronomy is ongoing in trickles as the season winds down. SMS being disseminated is on Agronomy Tips centered on preharvest, harvest, post-harvest technologies, storage and marketing tips. Use of SMS ensured all registered farmers who had access to a phone -regardless of whether it was a **feature phone** or a **smartphone**- could receive the up to date and certified Agri tips via SMS throughout the production season and post production period.

Overall 56 unique Agronomy messages and 9 regular notification messages were delivered to the farmers with a total of 103,560 SMS messages sent out of the targeted 120,000. The remaining messages will be delivered next the following month (September 2019) when the activities align with the season progress i.e. postharvest tips on monitoring of the stored produce.

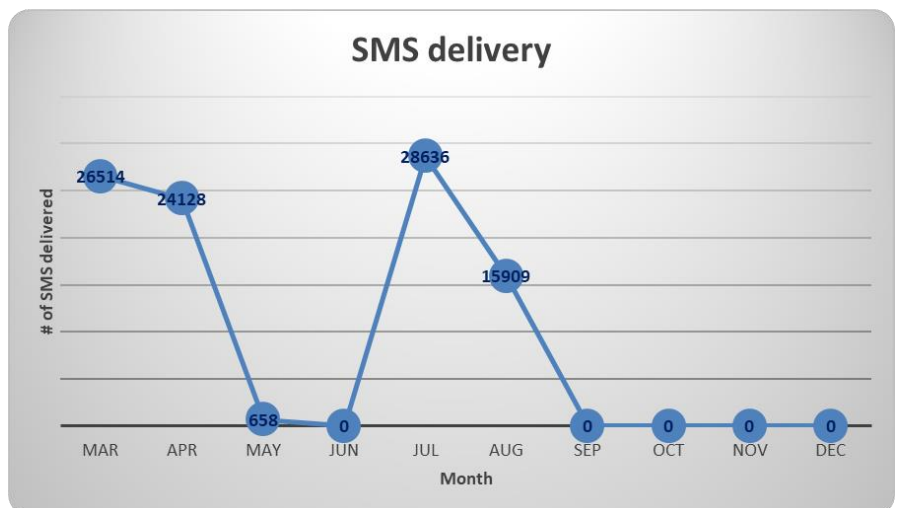


Figure 8: SMS delivery graph

2.5.5 Video development and dissemination

Use of interactive videos for training was also employed as an add-on to improve the knowledge transfer to the farmers. This was ideal in breaching the literacy gap and also provided practical and interactive training for the SHFs. The videos were developed involving the communities and were produced in Swahili language giving them a sense of ownership in the process and end product. The video training ensured that even 9% of the SHFs who did not have mobile phones had access to training and this represented the poorest of the poor.

Video collection and development from the field was completed progressively as the season progressed to ensure practicality. Video production and alignment to the crop production manuals was done at the Esoko Tanzania offices in succession as the video was being captured. In total 26 short videos covering different topics throughout the season were developed from over 100 gigabytes (GB) of videos collected from the field. After production the completed videos were compressed to 300 megabytes (MB) mobile friendly formats while maintaining the visual quality.



Figure 9: Farmers in Kilosa during capturing of land preparation and planting videos

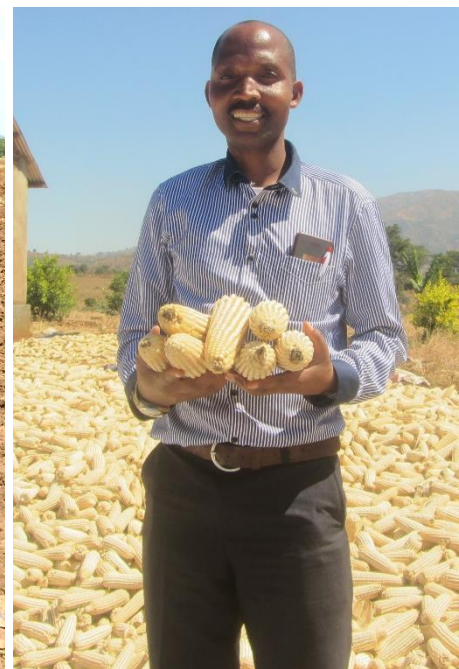
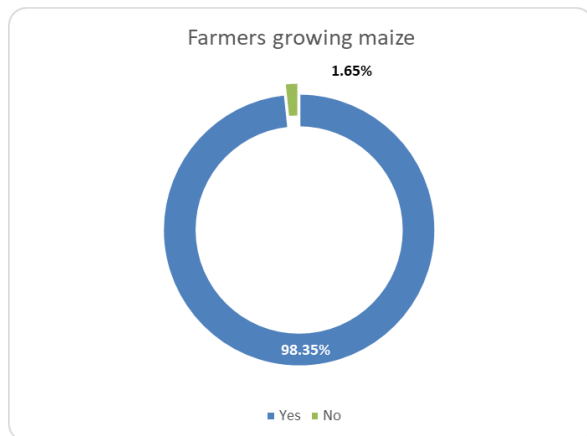


Figure 6: Mr. Leonard Sabula, a researcher from TARI Uyole during harvesting and postharvest video Dev

2.5.6 Crop Cultivation

Maize was found to be the important crop for the farmers with over **98.35%** of the farmers producing it. The total land size owned by 2,441 farmers was 5400 acres with 3,638 dedicated to maize production representing 64.4%. The average land ownership and average land under maize production at 2.2 acres and 1.49 acres respectively.



Item	Land size in Acres
Total Acreage Owned	5400
Total Acreage Under maize	3638
Total land under production (including leased land)	5652
Average land ownership	2.2
Average land under maize	1.49

Category	Percentage
Under Maize	64.4%
Other crops	35.6%

The most important second crop was sunflower followed by rice, sesame, tomatoes, vegetables and beans. This is essential for enabling NCA prioritize on essential content on additional crops the farmers are producing.

