Food and Agriculture Organization of the United Nations

e-Agriculture Promising Practice

UPTAKE: driving adoption of agri-technologies through information and communication technologies (ICT)

SMS campaign drives adoption of improved seed varieties in Tanzania

Key facts

- **Location:** Southern Highlands and Eastern zones of Tanzania (focus on Southern Highlands)
- **ICT used:** SMS messages
- **Area of work:** maize value chain
- **Target group**: farmers
- **Stakeholders:** Smallholder farmers, extension agents, research institutes, maize seed companies, government, Esoko, CABI, USAID, AGRA, FRI
- **Timeframe:** 2015-2018 (focus on Nov 2016 to June 2017)

CABI and FRI's Upscaling Technologies in Agriculture through Knowledge and Extension (UPTAKE) project uses SMS messages to increase awareness and adoption of agricultural technologies in maize value chains. The project seeks to strengthen the adoption of improved maize varieties.

Continuous learning and improvement of the SMS campaign strategy is at the foundation of the success of the project. Lessons from farmers, extension agents and the entire maize value chain are being incorporated in the system regularly.

The beneficiaries are farming communities in the Southern Highlands and Eastern zones of Tanzania. Among the 1 000 000 smallholder farmers (3ha and less) targeted by the project, 40 percent are women and about 150 000 adopted good practices.

UPTAKE targets maize value chain actors and especially smallholder farmers sharing important information by SMS

Context and problem addressed by ICTs

Maize is the staple food for most of Tanzania and comprises about 45 percent of the cultivated land. Maize is produced mainly by smallholder farmers and usually grown under low input, rain-fed conditions. Production is constrained by several challenges such as: limited access to information on improved agricultural techniques such as better varieties of seed which are high yielding, pest and disease tolerant and short maturing to cope with changing weather patterns, integrated soil fertility management measures and pest control.

Limited access to farm inputs such as certified seeds and fertilizer limits the potential of rural farmers. The country's extension system is thinly spread with inadequate support, weak links to research and inadequate capacity amongst the extension workers.

From a supply side perspective, the maize seed sub-sector in the Southern Highland Zone has a proliferation of seed suppliers, who propagate multiple promotion messages through varied channels such as roadshows, demo plots and radio. This often leaves farmers confused about what is the appropriate seed for them as brand promotion obscures the characteristics of the maize varieties. For instance, the five seed companies who participate in this partnership promote similar "Uyole" hybrid varieties but under different brand names, resulting in farmers visiting the Agricultural Research Institute (ARI Uyole) to seek information. It is an enormous challenge for researchers to deal with the needs for information of individual farmers. In addition, many farmers attempt to grow maize that is not suitable for the areas they want to cultivate and others inadvertently buy counterfeit seed and farm inputs.

By increasing the use of interactive ICT based extension services across the country, the UPTAKE project aims to contribute to the overarching goal of enabling rural people to improve their knowledge for increased food security and nutrition, to contribute to raise their incomes, and strengthen their resilience.

Role of the different stakeholders

The beneficiaries are farming communities in the Southern Highlands and Eastern Zones. The project aims to reach at least 1 000 000 smallholder farmers (with 3 ha or less) and adoption of good practices by 150 000 farmers. At least forty percent of targeted farmers are women. Inclusion is promoted by deliberately seeking out women during the registration process. Enumerators visit women's groups to enlist their members in addition to public awareness campaigns and public meetings. Enumeration is also organized at times and places where women are available. During registration in public meetings, women are encouraged to sign up and their partners reassured to let them be registered to receive agricultural information via SMS.

Key partners in the intervention in the Southern Highlands are the Agricultural Research Institute (ARI) Uyole and five maize seed companies who implemented a public-private partnership (PPP) to promote, commercialize, distribute and increase adoption of improved maize varieties. The partnership was funded through the Scaling Seeds and Technologies Partnership (SSTP) program by USAID and AGRA to develop and release improved foundation and breeder seed of four maize varieties. The private sector companies bulk, commercialize, distribute and promote these varieties.

