

Scaling project – 2020 Annual Report

Project title: Scaling Akilimo A Digital Fertilizer Recommendation Service

Project start and end date: January 2019 - December 2021

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Project lead organization: International Institute of Tropical Agriculture (IITA): www.iita.org, www.rtb.cgiar.org.

Implementing Partners:

1. ARIFU
2. NOTORE
3. ONE ACRE FUND
4. YARA

Countries of intervention: Nigeria, Tanzania and Rwanda

Total budget: USD 997,696

Date of submission: January 2021

Alliance



Progress and results

Outputs

Outputs for 2020 are listed below, with a short summary of the achievements so far. Detailed output reports have been submitted for all 2020 deliverables on the MEL platform.

- **R1.1: AKILIMO interfaces have been tested and validated by scaling partners [Tool].** This has been fully achieved. The printable guides have been updated and improved, translated to all the major local languages, and partners have branded these and used in their dissemination events. The AKILIMO smartphone app was substantially improved in terms of UX, thoroughly tested by partners and now ready for widescale use.
- **R1.2: Arifu chatbot is fully operational for cassava (developed and validated) [Tool].** This is achieved, with some delay. The Arifu chatbot was advanced, and testing is in its final stages before launch in Q1 2021. Some delays were encountered due to difficulties to register a shortcode in Nigeria, as well as to fully integrate the AKILIMO scripts on Arifu's servers.
- **R2.1: Key players in the value chain are identified and scored for relevance to scale AKILIMO [Value chain assessment].** This has been fully achieved. A value chain analysis has been carried out and a list of partners with their engagement level into AKILIMO is available. Partners actively seek out organizations with linkages to their own role in the value chain, and scaling promoters and champions assist in evaluating these against a set of criteria.
- **R2.2: Bottlenecks for scaling AKILIMO and mechanisms to address these are identified.** This is fully achieved. Constraints were identified through multiple independent mechanisms, at core team level, through the value chain analysis and interactions with partners, as well as the ME&L activities with end-users. Main bottlenecks relate to access to inputs, access to credit, access to market and access to extension services, though with differing levels of importance in the countries/regions.
- **R3.1: Supporting materials to scale AKILIMO are available [Tool].** The initial suite of tools envisaged is available on the AKILIMO website and in use by partners. We however continued to expand this toolset with a farmers' guide in cartoon format and a short video series to further support scaling efforts, particularly the training of extension agents and reaching farmers through social media.
- **R3.2: Last-mile delivery agents are trained to use AKILIMO interfaces [Concept].** The number of extension agents trained exceeded target numbers, but the database was not completed yet. This will be available in Q1 2021, and fully part of an interactive dashboard for use by the scaling partners to support continued training in 2021 and beyond.
- **R4.1: AKILIMO functionality has been expanded to potato for the Rwandan context.** This has been postponed. A series of potato fertilizer response trials were conducted to permit calibrating and validating the AKILIMO framework. Data were analysed and confirmed that the logic and structure of the framework can be adapted for potato in Rwanda. Draft recommendations will be available in Q1 2021 for testing in on-farm validation exercises.
- **D1.1: Capacity building requirements for key value chain players have been identified [Value chain assessment].** This has been achieved. Capacity building requirements have been integrated in the partner database and are addressed through training-of-trainer events organized by the Scaling Champion and promoters.




Outcomes

The level of achievement and status for all outputs is described below for the 4 research and 3 development outcomes. Three out of the four research outcomes were due in 2020, while development outcomes are due in 2021.

R1: Cassava content and format of AKILIMO are aligned to primary scaling partners' operational strategies and partners have approved these for use to start scaling in each of the 3 countries. This has been achieved. Some partners were fully involved in the development of the AKILIMO tools through activities that started by the ACAI project. The primary scaling partners of the Scaling AKILIMO project (NOTORE and Kilimo Joint, linked to YARA) took a leading role in the evaluation of the AKILIMO interfaces and supporting materials. They provided feedback and organized partners across the value chain to evaluate the tools to do the same. Through this feedback, the project took a deliberate decision to further diversify the formats of the interfaces, and by 2021, AKILIMO advice will be available as printable guides (with downloadable annexes through a web-based dashboard application), a smartphone app, Arifu's chatbot (which will not only be available as interactive SMS, but also in chat applications, including Telegram, WhatsApp and Facebook Messenger), and IVR through VIAMO's 321 service. Also the supplementary materials were further diversified and expanded to meet the diverse needs, preferences and capabilities of end-users and extension workers. Video material for example is preferred for dissemination through community video screening events, while instructional guides, slide decks and manuals are preferred for training events. Worksheets were designed as these are cheap to print and permit farmers to run through the calculation and understand the decision-making process. Certain materials also address specific needs of gender groups, as these fit better within dissemination events with higher representation of women groups. This deliberate diversification has prepared the project for an effective scaling process, and address the specific needs of different types of end-users.

R2: A consolidated scaling strategy informed by a comprehensive value chain analysis is agreed on with the primary partners and ready for implementation in each of the 3 countries. This has also been achieved. Scaling strategies were developed with full involvement of the project partners. This scaling strategy relies on full integration of AKILIMO into partners' operational strategies, supported by training-of-trainer events organized by the project team, and stepdown training sessions for extension agents, organized by the partners. We expanded the set of partners and attracted relevant value chain actors based on an in-depth value chain analysis, guided by insights in the main bottlenecks and drivers for use of the tools and uptake of the recommendations. These insights were obtained through facilitated discussions with the relevant value chain players, as well as through thorough ME&L with end-users. The scaling strategy includes activities to overcome bottlenecks, mainly by bundling AKILIMO with complementary services of partners in the value chain. Throughout the process, partners were fully involved and the project's overall scaling strategy was agreed on with all partners. Partners now lead the implementation and further adaptation of the strategy.

R3: At least 100 last-mile delivery agents have been trained in the use of AKILIMO tools, and are fully equipped and ready to provide improved fertilizer advice in each of the 3 countries. This has been achieved for Nigeria and Tanzania: a total of 694 EAs have been trained in Nigeria, and 332 in Tanzania. EAs were trained through a training-of-trainer approach, whereby the first set of trainings for coordinators and lead extension workers were organized by the project team, led by the Scaling Champions and Promotors, and then stepped down by the partners within their respective organizations. Gender balance is relatively good in Nigeria (44% of extension agents are female), but less so in Tanzania (30% female EAs), and this contributes to an overall gender gap, especially in Tanzania. Extension agents were fully trained to apply the AKILIMO printable guides and worksheets, and equipped with all supplementary training material. They were also exposed to the AKILIMO smartphone app, and informed that in 2021, additional interfaces will



become available. Refresher training sessions will be organized in 2021, which will cover the full range of interfaces and materials.

