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e-Agriculture Promising Practice UshauriKilimo information system Web and mobile phones for extension services in Tanzania



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Key facts

- **Location:** Kilosa District, Tanzania
- **ICT used:** mobile and web based advisory information system integrated with community radio
- **Area of work:** Agriculture and livestock
- **Target group:** farmers, researchers and extension agents
- **Stakeholders:** Government, research institutes, universities, community radio and telecentre
- **Timeframe:** 2011-2016

Blending traditional and new ICTs for improved extension services and connecting extension agents, farmers and researchers

'UshauriKilimo' is a Swahili word from 'Ushauri' and 'Kilimo' which means 'advisory' and 'agriculture' respectively.

'UshauriKilimo' is a system for agricultural advisory services. It is an agro-advisory and extension service system that allows any actor in the agricultural sector to ask for advisory services to an agriculture extension officer using either the web or a mobile phone. The mobile and web based advisory information system for farmers was developed in collaboration with the Kilosa Community Radio, using participatory action research to ensure the improved extension services would correspond to the needs of the end-users. The Web-based Farmers Advisory Information System (M-FAIS) and Mobile-based Farmers Advisory Information Systems (W-FAIS) were released for public use in January 2015, after an awareness raising campaign conducted in Kilosa District of Tanzania.



© Radio Jamii Kilosa

UshauriKilimo.org was developed together with the users using participatory action research to ensure the platform meets the needs of the beneficiaries

Context and problem addressed by ICTs

In Tanzania, agricultural information is mainly disseminated through agricultural extension officers and farmer-to-farmer extension. The information dissemination system has not been as effective it should be, due to the lack of ownership of the system by the clients and the fact that it is not demand driven. The linkages between farmers, extension officers and researches need to be strengthened and there is a need to unlock the potential of ICTs to complete and enrich the existing conventional extension services.

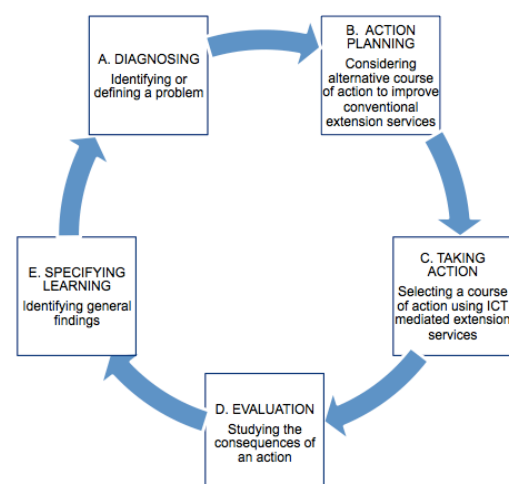
In the Kilosa District in Tanzania, extension agents have been providing information to farmers for a long time but to tackle the above mentioned challenges the project introduced a mobile and web based advisory information system for farmers in collaboration with the Kilosa Community Radio.

The development of the ICT used: web and mobile-based advisory information system

'UshauriKilimo' is an agro-advisory and extension service system that allows any actor in the agricultural sector (e.g. farmer, extension officer, policy maker, trader, etc.) to ask for advisory services to an agriculture extension officer using either the web or a mobile phone. The system is an integrated system, which has modules for mobile-based farmers' advisory information system (M-FAIS) and web based farmers' advisory information system (W-FAIS). Both M-FAIS and W-FAIS allows farmers to get advice on various agricultural issues such as agronomic practices, post-harvest operations, livestock husbandry, forestry, veterinary services, community development and market. A farmer can send a question (in form of a

text or Short Message Service (SMS)) to a preferred mobile phone number, which is predefined to our system. After the question has been sent to a system it is assigned to an expert (i.e. extension agent). The assigned extension agent has a role of answering the question from a farmer via his or her mobile phone. In case the question sent to extension agent was difficult, it can be re-assigned to a researcher from the Sokoine University of Agriculture (SUA).