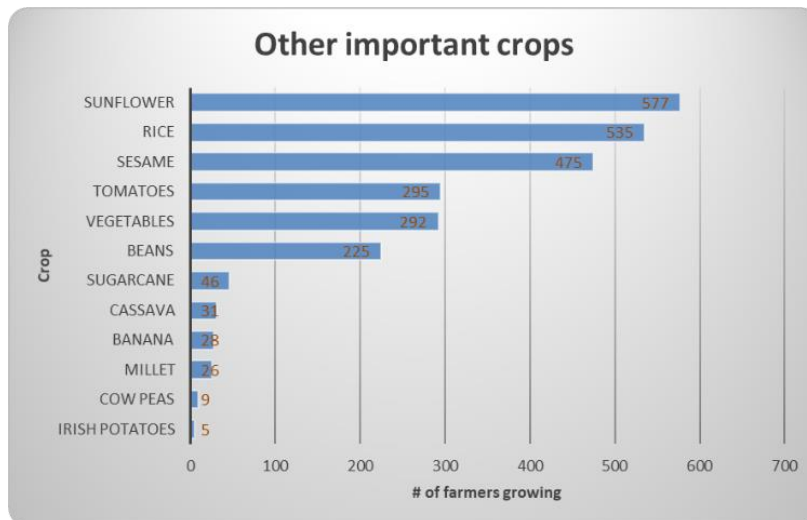
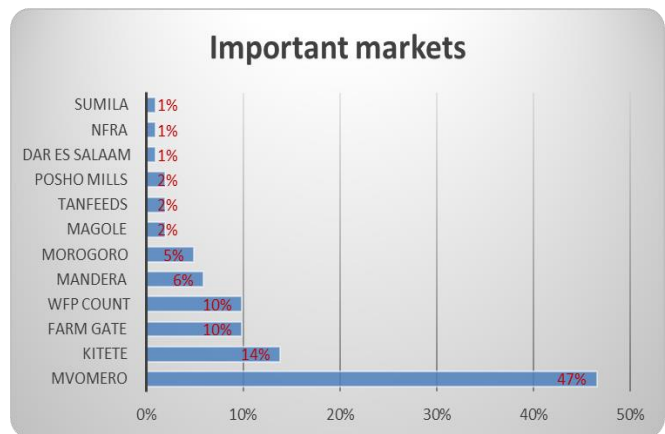
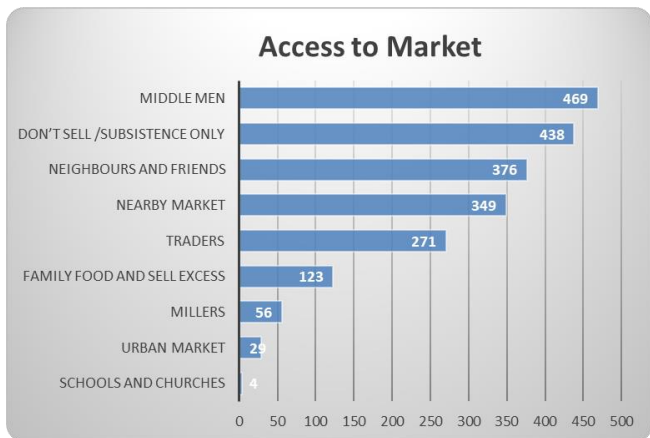


Figure 10: Other important crops the farmers cultivate

2.5.7 Access to Markets

Most of the farmers profiled sell their produce through middlemen followed by selling to neighbours and friends then to neighboring markets and traders. Access to millers and urban markets is very little hence a forward linkage should be established to enable the farmers access new markets and better prices. The over dependence on the local markets could be the biggest reason why the farmers are always complaining of lack of market for their produce.

There is also a very large portion of farmers who are practicing subsistence farming and only produce maize for food, this group should be empowered more so that they can increase production and start selling to earn income and improve their livelihoods.

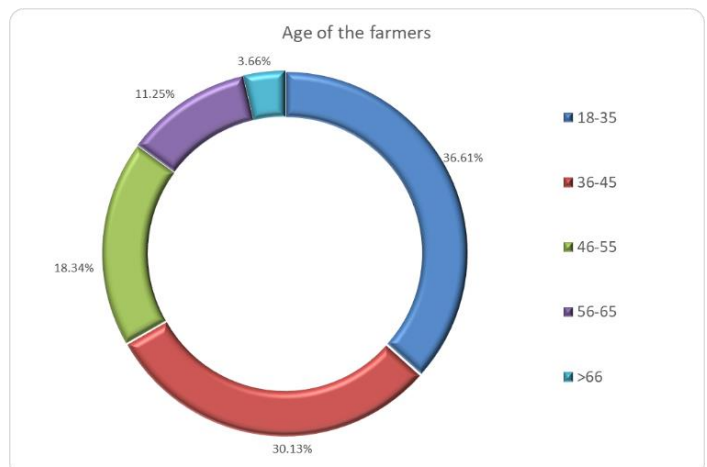


2.6 Women and youth Engagement

We sensitized and encouraged the youth to get registered -through the focal persons and agronomist in their areas- for both the SMS service and through the Interactive Video training Kplus App and the results were very encouraging. **36.61%** of the registered farmers were youths. The use of technology was enthusiastically welcome by the youths and it aligned with their modern lifestyles and was “not boring”.

In the next phase we will seek to sensitize and reach out to all those with smartphones -majority of whom are youths- and encourage them to download the Kplus App and access the video training modules straight to their mobile phones.

We also managed to reach a very good number of women, out of the 3,050 SHFs registered, 46.2% were women. Another interesting observation was that in most of the training sessions the number of women was higher than that on men and they were super excited to be featured on the videos.