R4: Potato content and format of AKILIMO are aligned to scaling partners' operational strategies and approved these for use to start scaling in Rwanda. This is a 2021 outcome. Good progress has been made to adapt the modelling framework for potato in Rwanda, based on a series of fertilizer response trials. This process has demonstrated that the adaptation of the backend processes can be achieved in much shorter timeframe than originally achieved for the cassava content for Nigeria and Tanzania by ACAI. This is an important achievement, as with this higher efficiency, we demonstrated that further expansion to new geographies and crops is possible faster, and at a much lower cost. The interface development is underway, but is however time-consuming, as it involves user testing and several rounds of improvements.

D1: Sustainable capacity building modules are operationalized, allowing at least 2 key value chain players (beyond the primary scaling partners) per country to tap into AKILIMO tools and training materials and use or integrate tailored fertilizer advice within their operations. This is a 2021 outcome, but well underway. Partners have expressed their willingness to come together in a form of national associations, which will be the vehicle for continued capacity building within the countries. More likely, these associations will have at least 5 lead partners, and a formally recognized structure that includes representatives from the national extension system, national research institutes, private and non-governmental sectors. Different options will be explored to sustain the training, and likely will include pay-for-services of trained extension workers to train extension workers and lead farmers of new interested partners. A virtual platform will be set up to provide access to training material, as well as register trained extension workers.

D2: Clients of primary scaling partners are benefiting from tailored fertilizer advice delivered through AKILIMO interfaces. This is a 2021 outcome but also well underway. The number of subscribed users is captured through a common ME&L framework of the AKILIMO partnership, and use and uptake is continuously evaluated through phone interviews with a sample of newly subscribed users. All data is made available through a dashboard, that permits evaluating success rates, as well as quantify the total value generated. Actual benefits under farmer's conditions have been quantified by the ACAI project through validation exercises carried out by over 5,000 volunteer farmers, supported by trained extension agents, and without direct involvement of researchers. Achievements are provided under the Impact section.

D3: Continued use of AKILIMO services is supported and sustained for at least 2 key value chain players (beyond the primary scaling partners) in each of the countries. Further, the development of AKILIMO will be sustained through a community setup, through which also third-party clients can benefit and integrate from the AKILIMO tools. This is a 2021 outcome, and towards the end of 2020, when progress with scaling and achievements were discussed, this became the centre point of attention. Partners have realized the value generated by the AKILIMO project, and see direct impact on the farmers in their networks. Partners now wish to take charge of the training and dissemination, and take over the ME&L activities through a national association setup. The exact structure and organization will be elaborated in 2021, ensuring the partnership can continue to grow, attracting new partner organizations, increasing the number of trained extension workers, and ultimately, the user base. This process is guided by insights in the value chain, building on strengths of individual partner organisations to overcome bottlenecks.



Impact

We envisaged three impact targets. The first target is direct access to tailored fertilizer advice for 50,000 cassava farmers in Nigeria, 50,000 cassava farmers in Tanzania, 10,000 cassava farmers in Rwanda and 5,000 potato farmers in Rwanda through the Arifu chatbot and AKILIMO services. Currently, we have reached 35,696 farmers in Nigeria and 37,858 in Tanzania, of which 40% are women. This involves only the farmers directly reached by the Scaling AKILIMO project with fertilizer advice (so excluding the farmers reached by the ACAI project). Farmers were mainly reached through the AKILIMO services handled by the project, and mostly with the printable guides disseminated through partners' scaling events. The smartphone app was only recently considered ready for wide-scale use and the Arifu chatbot will be launched in Q1 2021. We were able to make progress by investing in expanding the partnership beyond the two primary partners (NOTORE in Nigeria and Kilimo Joint, and outreach initiative linked with YARA in Tanzania), and attracting value chain players with complementary services. We are positive that we will outperform on the targets set for Nigeria and Tanzania. In Rwanda, scaling is yet to start, as the interfaces are not yet ready for use.

Secondly, we targeted an uptake rate of 30%, meaning that one out of three users of the service effectively apply the recommendations in their field. We achieved aggregated and weighted uptake rates of 45% in Nigeria and 30% in Tanzania for the fertilizer advisory modules of AKILIMO. These differed for gender groups and were higher for women than for men in Nigeria, while the opposite was observed in Tanzania. Detailed investigations were conducted to disaggregate uptake rates by exposure method, wealth status, market access, extension service support, amongst others, and differences observed informed scaling strategies to address constraints. For example, in Nigeria, access to extension support is a critical bottleneck, as only 4% of farmers regularly interacts with extension workers, and a lead farmer approach was followed to increase farmers' access to trained AKILIMO users. In Tanzania, market access, cost and affordability are important bottlenecks, and we work to overcome these by bundling AKILIMO with services of partners that facilitate access to market and credit. We aimed for income increases of at least 20%. We quantified these benefits based on the observed yield and revenue improvements observed in validation exercises conducted by over 5,000 volunteer farmers, penalizing the potential benefit according to the uptake rates for the individual steps of the recommendation tool. Based on the numbers of farmers reached, the uptake rate and the penalized revenue increases, we calculated the project realized a total value of US\$5,995,554, summed across all beneficiaries of the Scaling AKILIMO project (US\$2.3M in Nigeria and US\$3.7M in Tanzania), of which 40% benefited women cassava growers.

Lastly, in Rwanda, we target at least 30% of potato farmers to adapt their practice and apply the AKILIMO-recommended rate instead of the blanket recommendation, thereby improving agronomic efficiency and realizing an environmental benefit without compromising their profit. No measurable progress can be presented at this point as the interfaces are still under development. We have however initiated partner engagements and are positive to launch by mid 2021 and measure impact by end of the year.

Documentation and reflections on scaling and Scaling Readiness

Step 1: Characterization

Innovation package

In the proposal, AKILIMO is described as a digital advisory service for smallholder cassava growers. It is comprised of a modelling framework based on digital data resources, crop models and algorithms hosted on a server infrastructure and interacting with a suite of interfaces to provide recommendations to farmers, and accompanied by a set of training and promotion materials to facilitate correct use of the tools and correct implementation of the recommendations. These three sets of components are considered the core, while complementary innovations comprise accompanying services to facilitate intensification of the cropping system: access to seed of improved varieties, access to fertilizer and herbicide inputs, access to credit, access to market and access to extension support. The full list of core and complementary innovations are described in Table 1.