In order to develop 'UshauriKilimo' Participatory Action Research (PAR) combined with other research methodologies (i.e. triangulations approach of quantitative and qualitative data) and software engineering techniques were used. The PAR helped to ensure the intervention would be sustainable and practical aiming at resolving real problems experience by farmers and other actors in the agricultural sector. Combining different research methods allowed a better understanding of the problems the farmers are facing while the software engineering techniques were used during the development of different information systems, in complementarity with the existing conventional extension services.



Participatory Action Research was used as follows during the research phase of the project:

- A. Diagnosing
 - a. Semi-structured interviews with maize value chain actors
 - b. Use of checklists by inspecting agricultural extension officers
 - c. Desk review of available literature
- B. Action Planning
 - a. Exploratory study
 - b. Stakeholder analysis
 - c. Inception workshop
 - d. Baseline survey
- C. Taking Action
 - a. Developing M-FAIS and W-FAIS using waterfall approach
 - b. M-FAIS and W-FAIS analysis and design
 - c. M-FAIS and W-FAIS implementation
- D. Evaluation
 - a. Testing the usability of M-FAIS and W-FAIS in the computer laboratory
 - b. M-FAIS and W-FAIS demonstrations to different actors
 - c. Group discussions with different agricultural value chain actors to get feedback
- E. Specifying learning
 - a. Presentations and fieldwork reports
 - b. Publications: Thesis of undergraduate and postgraduate involved in the project and scientific articles

The type of information in the system was identified during the research phase by requesting farmers to send SMS to the Kilosa Community Radio. Community Radio remains an important channel to reach farmers in rural areas, and a good way to poll the needs of the beneficiaries. In complement to the advisory information services developed radio drama and jingles (<http://ushaurikilimo.org/faq2.php>) were designed for the Community radio to ensure maximized sharing of information.

Through the web-based system farmers can ask questions (<http://ushaurikilimo.org/farmerlogin.php>) and also look into the answers that were provided to other farmers (<http://ushaurikilimo.org/farmerview.php>). For the mobile-based systems farmers can download an application on their mobile phone (<http://ushaurikilimo.org/kilimoApp.apk>) or request information by sending a SMS message.

The W-FAIS and M-FAIS were released for public use in January 2015, after an awareness raising campaign conducted in Kilosa District.

Example: Twenty recently asked questions by farmers' via their mobile phone can be accessed through: <http://ushaurikilimo.org/maswalimajibu.php>. In total there are more than 1500 questions, which have been answered to more than 1000 farmers.

The system was developed by experts from Sokoine University of Agriculture (SUA) and Norwegian University of Life Sciences (NMBU) and funded by Enhancing Pro-poor Innovations in Natural Resources and Agricultural Value-chains (EPINAV) at SUA.

Impact

The project improved the efficiency of the extension officers, providing equal access to information and agriculture innovation systems to the farming communities and linking all major actors of agricultural sector such as farmers, transporters, traders, input suppliers, extension officers, researchers and policy makers, facilitating the establishment of the community initiative to solve complex problems in agriculture.

In 2015, a survey was conducted to evaluate the impact of 'UshauriKilimo'. The survey trip was conducted from 9th to 10th September 2015 in which farmers from nine (9) villages among the twenty villages involved in the project were visited. The evaluation was meant to serve for formative evaluation. Formative evaluation is an approach of evaluation, which seeks to assess the progress of the implementation of the intervention.