The Government, through the Ministry of Agriculture, Livestock and Fisheries (MALF), is also a key stakeholder in providing agricultural technologies and facilitating dissemination through district agriculture offices and the extension system.

Other stakeholders include: Esoko Ltd., a mobile valued added services provider (mVAS) who provides the platform for dissemination of SMS messages.

Farm Input Promotion (FIPS) is a local NGO that promotes farm inputs to farmers and supports farmer mobilization for project activities.

Farmer groups also participate in UPTAKE activities, as do private sector input providers supplying fertilizers and pesticides.

The development of the ICT used: SMS messages

UPTAKE introduced an SMS service, through a private mobile valued added services provider (mVAS) Esoko, to contribute to providing farmers with quality information to enhance maize production, reduce farmer exposure to risks and minimize post-harvest losses. Farmers received information on improved maize varieties adapted to their geographical areas. They also learned about the benefits of using improved seeds, how to identify genuine seeds and where to buy them. Good agricultural practices that covered the entire cropping cycle were disseminated to ensure the use of improved seeds was put in the proper context.

The project applied a collaborative approach, bringing together all value chain stakeholders to jointly agree upon the relevant techniques to be promoted and then together, developed appropriate messages for dissemination. The information disseminated has thus a stamp of approval from critical stakeholders, which contributes to farmer confidence about the information disseminated.

UPTAKE provides a platform to increase awareness and adoption of improved maize varieties, developed under the Scaling Seeds Technologies Partnership (SSTP) for the Southern highlands of Tanzania. SSTP worked with private and public sector partners to transform agriculture in Tanzania by promoting technologies for improved production. Maize is one of SSTP target crops, due to its important contribution to livelihoods both for subsistence and commercial purposes. SSTP through its partnership with research institutions and maize seed companies ensured that high yielding maize varieties were bred, commercially bulked and released to ensure availability on the market. A key aspect of CABI's role included enhancing linkages between the research institution and private companies for promotion of four seed varieties.

The SMS information service provided tips on the use of the improved seeds as the pivot of increased farm productivity, but put into the context of overall good agricultural practices (GAP). The SMS messages were disseminated to maize farmers who expressed interest. Farmers were registered to receive farming tips through an on-ground farmer profiling exercise. Support from the government administrative system at regional, district and local level was sought to facilitate the farmer registration process.

The effort toward the information campaign in the Southern Highlands Zone begun through a situational analysis to identify gaps and challenges farmers, seed suppliers and the extension network were facing. Alongside the challenges farmers faced in their efforts to access information and improved seed varieties, the rapid analysis also revealed a disjointed promotion effort amongst maize seed companies in creating awareness of improved maize varieties developed under SSTP. The result was a fragmented, fragile and unsustainable seed company that remained with huge stocks of unsold seeds.

To address these challenges CABI employed a collaborative approach. Interviews were held with key partners the Ministry of Agriculture, Livestock and Fisheries (MALF) through its extension department, the regional agricultural research institute (ARI), five maize seed companies, non-governmental organizations in farm inputs promotion and private sector input providers to better understand the situation. Subsequently stakeholders were brought together to interact and chart out a path to realize the broad common goal of improving farm productivity among smallholder farmers. CABI recognized that a fragmented effort would not yield the necessary results and

choose a partnership approach to achieve a coordinated effort. The approach taken was one of applying partnership principles of equality, openness, results orientation and complementarity to keep the partners at ease and focused on the objective of delivering a collaborative, coordinated, targeted maize campaign. The partnership comprised of MALF, through its regional and district extension agents, the ARI, the maize seed companies, NGOs and the private sector input providers. The group undertook a three-day write-shop process to identify and build consensus amongst all the stakeholders on relevant technologies to be promoted within the region. This write-shop culminated in the development of a technical brief for production of maize in the Southern Highlands Zone of Tanzania. The technical brief was subsequently used to guide the development of the SMS messages.

Elementary training on developing SMS tips, which should carry an actionable message in no more than 160 characters, was provided to partners who then carried out the task through a participatory process. 60 SMS messages were developed in the write-shop. These were then subjected to a validation exercise with experts from SSTP, the ARI and farmers carefully scrutinizing the SMS for accuracy, relevance, language and understanding.