TABLE 1: AKILIMO COMPONENTS CATEGORIZED IN 4 GROUPS: BACKEND COMPONENTS, INTERFACES, SUPPORTING TRAINING AND PROMOTION MATERIALS, AND COMPLEMENTARY INNOVATIONS.

	component	component_label	Category
1	soil_maps	Digital soil maps	Backend
2	weather_maps	Geospatial daily weather data	Backend
3	price_maps	Geospatial input and crop produce prices	Backend
4	DSSAT	Model predicting attainable crop yield (DSSAT or LINTUL)	Backend
5	RFM	Machine learning model predicting soil nutrient supply (RFM)	Backend
6	QUEFTS	Model predicting crop nutrient response (QUEFTS)	Backend
7	optimizer	Algorithm optimizing net revenue or BCR	Backend
8	pred_tillage	Model predicting crop response to tillage interventions	Backend
9	pred_intercrop	Model predicting crop response to intercrop arrangement and density	Backend
10	pred_LER	Model predicting LERs of intercropping systems	Backend
11	IT_infrastructure	IT infrastructure to host prediction engine, GIS layers and software	Backend
12	app	Smartphone AKILIMO app	Interface
13	IVR	IVR interface (VIAMO 321 service)	Interface
14	USSD	USSD interface	interface
15	chatbot	Interactive SMS (Arifu Chatbot)	interface
16	paper_tool	Paper-based decision support tools	interface
17	paper_annexes	Annexes to the paper-based tools (maps, tables, dashboard)	interface
18	worksheets	Farmer's worksheets accompanying the paper-based DSTs	interface
19	app_manual	Smartphone AKILIMO app manual	training & promotion
20	paper_tool_manual	Manuals accompanying the printable decision support tools (slide decks)	training & promotion
21	simple_text	Simple text recommendations to share through radio, SMS or IVR	training & promotion
22	short_briefs	Short briefs (postcards) summarizing the tools for promotion purposes	training & promotion
23	radio_booklets	Booklets summarizing radio content	training & promotion



24	GAP_guide	Guide with general advice on good agronomic practices	training & promotion
25	farmer_guide	Farmer guide on implementing recommendations in cartoon format	training & promotion
26	training_video	Farmer-friendly training videos on recommended practices	training & promotion
27	training_manual	Training handbook for extension workers	training & promotion
28	video_series	Series of short videos (developed by mango tree) for training and promotion	training & promotion
29	varieties	Access to improved, responsive and disease-resistant varieties	complementary
30	fertilizers	Access to fertilizers suited for cassava systems	complementary
31	herbicides	Access to herbicides suited for cassava systems	complementary
32	tractor_implements	Access to tractors and implements (plough and ridger)	complementary
33	credit	Access to credit / finance	complementary
34	Extension	Access to training / extension service	complementary

No major changes were made to the overall core structure of AKILIMO in 2020. The backend components were advanced, and predictions further improved for the Nigeria and Tanzania context, using data from on-farm validation exercises, through the efforts of the ACAI project. Over 2,000 smallholder volunteers tested the recommendations alongside their current practice, and observed yield effects were used to refine recommendations or improve the targeting of investments. Through the Scaling AKILIMO project, we invested efforts to expand the set of training and promotion materials, as we learned these are critical for partners to scale the innovation package. Due to the corona pandemic and the lockdown, partners were unable to organize in-person training and promotion events during most of March – May 2020. We invested efforts in materials that permitted training and promotion through digital channels. We initiated the development of short video series, and made all training guides available in the form of animated slide decks with narration. We also advanced the radio guide, providing content on the AKILIMO tools and recommendations in a format that is suited for airing on radio shows, with various examples and different “density” of information, from short promo messages, to 5–10-minute descriptions of the different steps of the tools, as well as examples of soap operas or dialogues between extension agents and farmers. Radio program hosts could then adapt their content to fit the style and duration of their shows. Further, we invested in digital projectors to enable extension workers in the regions to organize video shows at community centers as and when possible, following local corona regulations.

In 2020, scaling happened predominantly using the set of printable interfaces. These were already available in 2019, but were further improved, both in terms of flow and logic, as well as look and feel. The printable guides were also accompanied by simple two-page worksheets that allow end users to perform the calculations required, and understand the steps and the importance of the input information. At the same time, the AKILIMO app for android was advanced and a new version was released with an improved user experience, and thoroughly checked for functionality, improved speed, and overall performance. The app however was much less used than the printable tools. Only extension agents with smartphones made use of the app; most partners preferred the printable guide, as it fitted better within their operational strategies. While we had planned to roll out the Arifu chatbot as well as the IVR interface through Viamo’s 321 service, adapting the framework to the specifications and requirements as well as supporting the integration into these partners’ services took longer than expected. At the end of 2020, however, testing and validation was almost completed, and both services are expected to go live in the first quarter of 2021. The advantage of these interfaces is that they allow farmers to directly interact with the AKILIMO content over simple phones, and free of charge.

Finally, in terms of complementary innovations, we focused predominantly on linking AKILIMO users with services of partners who provided these innovations. These included firstly access to inputs, particularly



fertilizer and herbicides. NOTORE, a partner in the AKILIMO project in Nigeria, provided intensified support through their network to facilitate access to fertilizer, and started the development of a new special cassava fertilizer blend. In Tanzania, we partnered with Kilimo Joint, a critical partner part of YARA's outreach network, who supported farmers with knowledge and access to fertilizers. Partners also started co-promoting fertilizer advice with best planting practices, which included use of healthy seed of improved varieties, appropriate land preparation, tillage and weed control. This was critical to ensure profitable responses to fertilizer. As such we facilitated access to healthy seed through linkages with MEDA's commercial seed entrepreneurs and co-promoting the cassava seed tracker applications to enable farmers to buy seed locally. Further, we promoted the use of good tillage practices and weed control, including the appropriate pre- and post-emergence herbicides by commercial companies such as UPL, Saro Agrochemicals, Bayer and Syngenta. Finally, we explored possibilities for better linkages with markets, especially through networks of starch companies in Nigeria, and access to credit through for example Zowasel/Growsel in Nigeria and the Tanzania Agricultural Development Bank (see further for an exhaustive list of new partners and the status of the relationship).

Both the improvements and developments made to the backend and interface components as well as the suite of training and promotion materials and the growing variety of partners have greatly contributed to the scaling potential of AKILIMO. The diversity of the tools materials permits users and partners to choose or give different emphasis, depending on their operational strategies, choosing those that are most compatible with their dissemination approaches and interventions at grassroots level. The end-users – smallholder cassava farmers – are diverse as well, and better served by a package that they can adapt and choose from, according to their preferences and capabilities.

