CASE STUDY

SYNNEFA

Smart farming solutions for anticipatory action in Kenya

COUNTRY:
Kenya

PROBLEM ADDRESSED:
Lack of accurate and timely data for smallholder farmers on crop health and weather patterns

TECHNOLOGY USED:
Satellite imagery, mobile and web-based platforms, including SMS and USSD

KEY PARTNERS:
Kitui Development Center and Solidaridad

BUSINESS MODEL:
Initially a freemium model, moving to a tiered pricing model for different user groups

FIND OUT MORE: www.synnefa.io

The GSMA Innovation Fund for Anticipatory Humanitarian Action supported Synnefa to integrate satellite imagery in FarmCloud – a mobile-based farm management platform. The platform provides real-time data on crop health and weather patterns to smallholder farmers in Kenya. Through a USSD interface, community engagement and training, FarmCloud provides soil moisture data, weather updates and agronomy support. This enables smallholder farmers to make more informed farming decisions, boost productivity and improve their resilience to the impacts of climate change.

GSMA Innovation Fund for Anticipatory Humanitarian Action

Synnefa Project Outcomes October 2023 – March 2025

3,000+
Farmers onboarded and trained on the FarmCloud platform in two Kenyan counties: Makueni and Kitui

67%
Onboarded farmers are women

61%
Farmers adopted new farming techniques in direct response to alerts and guidance

34%
Reduction in crop failure

4
Memoranda of Understanding (MoU) signed with 2 community-based organisations and 2 county governments to scale up community onboarding

$177,449
Additional investment unlocked from other sources during the GSMA grant period

GSMA
Mobile for Development

Synnefa

About Synnefa

Synnefa is a smart farming solutions company that provides holistic hardware and software to farmers to help increase crop yields, reduce losses and improve productivity. Synnefa provides solutions to address unpredictable weather patterns and harvest cycles that result in inconsistent incomes and affect access to traditional credit. Its goal is to empower farmers to improve their livelihoods. Synnefa believes that by leveraging technology, it can help farmers grow more, earn more and live better lives.

"Solving for humanitarian action is going to be a long game; it will need partners that understand the value of creating change through partnerships. We are excited to have partnered with the GSMA to use satellite technology to secure the futures of farmers in Africa."

– Taita Ngetich, Founder and CEO

The GSMA Innovation Fund

Synnefa was one of the organisations supported by the GSMA Innovation Fund for Anticipatory Humanitarian Action, launched in 2022. This initiative was funded by the UK Foreign, Commonwealth & Development Office (FCDO) and supported by the GSMA and its members.

The Fund backed solutions that leverage mobile digital technology to help anticipate potential humanitarian impacts and enable effective early response. By focusing on the important theme of anticipatory action, the Fund contributes towards the minimisation of humanitarian impacts and the improvement of preparedness in the face of sudden-onset crises.

The project

Prior to the GSMA-funded project, Synnefa developed FarmCloud, a farm management platform that leverages mobile technology to empower smallholder farmers in Africa. With support from the GSMA Innovation Fund for Anticipatory Humanitarian Action, Synnefa expanded the FarmCloud platform by integrating satellite imagery and building a USSD interface to make it more accessible for smallholder farmers without smartphones and help them become more prepared for climate-related hazards.

The new FarmCloud platform was tested and validated in pilot communities in two counties of Kenya – Makueni and Kitui – to ensure it met the needs of different farmers with accurate and actionable information, such as weather data, satellite data and agronomy support. The project also aimed to identify ways in which FarmCloud could be scaled and rolled out to other communities and regions across Africa.

Key project activities

October 2023 – Launch

February 2024 – FarmCloud user interface (UI) design developed

April 2024 – Satellite imagery integrated in FarmCloud

July 2024 – USSD service developed

December 2024 – Testing and configuration of new service

February 2025 – Final evaluation and impact survey

March 2025 – Close

GSMA Mobile for Development

Project activities

FarmCloud user interface design

The first step was to develop and test mock UI designs that would be integrated in the web and USSD interfaces. This required extensive user engagement, with feedback from farmers and the Synnefa tech team used to create user-friendly designs with clear language.