The SMS content covered the attributes of improved seed varieties, appropriate seed type for respective AEZs, where to get them and contacts of distributors. These were accompanied by good agricultural practice (GAP) messages covering land preparation, spacing, weed management and pest and disease control to put the usage of improved seed in context. The SMS were further subjected to a user validation exercise amongst farmers to assess for accuracy, relevance, comprehension, and contextual and cultural suitability.

The campaign content was aligned to the cropping calendar. Farmers were sent messages on key aspects of the cropping cycle. During the dissemination period, process monitoring was carried out in several areas to determine whether the SMS were being received and to ensure alignment with ongoing activities in the fields. Continuous liaison was maintained with the agricultural research institute and extension officers from different districts for updates on the situation and emerging issues. As a result, a number of dynamic messages were developed in regard to rainfall variability, a pest outbreak and inappropriate post-harvest drying and storage practices.

Through the dynamic messages, farmers were encouraged to plant short maturity varieties to address the rainfall unpredictability. To deal with pest control, they were tipped to regularly inspect their fields and take up recommended pest control measures to manage an outbreak of the stalk borer. Post- harvest tips on proper drying and storage techniques were also sent out in response to inappropriate drying techniques noted during field visits. A number of messages were also re-scheduled to make them more relevant to the cropping cycle within different agro-ecological zones (AEZs) when it was established that geographical areas (although proximate) fell in different AEZS.

Impact

At the time of the write-up of the promising practice, the first campaign season has just ended. No sizable evaluation has taken place to date but tangible changes were documented such as increased sales of seeds. Four of the five companies that participated in the campaign reported increased sales of between 20 an 50 percent, a considerable achievement over the previous practice of carrying over stock. The companies reported having received inquiries during the campaign, an indication the campaign contributed to increased sale of improved seed varieties. The companies have requested a repeat (echo) campaign for which they are willing to make a financial contribution, which indicates that it was of value to them.

Farmers reported increased knowledge and adoption of some of the technologies promoted. Three farmer groups were interviewed through focus group discussions and they all reported increased adoption of some of the crop management technologies promoted through SMS. They reported taking up pest and disease management practices that were recommended via the campaign following a reported outbreak of stem borer in maize. Users also reported new knowledge in areas such as the following:

- Learning that maize varieties are specific for different agro-ecological zones.
- Recommended timing and application of fertilizer
- Regular scouting and timely control of pest and diseases. Farmers reported this as the most important information that they received.
- Prudent use of chemicals.
- Usage of non-chemical maize storage technologies to reduce post-harvest losses and reduce use of chemicals in food.

The beneficiaries attributed the new knowledge to SMS tips and requested for SMS campaigns on other crops such as beans. Monitoring of the campaign has helped to determine the type of information that farmers consider most relevant and actionable. These include weather forecasts, pest outbreaks, post-harvest storage and markets.

> The campaign has made strides in the effort to facilitate access to information for women. Currently 27 percent of the registered farmers are women.

The second phase of the campaign will be more targeted towards content indicated as relevant to the farmer.

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Innovation and factors of success

Continuous learning and improvement of the campaign strategy is the foundation of the success. Lessons from farmers, extension agents and the entire maize value chain are being collected and integrated.

Some of the lessons learned relate to the type of information that farmers find constructive and easy to implement. Other lessons relate to how to better engage women to participate in the campaign. Experience in the enumeration process for instance points to women being more likely to be registered into the database when enumeration is done through a platform for women or community development group meetings rather than public meetings, which were initially the main forum of sensitization and registration. Enumeration efforts therefore, are now more targeted for more effective representation of women. Deep dive studies are planned to improve understanding of women's usage of mobile phones and their response to the SMS service.