Step 2: Diagnosis

Identification of bottlenecks for scaling for each of the locations

The AKILIMO package with its components was diagnosed using the readiness and use scales by the core team and partner leads in February 2020, and again by the core ACAI team in December 2020, who also indicated their involvement in the development of the various components. An enketo webform was developed for this purpose. This assessment was done across Nigeria and Tanzania, where readiness and use is considered fairly similar for the majority of components. Backend components are developed simultaneously for both country, while interfaces and supplementary training and promotion materials are rolled out independently, but with little difference in timelines. Complementary innovations may differ substantially, but these are not under control of the project. An assessment for the AKILIMO innovation in Rwanda was not yet carried out, as the interfaces are not yet available for neither cassava nor potato, and backend components are still being adapted. Hence use is overall low for the interfaces and supplementary materials, and backend components are at intermediate stages of readiness in Rwanda.

For the backend components (specifically for Nigeria and Tanzania), use is rated according to their use within the agronomy community, while for the other components, use is rated according to use within the projects primary partners (i.e., partners who received funding from the ACAI or Scaling AKILIMO grant), secondary partners (i.e., partners who directly work with the primary partners) and beyond. Of the backend components, as said, much advancement was achieved, reflected by high levels of readiness of all components, except the digital secondary data products such as fertilizer and crop commodity price maps, weather information and digital soil maps (Fig. 1). Especially price maps are critical but not available. These products are not developed

by the project but used by the project. As a strategy to overcome this, we currently require the end user to provide his/her price but keep this optional; where end-users do not know the prices, we use conservative national prices. Where users do choose prices, some checks are in place to avoid overly low or high prices. In general, the AKILIMO package does not involve any new technology, but is rather an assembly of existing techniques. The secondary data products are used alongside with primary data collected by ACAI in a modelling framework that couples machine learning, geospatial statistics, crop models and an economic optimizer. The innovation lies in the modular combination, calibration and validation of the various stages of the framework, and the packaging into practical recommendations that fit end-users' needs. In terms of interfaces, the IVR and chatbot services are considered ready or close to ready but still going through final stages of validation, and currently not in use yet by the project's primary partners. The use of the printable tools, however, has scaled beyond secondary partners. For the training and promotion materials, a suite of tools is ready and widely used, beyond secondary partners. Some of the more recent materials, are still under development and widescale use of these is planned in 2021.

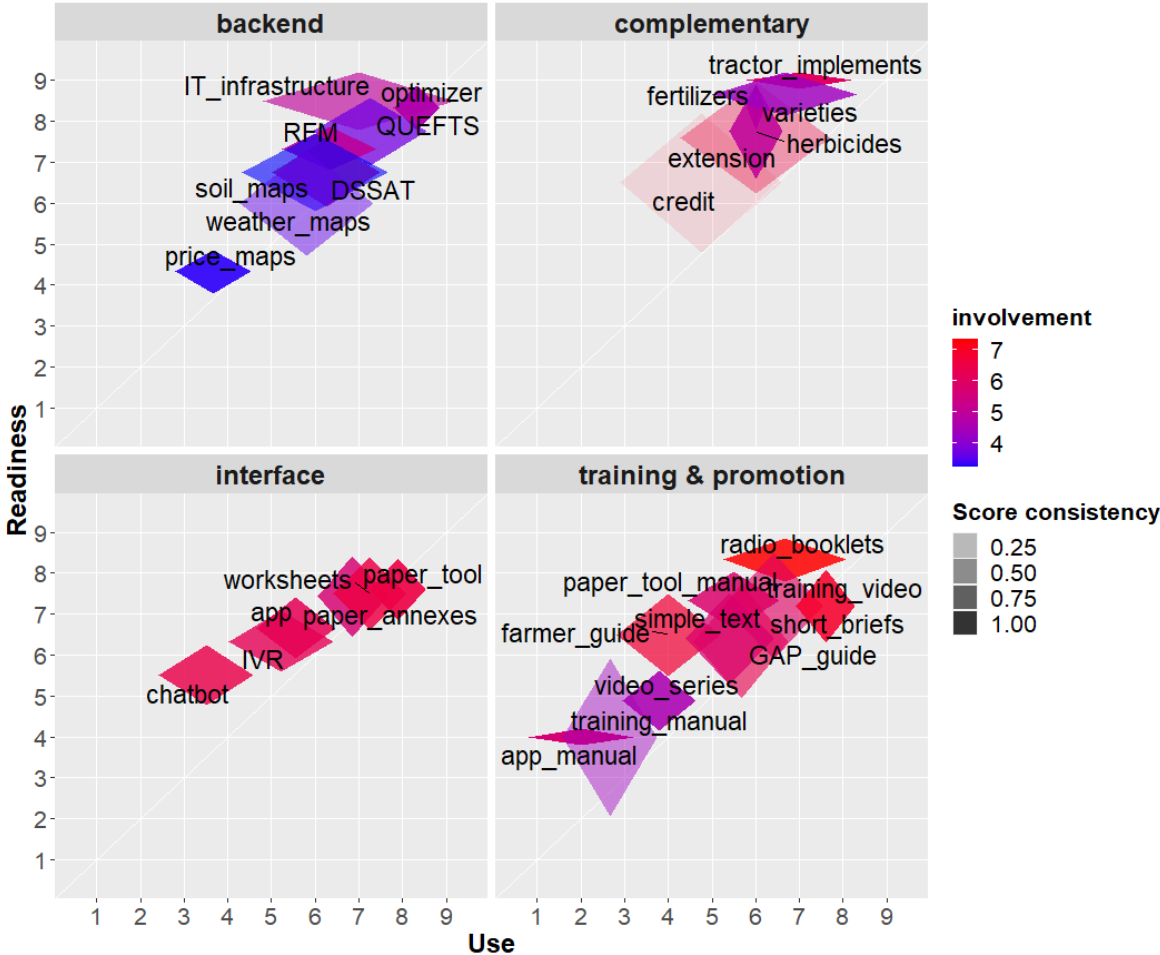


FIGURE 1: CORE COMPONENTS CATEGORIZED AS BACKEND, INTERFACE AND TRAINING AND PROMOTION MATERIALS, AS WELL AS COMPLEMENTARY INNOVATIONS, SCORED FOLLOWING THE READINESS AND USE SCALES BY THE CORE ACAI TEAM IN DEC 2020 ACROSS NIGERIA AND TANZANIA (FOR DETAILS ON THE COMPONENTS, SEE TABLE 1). RATINGS WERE AVERAGED ACROSS CORE TEAM MEMBERS AND PRESENTED AS DIAMONDS WITH LENGTH AND HEIGHT REFLECTING 2 STANDARD DEVIATIONS OF SCORES; HENCE, LARGER DIAMONDS WITH HIGHER TRANSPARENCY REPRESENT INCREASING INCONSISTENCY. COLOUR REPRESENTS THE TEAM MEMBERS' INVOLVEMENT IN THE DEVELOPMENT OF THE COMPONENTS.