Integration of satellite imagery in FarmCloud

A key part of the project was adding satellite imagery to FarmCloud. This enabled the platform to monitor information on metrics like vegetation health, soil moisture and temperature changes, which can then trigger timely advisory content. For example, when vegetation health declines due to dry spells or nutrient deficiencies, farmers receive targeted guidance on irrigation adjustments, fertiliser use or soil conservation techniques. Field agents played a crucial role in this process, visiting farmers' fields, collecting personal information and using tablets to draw farm boundaries and identify crop types. This data was used to provide accurate weather and soil moisture information tailored to farmers' locations.

USSD service development

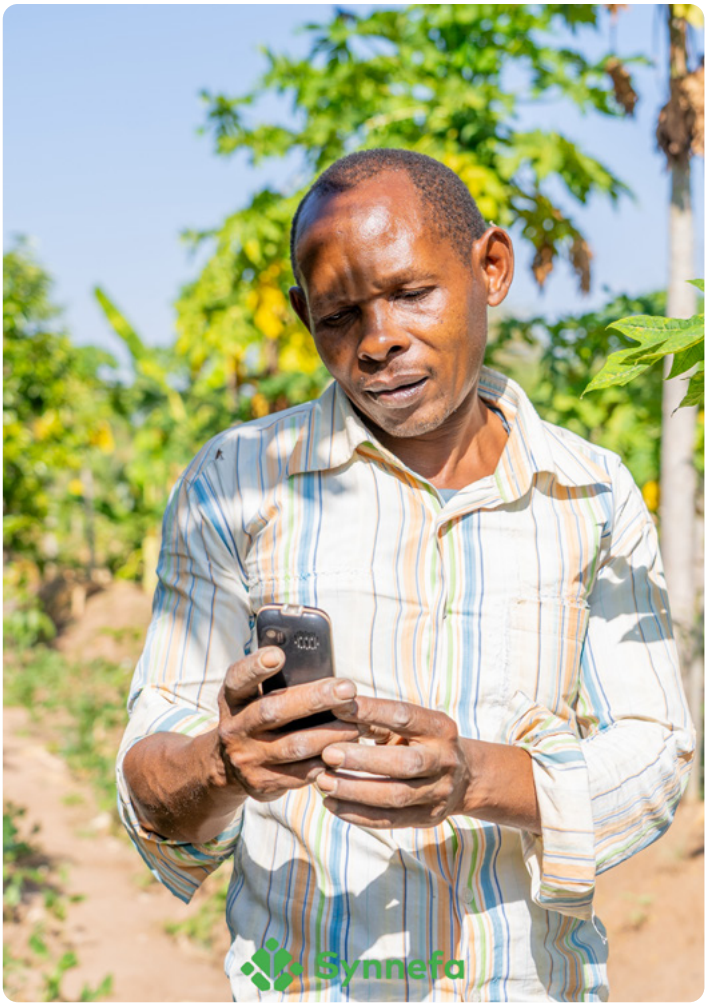
Synnefa developed a USSD service to ensure that smallholder farmers without access to smartphones or high-speed internet could benefit from the FarmCloud platform. The interface enables farmers to dial the USSD code (*384*1#) to access weather, satellite and soil data. This meant that all farmers could benefit from the weather satellite and soil data information regardless of access to technology.

Testing and configuration

The testing phase involved meeting with representatives from the county governments of Makueni and Kitui, alongside NGOs and field agents. Through this, Synnefa successfully onboarded more than 3,000 farmers with the help of local partners. Farmers were introduced to FarmCloud through a two-pronged training approach: first, through interactive group sessions followed by personal farm visits from field agents. Farmers were introduced to FarmCloud's key features – weather forecasts, satellite imagery and soil data for informed decision-making – and received guidance from trainers on using the USSD code to access this information. Real-life scenario training helped demonstrate how farmers could use FarmCloud to navigate specific challenges such as drought, planting schedules and irrigation planning.