CABI employs a participatory approach to bring stakeholders together in a partnership where the interests of all actors are taken into consideration and all partners are rallied around the best approaches for smallholder farmers. A situation analysis is undertaken and thereafter partners are brought together for campaign design stage, development of the technical brief and

dissemination of the information. Partners have different but complementary roles with each making an important contribution to outputs and outcomes of the campaign. The idea of creating a participatory process to draft the technical brief is borrowed from the experience of the African Soil Health Consortium (ASHC) partnership approach. Joint development of a technical brief helps the group drawn from different organizations to come to a consensus about the approach and content for the campaign. All too often farmers are presented with information that lacks consistency hence it is important to get agreement on the technology and messages that will be presented to farmers. This process creates a single summary document from land preparation & planning to post-harvest storage. CABI facilitates the partnership formation and development, but lets the group work towards consensus on common messages drawn from the technical brief that sets out a shared vision of the best approaches for small-scale farmers. This promotes ownership of both the process and the content that is disseminated enhancing support for the intervention. The partnership approach also gives credence to the campaign making farmers more confident about the information disseminated knowing that organizations they can trust such as research institutions are partners in this process.

Tightening the collaboration between the public-private partnership and the government extension system, which is far reaching on the ground, has promoted great ownership of the campaign amongst government agents who are now able to provide advice on areas that are not well elaborated. This collaboration also helped to obtain contacts of more farmers at lower cost than going out to the farm to profile at the cost of USD$ 1 per farmer. Whereas the campaign initially targeted 30 000, efforts of the extension agents to have their farmers signed up resulted in this number rising to 43 000 and thereby contributing to the scale up efforts.

Challenges

A number of challenges have been experienced in carrying out the campaign. Some relate to the non-interactive nature of the SMS such as:

- Lack of a feedback mechanism, which has impeded the interaction between the farmers and the source of information. ARI Uyole (the research institute) is considering adapting its customer care desk to be able to handle calls related to the campaign. Monitoring processes have however helped to document and capture feedback to be able to adapt the campaign content to the farmers' needs.
- Male farmers are sometimes apprehensive of messages sent to their partners and usually demand to have the information sent to them. It is currently unclear how this information is shared with partners.
- Farmers occasionally decline to subscribe to the service fearing the cost.
- The limited capacity of smallholder farmer's phones means limits to the storage of messages. Farmers are therefore advised to maintain a notebook to record messages for reference.
- Challenges encountered by the beneficiaries relate to inputs not always being readily available, especially in remote areas. Many farmers have limited purchasing power, which causes them to recycle seeds and not use fertilizer.
- Observation during monitoring processes also revealed that a number of female farmers are semi-literate and are therefore not able to understand the messages.

Lessons learned

Some of the lessons learned are:

- Farmer profiling activities were initially targeted at registration of the head of the household. It is however still unclear how the information is shared within the household and this needs further investigation.
- The effort of bringing more female farmers on board should take into account low literacy levels and women's decision-making roles in farming.
- Efforts to target women must pay greater attention to their social roles, exemplified by their inability to participate in activities such as farmer profiling or feedback sessions at short notice.
- SMS delivery to the farmer needs a more disaggregated approach on the basis of agro-ecological zones. In its current approach, the project tends to focus more on administrative structures, as the basis for dissemination, yet villages within a district may be in different agro-ecological zones.
- Backstopping visits should be organized and collaboration with extension agents should be increased to guide on cropping schedules.
- It would be pragmatic to have a more concentrated approach to facilitate learning. Currently users are dispersed in seven regions making traceability and monitoring and evaluation a challenge.
- The capacity of farmer's phones does not allow for storage of messages. It is therefore important to find practical solutions for storage of messages for future reference.
- Currently the project does not disaggregate farmers on a social and economic basis. It is however evident that project success in diffusion of information and technologies will depend on identifying farmers that can trigger the process in their villages. This could be reflected through their communication and behavioral patterns and also developmental stages.