In addition to the scaling use and readiness assessment by the core team, a diagnosis of the innovation package and key bottlenecks were carried out with involvement of relevant stakeholders/value chain actors, and effort was invested to ensure their full participation in the exercise. Their feedback was sought not only to understand drivers for uptake and bottlenecks for scaling, but also to foster co-ownership of the AKILIMO innovation, as the scaling process must be driven by these partners to be successful. To attain sustainability, integration into partners’ strategies is critical. Detailed information on the engagement process is covered in the section on the partnership strategy below.

In 2020, the innovation profile sheet was used for overall diagnosis and assessment of the complementary innovations. Many partners expressed a need to integrate additional complementary innovations that align with their operations to facilitate the use of the AKILIMO tools and uptake of the recommendations provided by smallholder farmers in partners’ networks. Stakeholders were taken through the characteristics of the innovation package (core and complementary innovation inclusive). The need to collectively design, develop, disseminate AKILIMO and use at scale was discussed in all countries. An assessment of the innovation package was carried out, led by Notore (Nigeria) and Kilimo Joint (Tanzania) and One Acre Fund (Rwanda). These primary partners engaged an additional 23 secondary partners from various organizations. The following feedback was given on the need to improve the performance of the intervention to suite the operations of the partners:

- (i) Identify capacity gaps in the use of the core innovation, AKILIMO;
- (ii) Develop a sustainable pathway between the project and partners so that dissemination activities are linked to partners’ operations;
- (iii) Create a governance system to be owned by the partners and platform to constantly exchange and give feedback on use of the core innovation;
- (iv) Bundle AKILIMO with complementary services that will aid the uptake of AKILIMO advice, consistently within partners’ operations.

Bottlenecks that could inhibit the use of AKILIMO at scale were identified through a value chain approach. Linkages among the partners were mapped across different segments of the value chain (Fig. 2). This provided opportunity to identify bottlenecks across the different segments and in different partner locations.

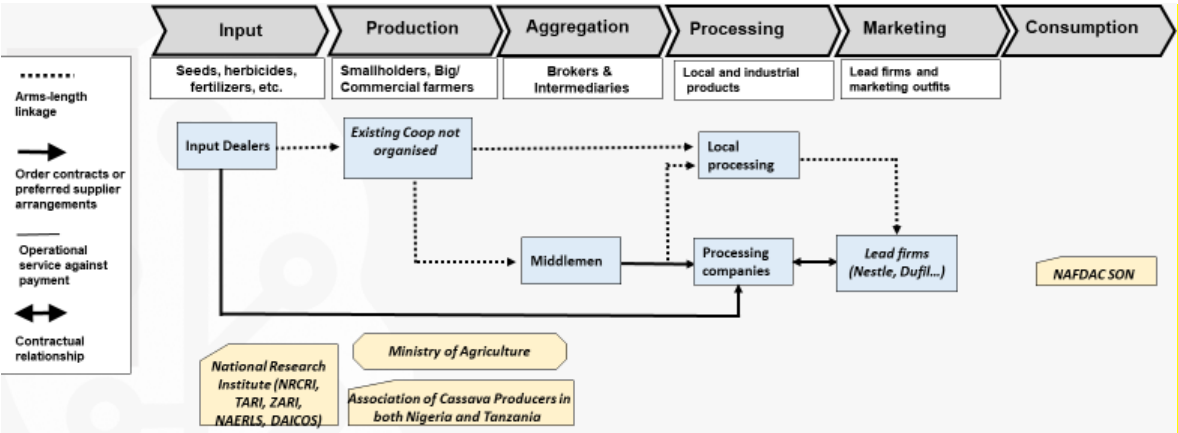



FIGURE 2: SCHEMATIC DIAGRAM OF THE VALUE CHAIN AS DEVELOPED BY A MAPPING EXERCISE WITH THE PRIMARY AND SECONDARY PROJECT PARTNERS. LINKAGES AND INTERACTIONS WERE IDENTIFIED AND DISCUSSED, AND SERVED AS THE BASIS FOR IDENTIFYING BOTTLENECKS FOR UPTAKE OF IMPROVED AGRONOMIC PRACTICES AS ADVISED BY THE AKILIMO SERVICE.



The major bottlenecks were identified based on interactions and practical sessions with partners, evaluating how they interact and support each other in the value chain. Bottlenecks were mapped within each segment of the value chain. Thereafter, a bottlenecks matrix was developed, which summarizes the main bottlenecks mentioned by the partners and sustainable solutions as mitigation measures. Bottlenecks were then prioritized for effective strategy development. Main bottlenecks identified were (i) access to output market, (ii) access to credit, (iii) access to extension services (iv) availability and access to quality inputs and (v) limited technical knowledge on correct use of inputs especially, fertilizer and herbicides. Other bottlenecks include input adulteration, limited access to inputs in rural locations, and ineffective input supply arrangements. These bottlenecks are the same as those identified in the scaling fund project proposal with the exception of the additional ones (access to extension services, limited technical knowledge and ineffective input supply arrangement in the value chain), which have been added.

Step 3: Strategize


Scaling strategy

The scaling strategy, as indicated in the proposal is built on 4 fundamental pillars:

1. Capitalize on intensified use of the service in the operational strategies of primary scaling partners (NOTORE, YARA, RAB and One Acre Fund), and support this with a diverse suite of training and promotion materials that match partners' operations and end-users' capabilities and preferences.
2. Through Arifu, develop software and learning content that allows delivering tailored fertilizer advice directly to smallholder farmers using the functionality of simple phones, an interactive SMS chatbot inclusive.
3. Establish mechanisms to sustain the AKILIMO service beyond the duration of this project through a community structure of a range of partners across the value chain and attract complementary services, permitting CGIAR centres together with the national research and extension systems to continue building and supporting the service.
4. Establish a digital learning platform with at least two key value chain players in each country.

The scaling strategy brings partners together and provides recommendations and guidelines for improving the use of AKILIMO at scale in their operations. It was co-developed with the relevant partners identified across the value chain. The project team re-strategized with partners on the implementation of the above strategic pillars, and the integration into partners' existing operational strategies. This was made possible through strategic choices to resolve identified bottlenecks in order to sustain the use of AKILIMO within the operations of the partners. Based on this, existing strategies of partners in working with smallholder farmers were reviewed. Sustainable solutions to resolve bottlenecks were built around the strategies.