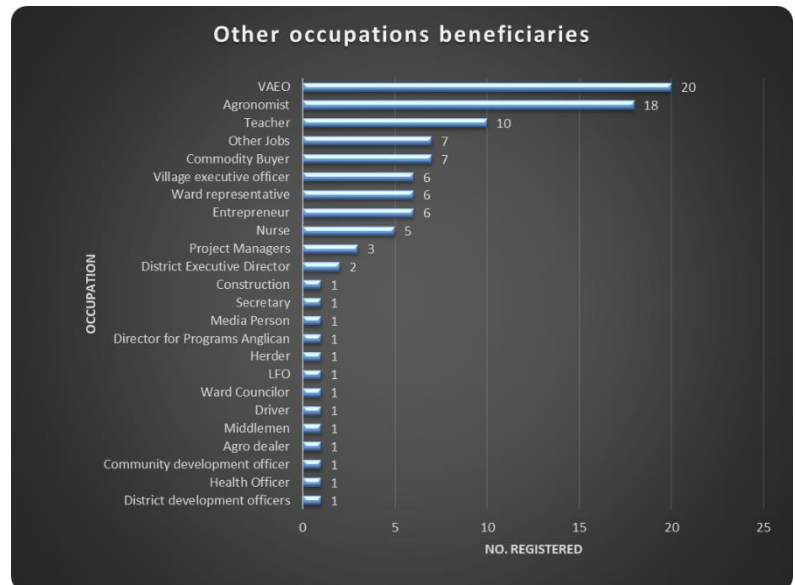


2.7 Local capacity development, Policy and Governance support

We encouraged the DAICOS, extension officers and agronomist to join the service so that they can also learn about new technologies being disseminated. We will also encourage them (extension staff and agronomist) to install Kplus app and get more detailed training with an intention of making Kplus App an essential tool for retooling them. A total of 20 VAEOs and 18 agronomists were registered for the service.

There was great interest from other officers and leaders just to mention a few: 2 District Executive Directors, 6 Village executive officers, 3 project managers, 6 ward representatives and 1 Ward Councilor were amount those who registered for the services showing a great acceptance even from the leaders.

Kplus presents an opportunity for **retooling** the extension staff and agronomist by providing them with latest technologies researched and verified. Most extension staff rely on training they got when they were in school which is outdated and lacks the latest research and innovations. Enhancing the knowledge of the local extension officers, lead farmers and agronomist is key for sustainability and continued technology transfer to the last mile. Over and above agronomy, local extension officers (VAEOs), lead farmers and agronomist will also have an opportunity to learn and develop new skills in the use of ICT to deliver extension services to SHFs in a more interactive, cost effective and efficient way.



Use of SMS and videos will go a long way to support agricultural extension activities in the area of implementation. This is a big boost to the under staffed extension departments and will enable more smallholder farmers to be reached with timely agronomic information which would have been impossible to achieve using the under resourced extension officers. We are also lobbying the local governments to see the importance of using ICT to deliver extension and incorporate the costs into their budgets for sustainability.

2.8 Private sector engagement & Public Private Partnerships(PPP) Collaboration

Esoko has been engaged by the project as a private sector player. Subsequently Esoko partners with private sector Agri businesses, Government (both local and national), Research institutes such as TARI-Uyole and TARI-Selian to deliver its mandate. Some of the Agri businesses Esoko engages are fertilizer companies, seed companies, micro finance institutions, micro insurance companies, millers...etc. all in a bid to deliver bundled services to the smallholder farmers who would otherwise be left out of such engagements because they are considered financially risky.

2.9 Science, Technology, and Innovation

Esoko is continuously innovating in line with the ever-changing world telecommunication technologies. Esoko came into being by riding on the emergence of mobile phone technology to deliver market prices to farmers to increase their bargaining power with middle men and traders, now with the growth in popularity of smartphones, Esoko's Kplus is slowly becoming a must have application bringing a more enhanced training interface for trainers and m-learners.

One of the innovative way's farmers are receiving training is by use of Kplus running on Android tablets with inbuilt projectors. This has really changed the dynamics as farmers get to train as a group using the videos and the content stays at their communities where they can access it anytime and train on their own. The community members are also excited to be featured in the videos giving them a sense of ownership of the content development process.



Figure 11: Farmers in Kilosa following training on Kplus using a tablet projector device

2.10 What went well?

- During the field visit to different communities, the farmers seemed very enthusiastic about the project and many kept the production.
- There was overwhelming support from TARI-Uyole, Dr. Bucheyeki Tulole (the TARI-Uyole center director) and Mr. Leonard Sabula (maize researcher at TARI-Uyole) exceeded our expectation; they went out of their way to ensure we got all the content and information we needed.
- One of the fascinating things we realized is that the video training was no longer limited to the farmer group but was the whole village affair, large groups of up to 100-150 SHFs would converge to watch the training modules, this is reminiscent of the 1980's when government extension department would deploy "Movie vans" to train communities (Annex E)
- Esoko is partnering with a micro insurance company and will be piloting a health micro insurance product to farmers in Kilosa and Mvomero as part of the bundled services.
- One of the most amazing impact we found in such a short implementation time was an increase in use of fertilizer and improved/hybrid seeds. When we did the initial farmer registration - which acted as our baseline- 35.78% and 16.56% of the farmers were using improved/hybrid seed and fertilizer respectively and after training the numbers increased to 57.6% and 30.9% respectively.

The sharp increase in use of hybrid seeds was partly influenced by the delay in rains by one month and the farmers were actively enquiring on what short maturing seed varieties they would use based on the TMA forecast rain forecast that indicated they would get less than average rains for only one month. This provided powerful evidence of how a combination of agronomy and weather information can help farmers to be resilient against effects of climate change.