The specific objectives of the trip were the following:

- Visit extension officers and their farmer's groups in the piloted villages to monitor project implementation
- Discuss with farmers on the challenges, benefits and outcomes of using W-FAIS and M-FAIS for agricultural consultancy services
- Provide some clarifications to farmers on issues related to W-FAIS and M- FAIS

The 99 farmers visited and interviewed, testified that they benefited much from using the system. Some of the benefits presented by farmers during the field interview are:

- **Increase in production:** Mr. Msafiri Saidi, a farmer in Nyameni village, used M-FAIS in every stage of cultivating peppers. Through the system he was advised regarding the best way of preparing the land, sowing, watering, weeding, harvesting and storing peppers. The system also guided him on the appropriate herbicides, insecticides and fertilizers to use. As a result, he witnessed the significant increase in the yield.
- **Improved collaboration between farmers with their extension officers:** Most farmers (95%) affirmed that it is now easier to get advisory services thanks to M-FAIS since many extension officers, including the one in their village, now support them.
- **Improved cooperation between farmers:** The M-FAIS has created a strong network, so farmers can easily share knowledge and experiences through the system. Mrs. Fatuma Ligomba, a farmer from Magomeni village asked a question to M-FAIS regarding storing maize without using any chemicals and she was advised to use special plastic bags (i.e. using hermetic technologies). After testing that the bags work fine, Mrs. Fatuma shared the information to farmers in another District.

Innovation and success factors

An important part of the success of the practice is due to the involvement of the different actors in the agricultural sector at different stages of the development of the system: from the needs assessment, the system development, through the implementation of the project.

The needs assessment which was done in initial stage of project showed the pattern of farmers information needs and seeking behavior is skewed towards information related to farm inputs (e.g. seeds, pesticides, fertilizer), farm management practices, crop production, weather information, market and post-harvest information. Also, needs assessment showed that farmers use mostly radio and mobile phones as channels for receiving and sharing agricultural information, which lead to the decision of collaborating closely with the community radio.

The project is distinguished from similar practices because it integrated mobile, web and community radio. The aim was to make sure that different

pathways for communicating agricultural information to farmers and other stakeholders were available and could mutually strengthen each other.

Other examples of applications, which are being offered by 'UshauriKilimo', are:

- a. Crowdsourcing platform for agricultural extension service
- b. Early warning system for rabies
- c. Disease surveillance and monitoring system
- d. Open Data Analytics system
- e. Crowdsourcing platform for agricultural marketing information system
- f. Decision support systems for e-extension
- g. Tool for human web sensor
- h. 'UshauriKilimo' Mobile Apps (UMA)
- i. Tool for big data in agriculture
- j. Cloud-based Agro-advisory Service Information System (CASIS)
- k. Tool for mobile learning in other sectors like health

For more information about these applications read the publications appended to the end of this document.



Researchers from the Sokoine University of Agriculture are visiting the Kilosa community radio to ensure the traditional channels of information are blended with the newer ICTs in the best possible way.

Challenges and constraints

The challenges, which were encountered while implementing the practice are:

1. The delay in answering of the questions by the extension agents
2. Some of the answer in form of advisory provided by extension agents through mobile phone were not implementable in the local environment as they are very expensive
3. Sometimes farmers were given good advisories by extension agents through 'UshauriKilimo' but prevalence of fake farm inputs (e.g. fertilizers, insecticides and pesticides) lead to poor results even after they have used the advisories correctly.
4. High need of agricultural service providers especially on farm machinery, transportation and markets
5. Farmers sometimes receive answers in form of SMS from the system at late working hours (i.e. night), which sometimes caused family conflict. This was a problem mainly for women farmers because in the District of the project the cultural norms prohibit women to exchange SMS with a strange person.

The challenges faced were met with actions:

1. Encouraging extension agents to answers queries received promptly and in case the question is too difficult they were advised to share them with peers in the network before informing the administrator of 'UshauriKilimo' so that it can be assigned to a researcher from SUA.
2. Questions asked by farmers were assigned to an extension agent who is familiar with the environment of the farmers.
3. Sometimes, very difficult questions were assigned to more than one extension agent.
4. Since farmers used different media for communicating agricultural information a blended approach was used (i.e. mobile phone, community radio, social forum and web/Internet) to cater the needs of various actors

Lessons learned

An important lesson from the practice is that the use of participatory action research to develop an agro-advisory and extension system enhanced the adoption of the innovation by different actors (i.e.

multi-actors or multi-stakeholders) in the agricultural value chain.