Firstly, by following the scaling readiness approach, a strategic option of substitution was adopted by the partners. Bottlenecks identified were prioritized, and additional complementary innovation were suggested by partners to actively bundle these with AKILIMO. In particular, this serves to overcome bottlenecks related to access to input, credit, and extension services. As partners are the drivers, this has real potential to achieve impact at scale. Aside the primary partners (Notore, YARA and One Acre Fund) who were part of the process, an additional 20+ institutions were mobilized across different segments of the value chain. Over 100 partners were contacted and exposed to AKILIMO, interests and mutual value propositions discussed, and decisions taken for further engagement. Critical in this process is the capability and interest to work with smallholders and agronomic advice playing a key role in value generation for partners. This list continues to grow as partners applying AKILIMO are encouraged to actively seek out new partners with complementary roles in the value chain. They will jointly be working on the innovations and constitute the intervention team with limited support from the project.



This strategic plan on bundling services has been built around partners' commitment to integrate AKILIMO into their operations. It bridges the use of AKILIMO alongside with primary activities of the partners. For this to happen, 3 workshops were held where capacity of selected partners were built towards being strategic in handling identified bottlenecks that can in turn add value to them when turn to opportunities through collaboration with other partners in the value chain. Other strategic choices made by partners that will be integrated with the bundling services include:

- Leverage on association meetings in each community such as farmers associations;
- Use lead farmers to mobilize farmers for dissemination activities, rather than only extension agents;
- Forge partnership with NARS and national extension system and integrate their national programs into the strategic plans;
- Link up with other on-going initiatives and seed entrepreneurs in order to ensure access to quality planting material;
- Use a platform approach to add voice to development partners' efforts towards scale-up and expansion of use of AKILIMO into other networks;
- Facilitate dialogue between private (digital partners inclusive) and public institutions to sustain use of AKILIMO and provide feedback on updates and changes required;
- Focus on "leaving no one behind" and include family farming and cassava-dependent communities on use of AKILIMO, as well as commercial initiatives and farmers with high investment capacity.

Finally, we also deliberately decided to further diversify the interfaces and supplementary materials for training and promotion, to address the diverse needs, capabilities and preferences of partners and end-users. As we learnt in 2018, when starting the development of these innovation components, all tools and interfaces have advantages and disadvantages, and often complement each other. Alongside with the Arifu chatbot, we collaborate with VIAMO, to avail recommendations through their 321 IVR service, which offers similar functionality but is more attractive for illiterate users. Arifu themselves also diversified their interfaces, not only providing the recommendations through interactive SMS, but also within Telegram, Facebook messenger and WhatsApp, offering a more friendly user interaction, and the possibility to provide audio-visual material alongside the text messages. These options are however only available to smartphone owners with access to electricity, network and data, a minority still today. Ground partners welcome these interfaces, as it allows them to overcome the need for intensive and direct support by extension workers for their smallholder clients. They can now focus on teaching farmers to use these services and obtain recommendations directly. This is also supported by our suite of training and promotion materials. We made decisions to develop a cartoon farmer guide, in which an extension agent guides a farming couple through all the essential steps of the AKILIMO toolset, and how to implement recommendations correctly in their cassava farm. In addition, we are developing a short video series, training guides as slide decks, printable guides and video, all to support the training activities of ground partners. This diversity in tools accelerates the use of the tools and uptake of the recommendations, we have learned through our ME&L activities.

Partnership strategy

The project leveraged on networks of various primary and secondary in the targeted and satellite locations in Nigeria, Rwanda and Tanzania. We opportunistically focused engagement partners with ongoing projects and/or initiatives, or partners who formed networks. In that way, we expect a higher likelihood of sustained efforts and operations with AKILIMO tools and services beyond the project duration. A checklist for stakeholder identification of relevant stakeholders was developed together with the scaling readiness team. The checklist assessed capacity of potential partners to scale out AKILIMO tools and the feasibility and to integrate AKILIMO into their operations. The scouting/identification of these stakeholders was conducted by the Scaling Promoters and Scaling Champions using agreed criteria, which included (i) active engagement with a network of farmers, (ii) working on cassava and/or in the cassava value chain, (iii) implementing a model for dissemination, (iv) willingness to integrate AKILIMO tools and services, (v) working with EAs as part of their operational structure, and (vi) being able to define a sustainability arrangement for use of AKILIMO. The



engagement process led to the identification of many organizations and cooperatives who were profiled using the checklist. Partners selected were part of the assessment of innovation package to obtain their buy-in on the complementary innovations as included in the proposal.

After relevant stakeholders were identified, they were engaged in interactive sessions to improve their capacity to use AKILIMO effectively commenced. Training-of-trainers events were organized for 23 representatives of the partners through which they were trained on use of different formats of AKILIMO. Notore and Kilimo Joint were involved as part of facilitators for the training. Those trained were further supported to step down the training to their various extension agents who will take the AKILIMO knowledge to smallholder farmers. These partners reached over 30,000 smallholder farmers in 2020. Partners networks at times changed when their operations are extended to new locations. Whenever this happens, smallholder farmers in such locations are sensitized by the partners on the use of AKILIMO. The project staff backstopped this process. The model used for AKILIMO training in 2020 is as below:

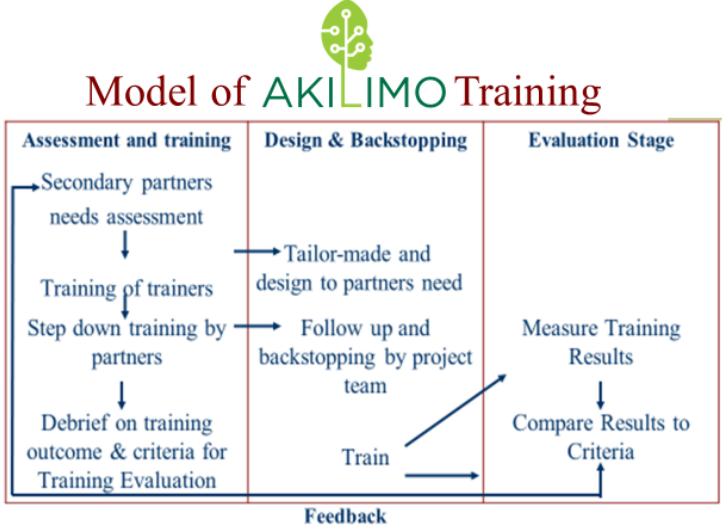


FIGURE 3: SCHEMATIC OVERVIEW OF THE TRAINING MODEL APPLIED IN THE PROJECT. TRAINING SESSIONS FOLLOWED A TRAINING-OF-TRAINERS AND A STEPDOWN TRAINING APPROACH, ADDRESSING SPECIFIC NEEDS PRIOR TO ORGANIZING TRAINING SESSIONS, AND BACKSTOPPED AND EVALUATED BY THE PROJECT TEAM.