Sustainability

UPTAKE's principal aim is to complement extension services. Tanzania has a thinly spread extension system with limited government support, weak links to research and limited capacity amongst extension workers. 2012 data on extension shows that for a population of 6 million farming families in Tanzania there were 10 891 extension officers of whom 6 925 were crop-focused, while the balance of 3 966 agents were livestock-focused. (Tanzania Country Profile 2015 – ASHC, CABI). It is estimated that only 10 percent of the farming families are reached by extension services. The SMS model introduced by the project is a novel one in regard to reaching thousands of farmers in a timely manner with up to date information. It is resource effective comparative to demonstration plots and farmer field schools.

Economic sustainability of the SMS service is challenged by the need to continually disseminate updated information to sustain farmer interest. Meanwhile farmer willingness to pay for such mobile-based services is very low. Sustainability is therefore being sought via collaboration with input providers.

UPTAKE in the longer-term targets to integrate the service to that of an existing mVAS with a sustainable business model that can take into account refreshing of information to ensure to meet the farmer's needs. In the interim, progress has been made in securing the interest of maize seed companies in the PPP to contribute towards the service, in an echo campaign.

Environmental sustainability is promoted through encouraging environmentally friendly practices using CABI's Integrated Pest Management (IPM) Green and Yellow IPM lists of plant protection following standards of the International Organization for Biological Control and other pesticide policies to decrease reliance on harmful pesticides. Other aspects promoted by UPTAKE are elements of climate smart agriculture; building farmer resilience to withstand climate variability for instance promoting short maturity varieties as well as promoting environmental conservation.

Farmer's story

Anthony Mwaisembo is a farmer from the Mshewe Village in the Mbeya Rural District. He is 25 years old and has a wife and two children. He owns 2 acres of land on which he mainly grows maize. Anthony also keeps a dairy cow to meet his family's milk needs and sells the excess production to other farmers.

Anthony says:

"I began to receive the SMS service in December 2016. I got a lot of benefit from the SMS messages but allow me to say something that I will never forget for the rest of my life. It was in February, the sun was very hot and I received an SMS that said that during this time when the temperatures are high and it is very dry, the maize is more likely to be attacked by pests. Normally at that time of the year when we have planted and have weeded, it is not common to have attacks from pests. Per the advice though, I decided to inspect my farm and I was shocked because indeed my crop was infested with a pest we call Imbenya in our local language. I therefore purchased one of the pesticides that were recommended and that was easily available from the agro-dealer. I sprayed and by doing so, I saved my crop. That SMS was really important for me. I believe I saved at least ten bags of maize from destruction. For a small farmer, that is a considerable amount, because we sell one bag at 50 000 Tanzanian Shillings. I would therefore have lost 500 000 Shillings. It would have been a big loss to my family. I expect to harvest 30 bags, which are in excess of my needs, and I would suggest that the project now sends us SMS messages with market information. I would definitely wish that this service continues in the next season, and would recommend that it starts as early as October when we do our planting in this area."

On the right we see Anthony Mwaisembo in his maize field.

Replicability and upscaling

The practice has not been replicated as it has only run through a single season and will need a thorough evaluation once better established. Some tips that may be considered when replicating the practice in other contexts are:

- Concentration of the campaign to allow for better learning and adapt the intervention where it is not working as effectively as envisaged at design,
- Target progressive farmers (who have shown already some effort towards improvement) working through farmer groups to promote faster adoption,
- Promote increased access for women and youth through deliberate targeting,
- Enhance interactivity. In other contexts and in the coming season, UPTAKE will employ interactive radio to enable farmers to connect more with the source of information, give feedback and highlight areas where more information and clarification is needed.
- Integrate the SMS service with more sought after services like money transfers, loans to purchase inputs and other value added services.

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Lucy Karanja has over 5 years' experience in providing technical support on the development and dissemination of mAgric content using various ICTs, a skill that has grown over the years since implementation of the first and unique pilot mobile agriculture service dabbed mFarmer, a service that resulted to subscription by over 50,000 famers to receive agriculture tips of 13 value chains in Kenya. She is currently a PhD student and working as a content manager at CABI.

Resources

- https://africasoilhealth.cabi.org/about-ashc/ashc/uptake/
- https://africasoilhealth.cabi.org/2017/04/05/uptake-stephanie-on-scale-up-climate-change/

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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