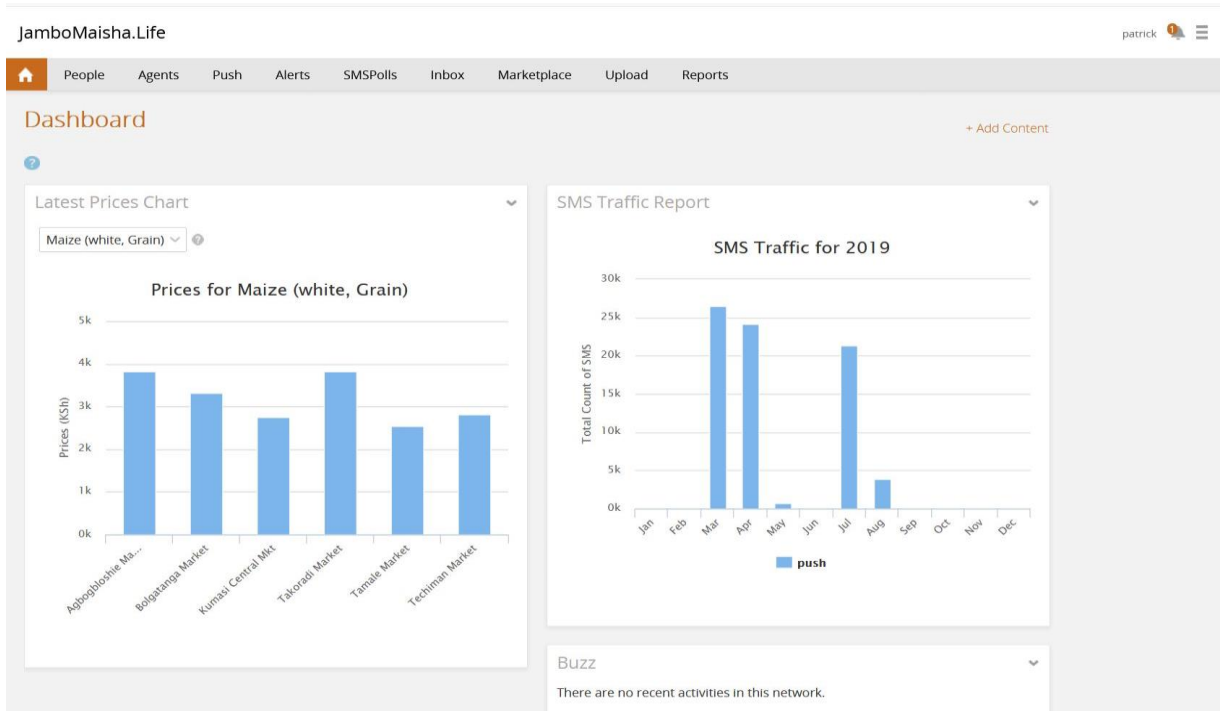
3.0 MONITORING, EVALUATION, AND LEARNING

3.1 Lessons learnt

- You have to offer a bundle of services: No single channel is the most effective and no amount of technology can replace the physical Extension officers because complex and technical language needs a human to human guidance and explanation which is why the video trainings are so important for the farmers.
- You have to be channel **agnostic** (SMS, Voice, Live experts, Radio, video): each farmer has preference on which channel suits them depending on the prevailing circumstances so multiple channels ensure a high probability of the information being delivered to the farmer and is impactful.
- You have to develop original **content**: most of currently available agricultural content is outdated since and lacks current agricultural technologies. The onset of new channels such as SMS and interactive video training modules means their content has to be developed afresh and constantly updated.
- You need **local champions**: -Farmers tend to trust the word of people they know and can relate too hence the success of ICT and any other agricultural technology transfer should incorporate use of lead farmers or local champions. This is the model Kplus utilizes to guarantee increased adoption and use of acquired knowledge.
- You have to integrate solutions for **businesses** – As long as there is a value proposition, businesses are willing to invest their time and money in what you are doing. This is the surest way of transitioning to sustainability.
- You should partner with media **companies to scale** – most mass media employ scattershot to broadcast its content over large geographical areas and reaching large populations. This can be a good way to scale interventions and reach more farmers who can then subscribe to services and get more personalized information based on preferences and their profiles.
- It's harder than you think – changing the mindset of someone takes a lot of patience, effort and energy hence success of an intervention may not be visible outright. This is especially so when you want to evaluate qualitative data from farmers. It takes a lot of patience to effect mindset change.
- It's 5% technology and **95% deployment** – At Esoko we have over the last 15 years accumulated a wealth of lessons and experiences while dealing with farmers and businesses that work with farmers, this is what gives us an edge in ensuring successful deployment of ICT services. While we are constantly adding innovations to our suite of products and services, we always prioritize deployment.

3.2 Monitoring and Evaluation

The Esoko systems have built in M&E capabilities enabling dashboard views of progress of SMS dissemination and also tools to monitor the modules each farmer has been trained on. The systems also allow for reports to be extracted to excel for further analytics.



Training reports interface - Web

This interface is used to download training reports

The interface displays a table of training reports with the following data:

Article	Trainer	Trainee	End Time	Date Trained	Rating	Score (%)	Start Time
7.0 Uhifadhi na Usimamizi wa mavuno	Emerda Maloda	salome, madeha	24 Jul 2019 10:27	24 Jul 2019	0	0.0000	24 Jul 2019 10:20
1.0 Mpango wa Kilimo Biashara cha Mahindi	Hermence Chris	hermence christopher	27 Mar 2019 10:32	27 Mar 2019	0	33.3333	27 Mar 2019 10:31
1.0 Mpango wa Kilimo Biashara cha Mahindi	patrick kiao	margareth mwandisi	16 Mar 2019 10:55	18 Mar 2019	0	0.0000	16 Mar 2019 10:55
2.0 Kuandaa Shamba na Upandaji	patrick kiao	margareth mwandisi	15 Mar 2019 08:53	15 Mar 2019	0	0.0000	15 Mar 2019 08:53
1.0 Mpango wa Kilimo Biashara cha Mahindi	patrick kiao	margareth mwandisi	15 Mar 2019 08:49	15 Mar 2019	0	33.3333	15 Mar 2019 08:38
1.0 Mpango wa Kilimo Biashara cha Mahindi	patrick kiao	margareth mwandisi	15 Mar 2019 08:36	15 Mar 2019	0	0.0000	15 Mar 2019 08:36
1.0 Mpango wa Kilimo Biashara cha Mahindi	patrick kiao	margareth mwandisi	15 Mar 2019 08:36	15 Mar 2019	0	0.0000	15 Mar 2019 08:36

7.0 CHALLENGES ENCOUNTERED

- A directive to deactivate numbers that were not in use for 3 months or more affected some of the farmers. Usually farmers have several mobile phone Sim cards -sometimes one for each mobile network operator- and they unfortunately don't top them up regularly therefore they are usually at risk of being disconnected from the SMS GAP information services if the number they registered with happens to be blocked for inactivity (inactivity is determined by the last time the number was topped up with airtime).
- Farmers also tend to get disconnected from the service when they lose their SIM card (for the phone numbers registered) and they buy new SIM cards instead of renewing the old number.