Step 4: Agree

Partners were involved in the development of the strategy from the onset, specifically focusing on how to address bottlenecks in the scaling process. This made it easy to reach a consensus on how to work and move forward with the implementation of activities. Each partner concentrated on their core competences in the implementation with progressive evaluation and feedback to identify more secondary partners that would help resolve other bottlenecks. The partners engaged in Tanzania and Nigeria are listed in Table 2.

TABLE 2: OVERVIEW OF PARTNERS ENGAGED IN THE SCALING AKILIMO PROJECT IN NIGERIA AND TANZANIA.

Partner	Country	Remarks
1	Kilimo Joint	Tanzania Lead primary partner
2	Esoko	Tanzania
3	KOLPING	Tanzania
4	CAPAFO Foundation	Tanzania




5	DAICOS	Tanzania	Operating in Newala, Handeni, Chalinze, Mkuranga, Kibiti, Bagamoyo
6	Tanzania Agricultural Development Bank for credit	Tanzania	
7	Notore	Nigeria	Lead primary partner
8	Soladuke Agro Input Ventures	Nigeria	
9	Perfect Impact Ltd	Nigeria	
10	Cato Foods	Nigeria	
11	Nigeria Cassava Grower Association	Nigeria	Operating in Delta, Edo, and Benue States
12	Cedro Royal, SUFAN	Nigeria	
13	Gemehaam Bees Ltd	Nigeria	
14	KOLPING	Nigeria	
15	Agricultural Development Project (ADP)	Nigeria	Operating in Ogun, Ondo, Osun, Oyo, Anambra, Abia, Delta, Rivers, Imo, Ebonyi chapters
16	Zowasel	Nigeria	
17	Federal Ministry of Agriculture and Rural Development (FMARD)	Nigeria	
18	National Agricultural Extension Research & Liaison Services (NAERLS)	Nigeria	

Because partners were engaged from the onset in developing the scaling strategy, it was straightforward to continue engaging with a broader set of stakeholders in the validation of the strategy. Primary partners (Notore and Kilimo Joint) led the process together with a couple of secondary partners and the core project team. Input companies, producer groups, processing companies, governments, non-governmental organizations (NGOs), local community association, business development service providers, suppliers of equipment, community based organizations (CBOs) and others (as listed above) with an interest in the use of AKILIMO were mobilized. In a wider consultation with all interested stakeholders in the cassava value chain, decisions were taken on specific activities to implement and enhance the use of the AKILIMO service, ensuring full buy-in of the partners, with added value for all involved. Additional stakeholders were consulted and accepted the overall strategic plan, spearheaded by the primary partners. Stakeholders made suggestions on (i) how to further verify the range of social impacts and issues (risks and opportunities) relevant to the use of AKILIMO, (ii) how to effectively integrate vulnerable groups in the use of AKILIMO, specifically elderly, youth, unemployed and people with disabilities, (iii) how to maintain a stakeholder register and link it to initial suggestions on establishment of platforms for regular interaction, (iv) how to gather local level insights and a clear picture into the perceptions of the impact as perceived by the various stakeholders (primary partners, immediate secondary partners and next partners). Based on this further stakeholder consultation, consensus was reached on how these issues will be integrated into 2021 action plans and implementation strategy. Feedback will be given in early 2021 on how the project can support these suggestions.

Step 5: Navigate

The ME&L strategy was originally designed by the ACAI project and further improved and enriched through the Scaling AKILIMO project. This strategy follows a logic with 5 stages for the AKILIMO service to generate impact for its end-users. The first step, referred to as “reach” describes the process whereby smallholder cassava growers are exposed to the service and learn how to use the tools and implement the recommendations. This happens predominantly through dissemination events organized by the partners, such as field days, training events, agric shows, community video shows and sensitization events. In a second step (“insights”), smallholders gain further insights through interaction with extension agents, in personalized or




group interactions, and obtain a better understanding in the functioning of the tools, as well as the reasoning and logic of the tools to enable them to make better decisions on investments in their cassava farm. Critical in this step is to permit interactions with such trained extension workers. Thirdly, farmers must continue to use the tools after the initial exposure. Hence, they must have access to the service, and be able to interact in a meaningful and attractive way with the AKILIMO service. This step is referred to as “use”. Next, farmers must apply the recommendations in their farm. This step, when farmers change their current practices and make investments is referred to as “uptake”. Finally, changes in practices result in yield and income benefits. Partial uptake may result in lower benefits as compared with benefits observed in on-farm field trials.

We implemented an ME&L strategy that quantifies each of these stages. This not only provides us with the ability to quantify the project value, but also enables us to learn about constraints and drivers, especially for the use and uptake stages, as well as evaluate gender gaps. In turn, this process permits adapting our scaling strategies to overcome these constraints. Reach was monitored through a general digital record keeping system shared with all partners, whereby (1) each dissemination event with all relevant details are registered, including date, venue, type of event, number of attendees (disaggregated by gender and type of participant), and (2) participant lists are uploaded with the names and contact details of the participants. Training of extension workers for the insights step was monitored in the same way. Each training-of-trainers event was registered, alongside with the details of all participating extension workers. Use and uptake are monitored through telephone interviews. Three enumerators call a sample of the participants following a stratified randomized sampling design, ensuring equal proportions of male and female participants, and equal representation of the various dissemination event types, but proportional representation of the various partners within each country. Use is considered low if the participant did not use the tools again, medium if only used once or twice, and high if used again at least 3 times. Uptake is based on an aggregated score, evaluating whether practices related to each of the 6 steps of the recommendations are applied fully, partially or not at all. High uptake then means at least 4 steps are fully applied and the other 2 steps at least partially, while low uptake means that only one step is applied or 2 steps are partially applied. Intermediate scores are considered medium uptake. Alongside with the assessment of use and uptake, a set of questions are asked that gauge the participant’s wealth status, education, age, commercial orientation for cassava, access and use of the supporting materials, frequency of interaction with extension agents, amongst others. We also asked to what extent they agreed with a set of 30 statements that relate to the user-friendliness of the tools, the relevance of the recommendations, expected benefits, perceptions around risk, cost and affordability, market access, need for extension support and overall attitude towards innovation. The final step (“benefits”) was not directly measured through an RCT design but estimated based on the uptake of the different steps and the distribution of observed benefits in validation exercises – these compared the performance of the recommendations relative to farmers’ current practice with over 5,000 volunteer farmers, supported by extension agents and without direct intervention of scientists.