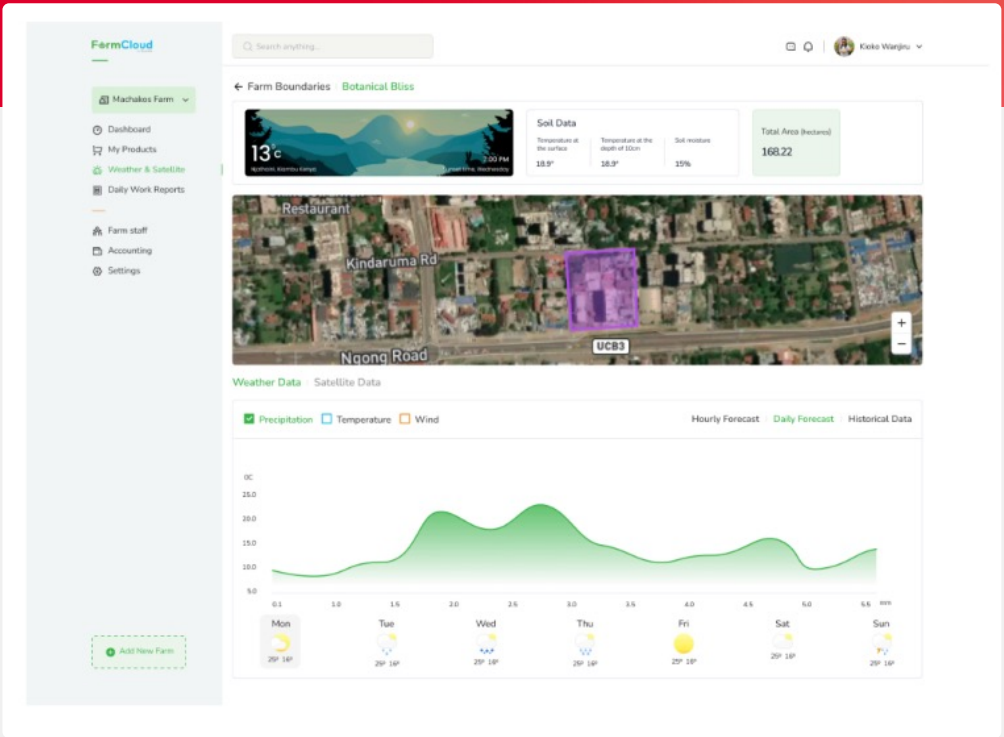
Final evaluation

An evaluation was conducted in each of the two counties to assess the impact of the project. Qualitative and quantitative data were collected from representative samples of farmers in both locations. Focus group discussions and structured surveys were conducted with farmers, alongside key informant interviews with project partners. The findings showed that using FarmCloud had positive results, including improved crop yields and better household incomes (see Outcome 3). The evaluation also shed light on areas of improvement for Synnefa, such as expanding field agent support and incorporating additional features like voice advisory and market integration tools to help connect farmers directly to buyers and markets.