Through the experience there was a clear understanding that it is not only about sharing information and knowledge but also about creating a stronger network among peers in a value chain and other actors in a value chain for improved communication and collaboration (i.e. multi-actors platform from different sectors).

The equal involvement of men and women from the beginning till the end of the project, contributed to its success. Implicating both women and men in all stages of its design ensured that there an equal rate of women and men that took up the innovation and as much men as women now use 'Ushaurikilimo'.

Sustainability

The practice is sustainable because farmers, researchers and extension agents are still using the system even though the project ended in June 2016.

The intervention is socially, economically, environmentally and technically (SEET) sustainable because:

- Socially: the system has been developed taking into consideration the culture of the farmers in the specific region. The system allows a farmer to seek advice from many experts (i.e. crowdsourcing). After the answers have been given by experts then they are shared to other stakeholders using cloud computing technologies (i.e. Internet of Things).
- Economically: the farmers can afford using 'UshauriKilimo', which was developed using low cost technologies. The sender (i.e. farmer or extension agents) of the SMS can pay charges depending on his/her local telecommunication company. Currently most companies charge less than 50 Tanzania shilling (2200 Tanzania shilling is equivalent to 1 USD). Farmers and extension agents who have been subscribed to pre-paid bundles can use 'UshauriKilimo' using free SMS-messages available in the bundle. Also, 'UshauriKilimo' is cost effective since it allows one single extension agent to give advisory service to many farmers without having to visit them.
- Environmentally: 'UshauriKilimo' cuts down the carbon foot print if you can compare with other means of communicating advisory and extension to farmers such as print media and visiting farmers through motorbike or bicycle or car.
- Technically: 'UshauriKilimo' is user friendly since the end user does not require undergoing any

sophisticated training. Any user who can read and write can use 'UshauriKilimo'.

Replicability and upscaling

This practice has not been replicated a letter of intent was sent to the Government to propose its replication in other regions of Tanzania. In order to be able to replicate this experience in other contexts there is a need to organize exploratory visit, inception workshops and then, actual the implementation. The replication of the systems at a larger scale is important if and only if more actors from telecommunications companies and community radios can be linked with the systems. The framework for upscaling the experience has already been developed. For more information, visit the following link:

<http://suair.suanet.ac.tz:8080/xmlui/handle/123456789/1008>

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Farmers from the Kilolo District visited farmers from the Kilosa district to learn how UshauriKilimo works.

Workshops were organized to discuss the sustainability and upscaling of the service to other districts.

Testimonies

As DW radio recorded, most farmers in Kilosa have applauded the service saying it has eased communication.

"I have always found it difficult to know the price of maize in Morogoro, now that information is available, thanks to this program," said Andrea Jaka, a farmer in Kilosa.

An agricultural field officer in Morogoro Edith Kija said farmers who use the phone messaging service have increased their farm productivity. Kija said the new innovation has not only helped extension officers overcome logistical challenges but also saves time. *"I used to spend about six hours daily walking through the villages to reach farmers,"* Kija noted, *"Sometimes I was forced to sleep there until the following day, that experience will now be history."*

More testimonies can be found through the following links containing featured stories in newspapers from Tanzania and Norway as well as Swahili radio from Germany:

- <http://www.bistandsaktuelt.no/nyheter/2014/mer-bondemakt-med-mobiltelefoner/>
- <http://www.thecitizen.co.tz/News/Extension-services-set-to-go-mobile/-/1840340/2229632/-/6ps83h/-/index.html>
- <http://www.dw.com/en/technology-boosts-tanzanian-farmers/a-17914855>

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Resources

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E-AGRICULTURE CALL FOR GOOD AND PROMISING PRACTICES

This document was developed in the framework of the 2017 e-Agriculture call for good and promising practices on the use of ICTs for agriculture and rural development in collaboration with the Food and Agriculture Organization of the United Nations (FAO) and the Technical Centre for Agricultural and Rural Cooperation (CTA).

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