Through this process, we were able to quantify the total reach and value of the project. The ACAI and Scaling AKILIMO projects together reached 127,466 farmers with fertilizer advice provided through the AKILIMO service, 41% of which were women. Counting only the partners part of the Scaling AKILIMO project, a total of 73,554 farmers (35,696 in Nigeria and 37,858 in Tanzania) were reached, of which 40% were women. Aggregated and weighted uptake rates were 45% in Nigeria and 30% in Tanzania. Uptake rates were higher for women (51%) than for men (40%) in Nigeria, while in Tanzania, uptake rates were higher for men (32%) than for women (27%). Total benefit realized was US\$5,995,554 summed across all beneficiaries of the Scaling AKILIMO project (US\$2.3M in Nigeria versus US\$3.7M in Tanzania), of which 40% benefited women cassava growers.

The exercise not only permitted to quantify the total value generated, but also generated interesting insights into the constraints and drivers. Partners applied different approaches to expose farmers, which had variable success in triggering use of the tools and uptake of the recommendations. Agricultural shows, mainly the Nane



Nane national agricultural show organized in August in Tanzania, enabled reaching many people, but use and uptake was very low, as compared with for example training and sensitization events, or video shows. The timing of these events was also critical. Field days for example only had marginal success, because these are typically organized mid-season, too late for farmers to start applying the tools. We also learned that different approaches have different levels of success for men and women cassava growers, and there were large effects of education and age as well. More importantly, we gained insights in some of the main drivers for use and uptake. In Nigeria, access to extension support was the most critical bottleneck. Only 4% of farmers have regular interaction with extension workers, and this group had substantially higher use and uptake rates. In Tanzania, this group was larger (48%), and no effect on use or uptake rates was observed. Contrarily, wealth status and access to market have significant impact on use and uptake rates in Tanzania: farmers with high use and uptake rates commonly obtained about 50% of their income from cassava, while those with low rates typically only obtained only 5% of their income from cassava. In Nigeria, uptake rates were not related to the proportion of income generated from cassava, which was overall much higher in Nigeria (50%) than in Tanzania (22%). This allowed us to make adjustments in the scaling strategy, focusing on a lead farmer approach to support smallholders in Nigeria, and targeting commercial growers in Tanzania (Step 2 and 3). An interactive dashboard was developed that permits partners to explore the ME&L data and evaluate differences in approaches, gender gaps and relationships with the farmer characteristics, and evaluate their success rates to independently make adjustments to their scaling strategy. Finally, we also evaluated how user groups with differing use and uptake rates differed in their perceptions on the AKILIMO service. Remarkably, their perceptions on the expected yield and income benefits had the least impact. In Nigeria, the user-friendliness and access to the tools alongside with aspects of cost and risk were the most important explanatory variables, while in Tanzania, also user-friendliness, but more importantly attitude towards innovation and market access ranked highest. These insights helped us to better understand how to increase use and uptake rates, and adapt scaling strategies, particularly the emphasis on bundling AKILIMO with services of partners related to access to credit, access to inputs and access to market. Bundling our services with eSOKO for example in Tanzania, who facilitates access to credit and market, resulted in substantially higher use and uptake rates.

Co-investment

Co-investment was not quantified. All partners involved contributed in terms of staff time to integrate the AKILIMO service into their operations, participating in training-of-trainer events, organizing step-down training events, and including training on AKILIMO in their dissemination events. Staff time was also invested in contributions to the overall ME&L system, recording the necessary details in the central database.

Annex 1. List of deliverables reported

TABLE 3: LIST OF OUTPUTS, DELIVERABLES AND STATUS OF THE SCALING AKILIMO PROJECT (JAN 2021)

	Output	Deliverable	Remarks
R1.1	AKILIMO interfaces have been tested and validated by scaling partners [Tool]	Printable guide, app or other digital interface branded and adapted to suit the needs of each primary scaling partner	Completed
R1.2	Arifu chatbot is fully operational for cassava (developed and validated) [Tool]	Field-validated prototype of the Arifu chatbot for cassava in local language accessible on shortcode in Nigeria and Tanzania	Completed (going live in Q1 2021)
R2.1	Key players in the value chain are identified and scored for relevance to scale AKILIMO [Value chain assessment]	Database detailing value chain players identified along with essential data for scoring and analysis of relevance for scaling AKILIMO	Completed
R2.2	Bottlenecks for scaling AKILIMO and mechanisms to address these are identified [Value chain assessment]	Report on value chain analysis, bottlenecks identified and outputs from discussions with scaling partners on how to mitigate or address bottlenecks	Completed
R3.1	Supporting materials to scale AKILIMO are available [Tool]	Suite of tailored supporting materials are available on shared drive and/or AKILIMO website	Completed
R3.2	Last-mile delivery agents are trained to use AKILIMO interfaces [Concept]	Database of trained extension agents, including contact details and details on training received	Postponed/draft
R4.1	AKILIMO functionality has been expanded to potato for the Rwandan context [Tool]	AKILIMO app functionality expanded to potato + report on cross-validation performance	Postponed
R4.2	Arifu chatbot functionality has been expanded for the Rwandan context [Tool]	Field-validated prototype of the Arifu chatbot for cassava and potato in local language accessible on shortcode in Rwanda	2021 deliverable
D1.1	Capacity building requirements for key value chain players have been identified [Value chain assessment]	Partner database expanded to include capacity building needs and avenues for integration of AKILIMO into operational strategy	Completed
D1.2	Government extension materials are updated with AKILIMO recommendations and training content [Tool]	Manuals used by government extension workers updated with AKILIMO recommendations and training content	2021 deliverable
D2.1	Insights from early use of AKILIMO interfaces by clients of scaling partners are documented and discussed [Concept]	Report on the use of the Arifu chatbot and AKILIMO interfaces based on feedback gathered through SMS surveys	2021 deliverable
D2.2	Insights on uptake of fertilizer recommendations by clients of scaling partners are documented [Concept]	Report on uptake of advice received through Arifu chatbot and AKILIMO interfaces based on SMS and in-person surveys	2021 deliverable
D3.1	A forum is created for value chain players to share experiences with AKILIMO [Framework]	Digital forum online and actively used by at least two key value chain players beyond the primary partners	2021 deliverable
D3.2	AKILIMO concepts and methods are integrated into services of key value chain players [Concept]	Report, newsletter or website demonstrating use of AKILIMO recommendations and training tools by key value chain players beyond primary partners	2021 deliverable