Solution:

We will keep sensitization the farmers through their village extension officers on:

- i. Ensuring they renew their old numbers if they lose their lines instead of just buying new SIM Cards
 - ii. Importance of topping up the phone numbers they registered with us regularly to avoid their lines from being deactivated
 - iii. Using the Self registration option "Jiunge" to register their new numbers
- Another issue we encountered was delay in video development due to the season. We collect and develop the videos as the season progresses and therefore sometimes, we just couldn't go to the field until a particular event such as harvesting was underway.

Solution:

In some cases, we would capture videos from different areas such as Mbeya and Chunya where their season was ahead of the targeted program locations (Kilosa and Mvomero) and at times we just had to sit and wait it out until the time was right to go to the field.

8.0 RECOMMENDATIONS

7.1 Opportunities for Kplus App that could be explored further.

- a) **Using Kplus to bridge the Extension to Farmer ratio by scaling up usage**
Currently averaging 1:600-1400, by using lead farmers, the extension to farmer ratio can be significantly brought down to up to 1:35-50 using the Kplus E-extension model.
- b) **Retooling and support for Agricultural Extension Officers**
Part of the reason the extension staff are underperforming is amplified by the fact that they don't have access to latest agronomic technologies and end up relying on what they learnt 15 to 20 years prior. There is a dire need to provide them with up to date information on new farming technologies, improved varieties and new diseases and pests such as Fall Army Worm (FAW) which may be completely new them. This will make them effective in their delivery of duties. Use of the Kplus E-extension model can be very effective in retooling them.
- c) **Special content for youths and women**
 - ❖ Use of smartphone-based training would be a plus for youths since they easily identify with this technology. They will be attracted by the use of videos since it's more fun and inclusion of returns in investment models for the different crops would propel them to try out farming. This project can be enhanced to provide information on other crops such as horticulture that have short maturity and high returns which are more attractive to youth.
 - ❖ Special content on nutrition, family health care, reproductive health, insurance can be included targeting women.
- d) **Onboarding Agribusinesses (for sustainability).**
Agribusinesses will have an opportunity to include their products and catalogues on Kplus at a fee to support the content provision and updating. Biggest sponsors will have their logos included on the landing page.
- e) **More use of the innovative Tablet Projector combined with Knowledge plus.**
This technology allows farmers to watch the videos together and discuss and was received very well by farmers. It should be deployed at a larger scale as it cuts down on costs of conventional training and capacity building.

7.2 What could have been added or done differently.

Ranking of the recommendations

High – the greatest potential for improved Farmer satisfaction

Medium – greater potential for improved Farmer satisfaction

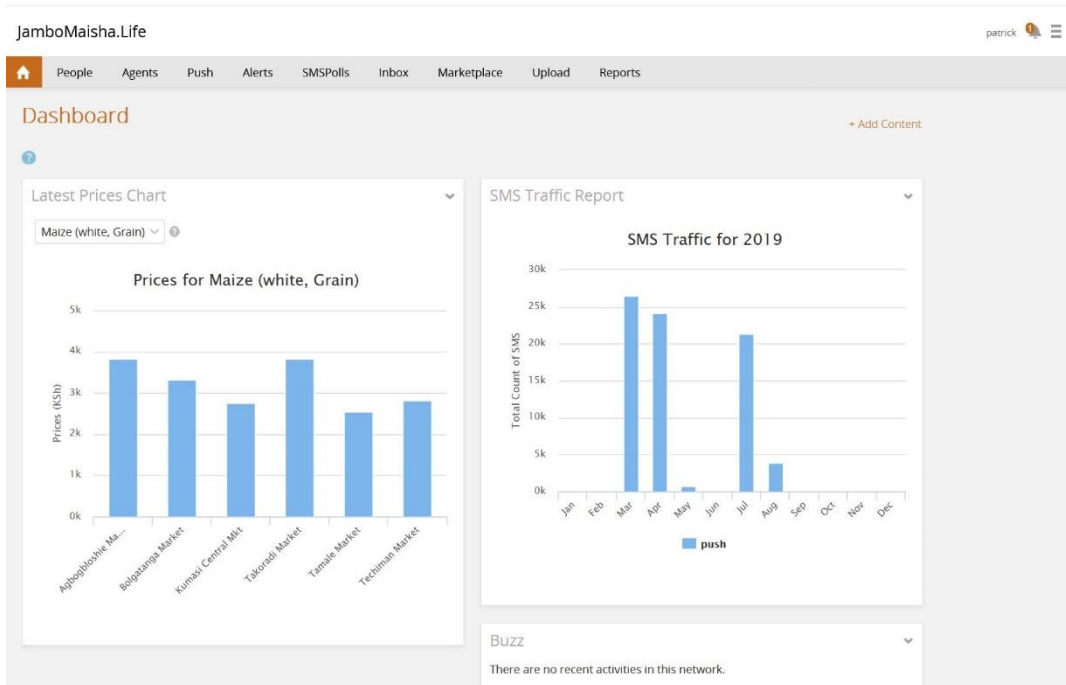
Low – the potential for improved Farmer satisfaction