How the solution works

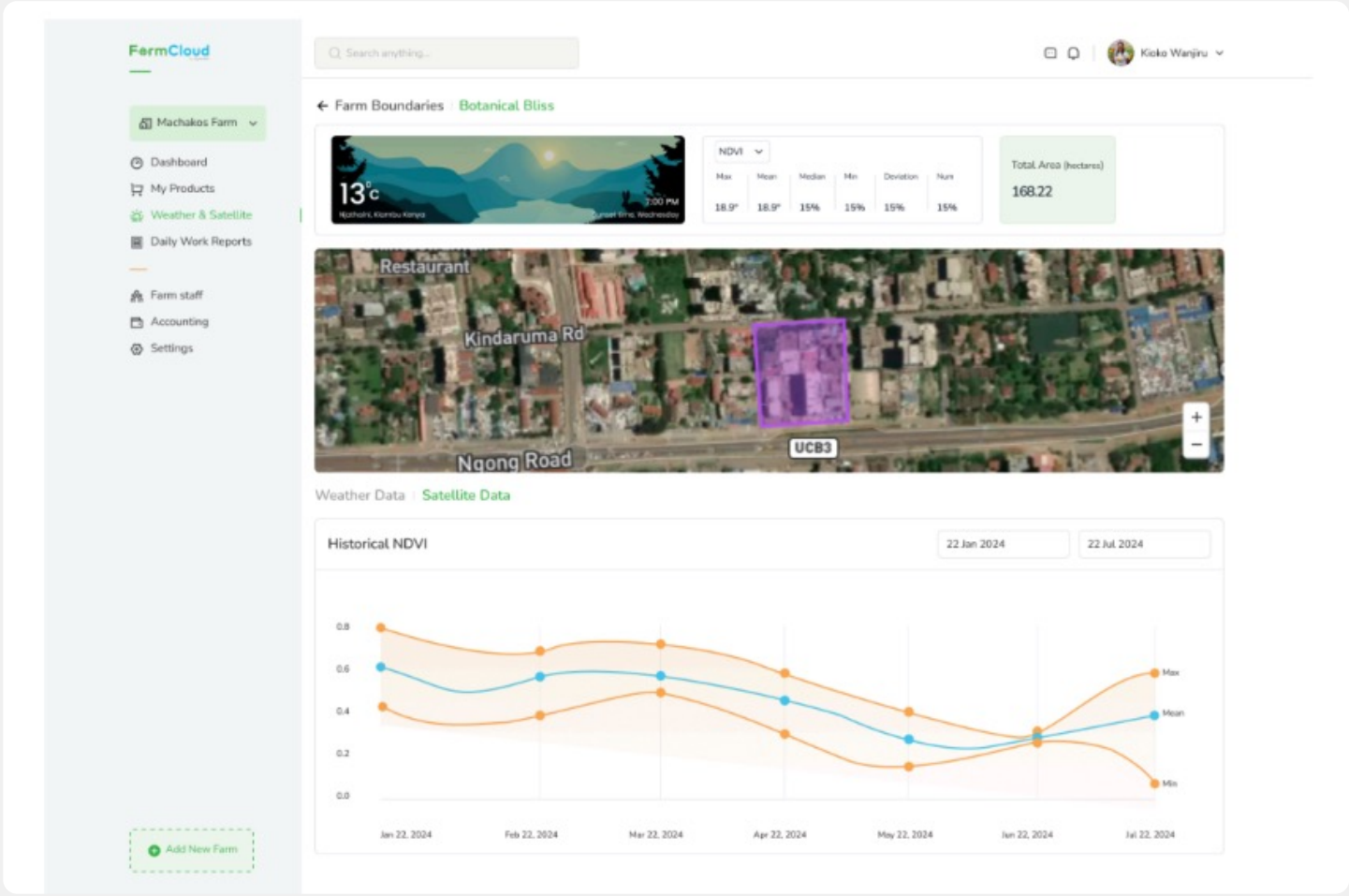
FarmCloud is available on both web and USSD platforms. The following images show the UI of the platform and the content a farmer can receive.