	Recommendation	Effect
1	Feedback mechanism: farmers requested for a phone number they can call when they have inquiries on farming, markets, weather or inputs. We feel the most appropriate channel is a call center running a farmer helpline which they can call and get answers. Esoko Tanzania is seeking to establish this as it will be a necessity as the number of farmers being reached increases.	High
2	Sensitization and creating awareness through mass media: there should be a provision for running radio or TV campaigns before engaging farmers to ensure they have some background of the project before engaging them on the ground. This can also be used for aiding in farmer self-subscription and registration.	High
3	Early deployment: the most vital and key component of improving production for small holder farmers lies in seed variety selection and alignment to weather forecast. Therefore, it is important to start the campaigns early enough so that the farmers can make informed choices based of the information they get about the improved seed varieties and weather information.	High
4	Increase the number of farmers profiled: ICT is all about scale, the bigger the number the better: To make the database more attractive and inch closer to sustainability investment in profiling at least 100,000+ farmers is recommended. This project is only reaching 3,050 farmers but there is potential to reach hundreds of thousands	High
5	Development and deployment of more Video training modules: The video training modules have been received with a lot of enthusiasm and are very attractive to youth. Efforts should be put in place to develop content in all the 3 additionally covered categories (poultry, vegetables and IR VICOBA) and deployed them to current and future farmers. The videos are very attractive to the farmers as they are detailed, interactive and help bridge the literacy gap.	High

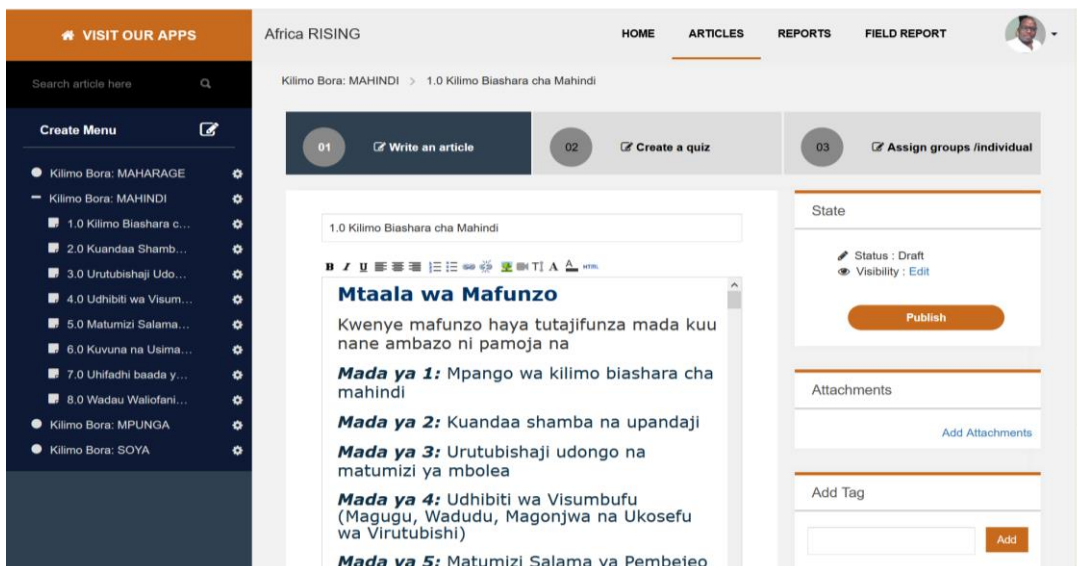
APPENDICES

Appendix A – System Setup: Screenshot of Systems

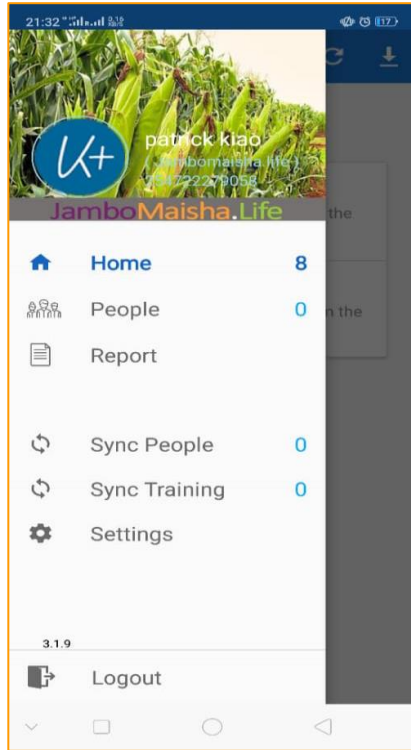
i. Web based MIS System: System for sending GAP information to farmers and database management



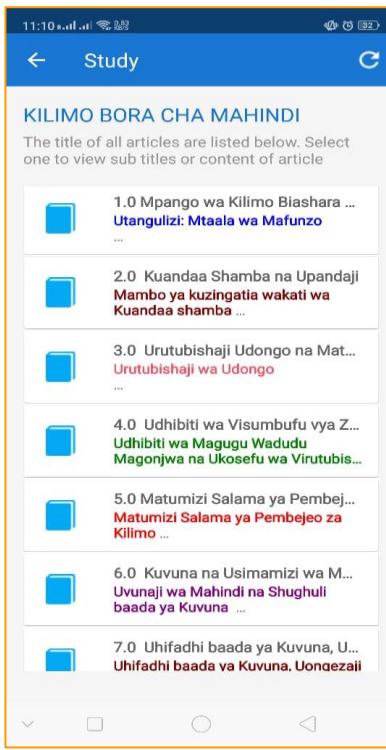
ii: Knowledge Plus system (web and Android): Web based system for training farmers using interactive videos



iii: Android based Kplus System for TOT trainers and M-learners



Activity page

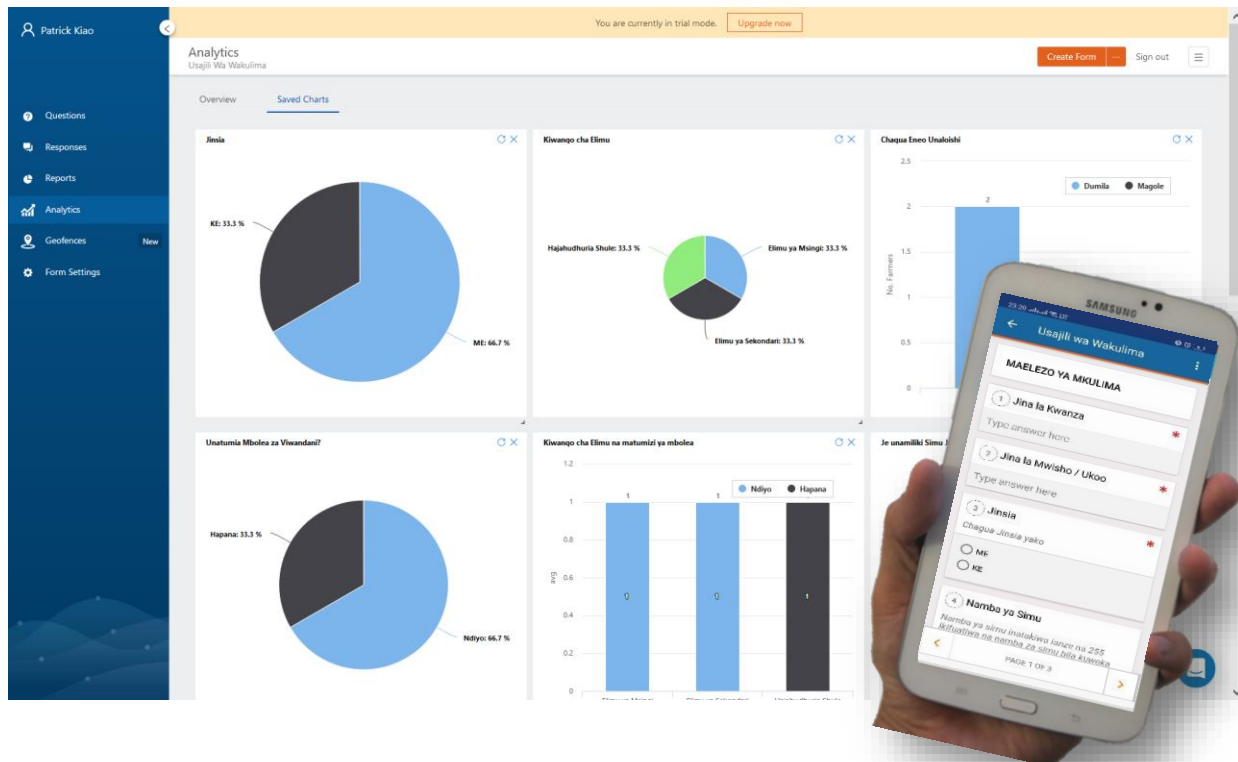


Training Modules List

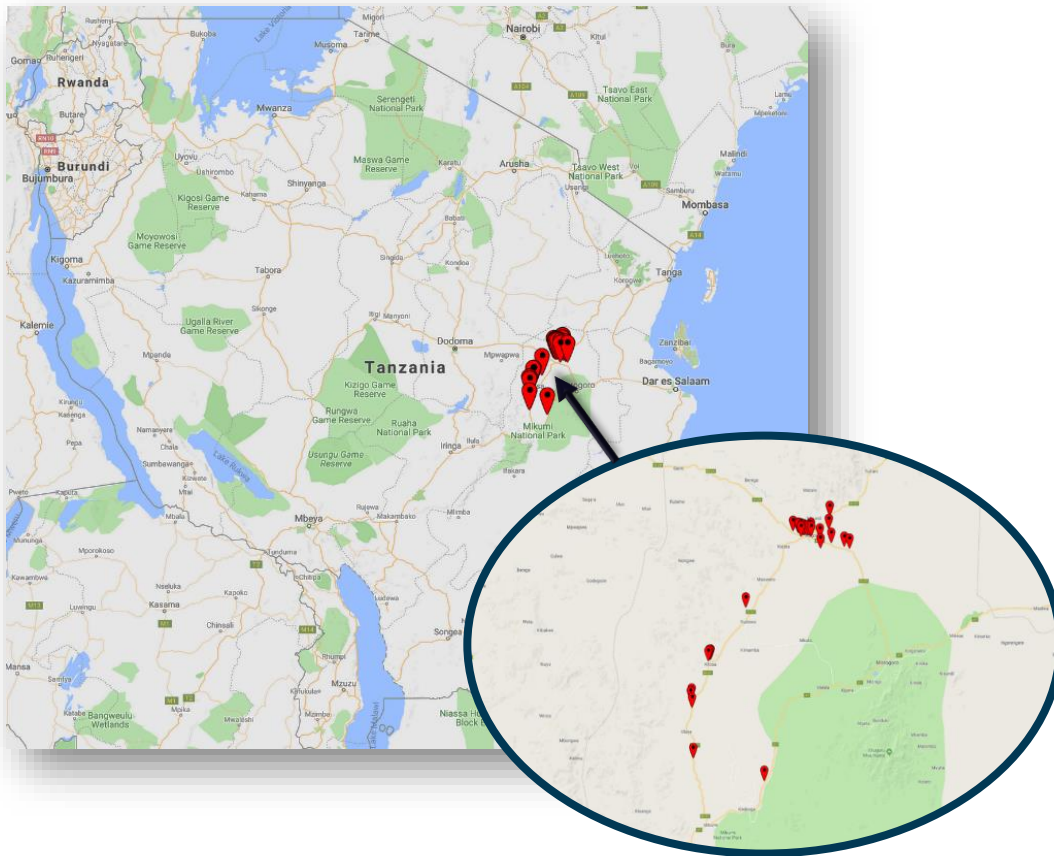


Sponsors & Implementers page

iv: Insyt data collection App



Appendix B – Geographical representation of profiled NCA farmers



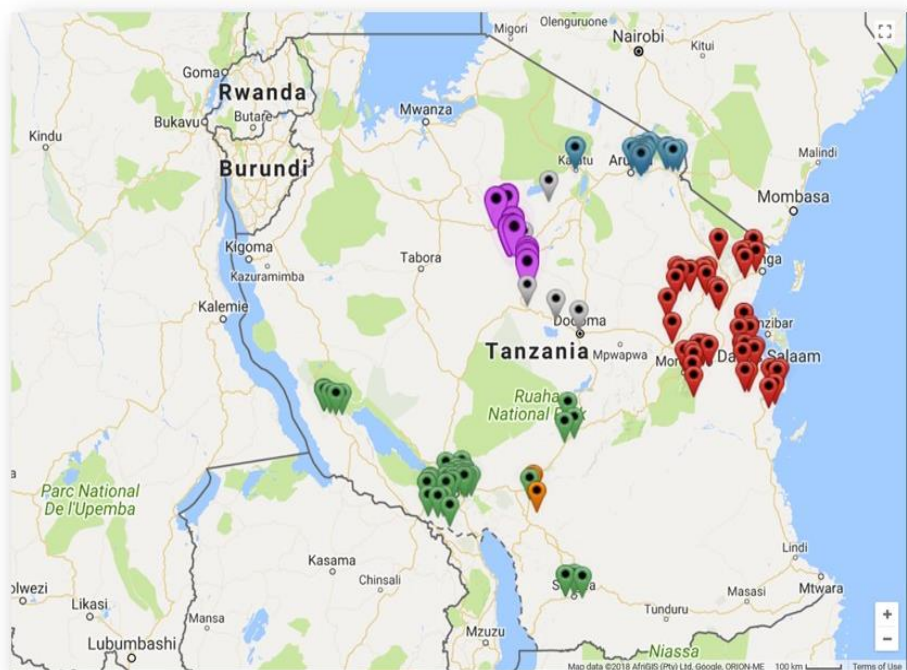
Geographical coverage of Esoko's services

Summary:

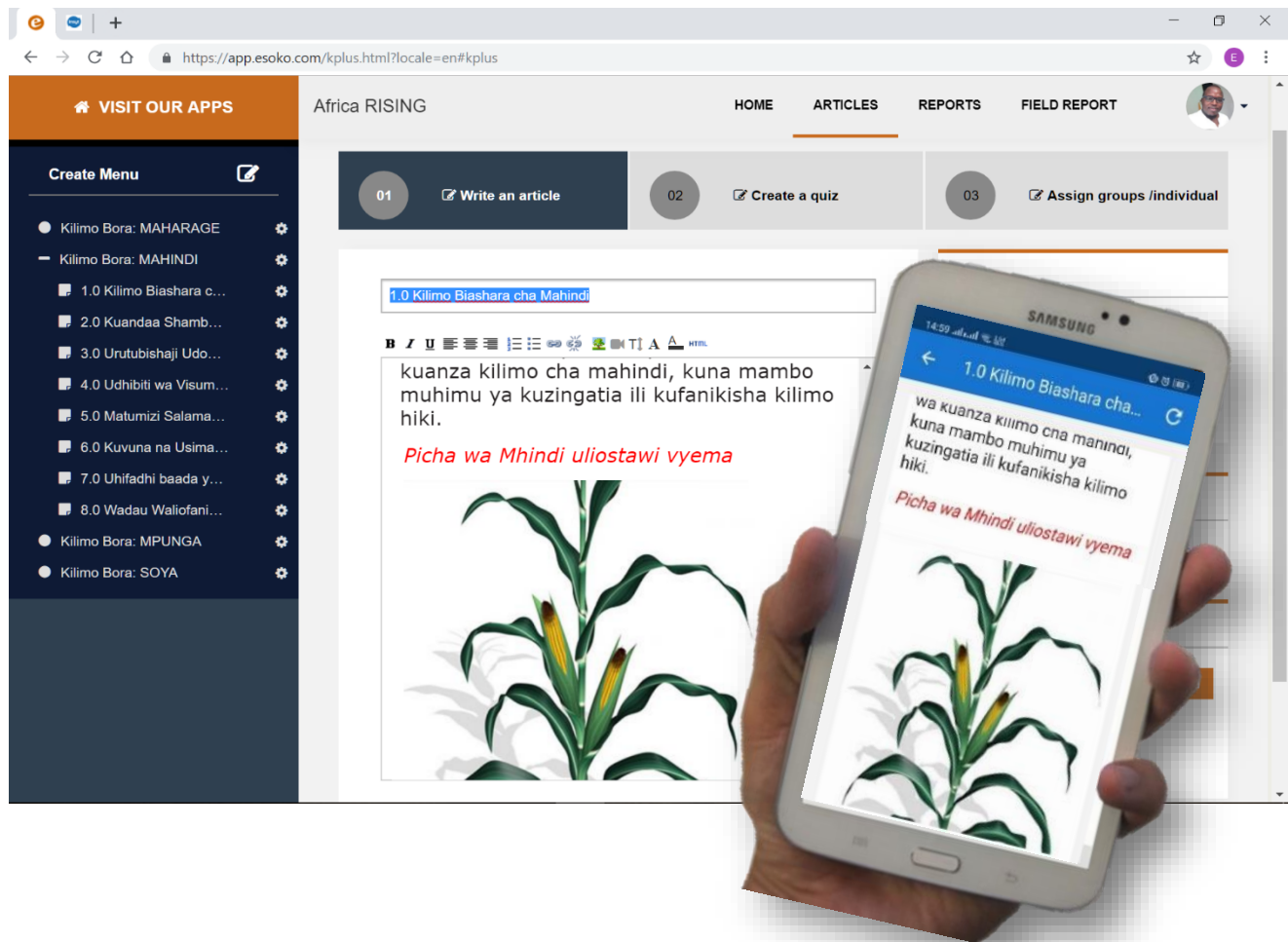
- 14 Regions
- 30 Districts
- 883 villages
- 140k Farmer profiles
- 200+ Champion Farmers
- 30% Women
- 39% Youth

Value chains:

- Irish potatoes
- Maize
- Cassava
- Sesame
- Sunflower
- Beans



Appendix C – Preview of the uploaded content on Kplus web and android



Appendix D – TOT Training on use of Kplus for training farmers



Appendix E – TOTs training farmers using Kplus installed on tablets with built in projectors