Cloud web platform

Weather data

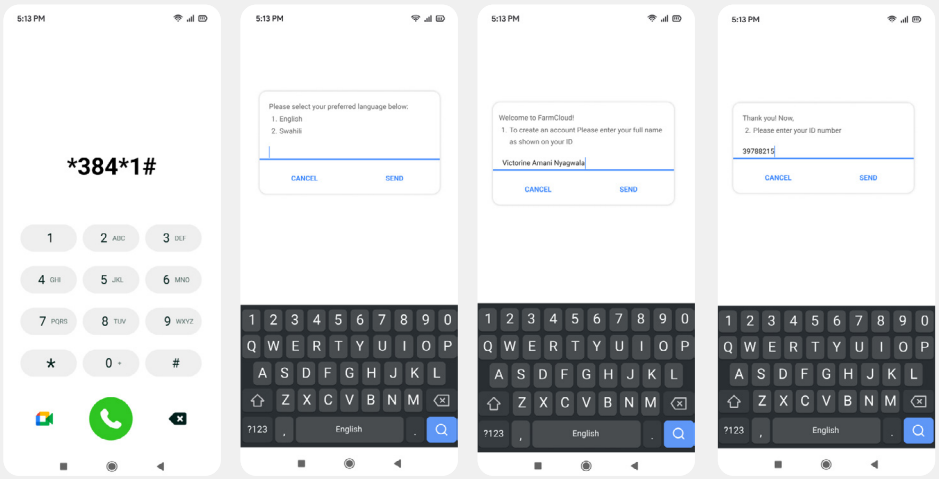
Users can choose between different types of data options. Tabs include current weather conditions, historical weather data and weather forecasts. There is also a tab for accessing satellite imagery data for a specific farm boundary.



FarmCloud USSD

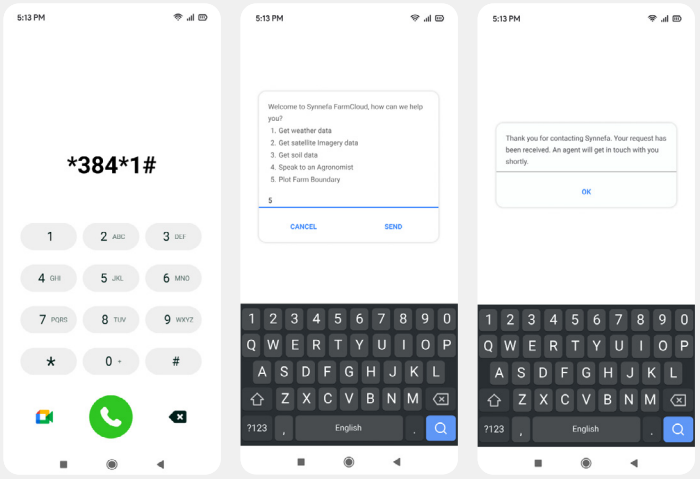
1. Account creation

Users can create an account by dialling the USSD code. They select their preferred language and then submit their information by entering their full name, ID number and the county where their farm is located. Once their account has been created, an agent contacts them to onboard them to the software.



2. Plot farm boundary

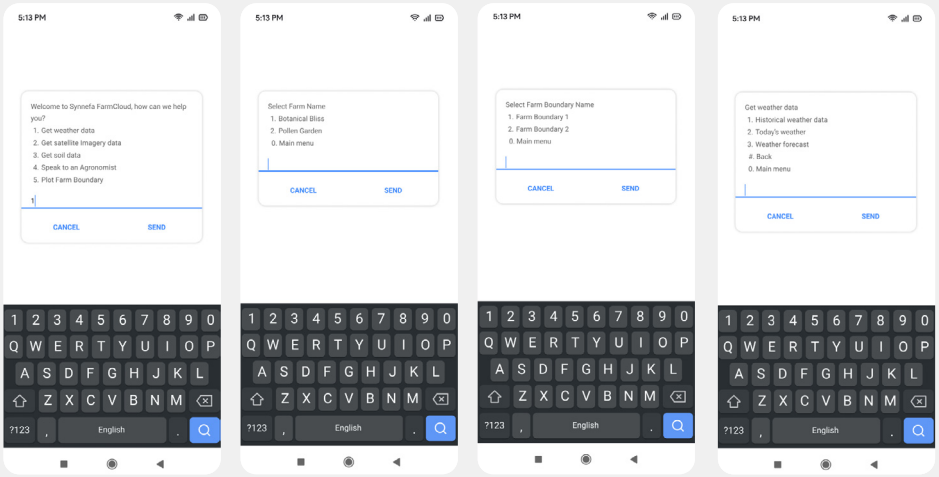
Users access the main menu by dialling the USSD code. Menu options include “Plot Farm Boundary”, “Request satellite imagery data”, “Request weather data” and “Request soil data”. Users select the first option to submit a request to plot a farm boundary. After submitting the request, an agent contacts them to finish the process.



3. Weather and satellite data

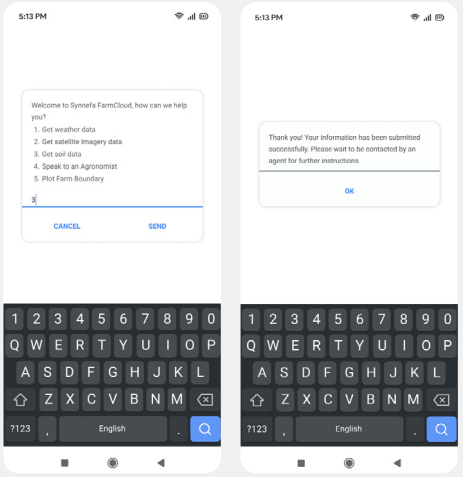
Farmers can request historical weather data, current weather conditions or weather forecasts.

They can also request either the latest satellite data or historical satellite data.



4. Soil data

Farmers can request soil data through the USSD platform.



Project outcomes and lessons

Outcome 1:
More than 3,000 farmers were onboarded to FarmCloud, with a high adoption rate among women

Over the course of the grant, 3,091 smallholder farmers were successfully onboarded and trained on FarmCloud, with a 90% adoption rate of the platform.[1] Synnefa surpassed its original targets by leveraging local field agents, developing strong partnerships with local organisations and delivering extensive training and continuous field testing to expand its reach. These combined efforts streamlined the registration process and increased adoption, helping Synnefa onboard three times more users than its initial goal.

67% of farmers onboarded were women (2,057). Synnefa successfully engaged female farmers by collaborating with NGO partners implementing gender equality and empowerment programmes, as well as deploying female field agents to onboard women farmers directly.

Lesson 1:
User testing and feedback loops led to key improvements

User engagement was critical in the development of the FarmCloud web and USSD interface. Field testing involved gathering farmers in Makueni and Kitui, with the Synnefa tech team participating in interviews to better understand their key challenges and gather feedback on the original designs. These insights were critical to ensuring the FarmCloud interface was user-friendly and effective.

Continuous feedback was collected from farmers through face-to-face meetings and surveys conducted by field agents, shaping improvements to FarmCloud. Insights from farmers led to a number of changes: alerts were simplified, weather data was localised to make it more actionable, USSD menus were redesigned to improve accessibility for low-literacy users, agronomist training was made more field-based rather than text-heavy and a live feature was introduced to improve the accuracy of farm data. Additional features like voice advisory using IVR instead of SMS, photo analysis for agronomy support and access to market information, were also suggested and are in the pipeline for the next phase of development (see "What's next for Synnefa?").

Lesson 2:
Sustained community engagement helped overcome initial adoption barriers

Social norms initially posed challenges for FarmCloud's onboarding process, with women requiring permission from a spouse or male family member before joining the project and using the platform. To address this, Synnefa collaborated with NGO partners, including Solidaridad and Kitui Development Centre, which ran gender equality awareness campaigns to work with communities and help address barriers to digital adoption.

Another challenge the project experienced was scepticism among farmers about the benefits of the platform, particularly among those who had no prior experience with digital agriculture solutions. This required additional engagement and demonstrations from Synnefa and partners. Localised training and field agent support helped ease the adoption of USSD technology for farmers. Partnerships with community-based organisations proved to be most effective in mobilising farmers.

Farmers were also cautious about sharing personal data on FarmCloud. To overcome this, Synnefa invested time in explaining data privacy and addressing concerns to increase confidence in digital solutions, ensuring that every farmer signed a consent form before registration. Synnefa also acquired a data protection licence at the beginning of the project to reinforce security and compliance.

1. "Adoption rate" refers to users who have signed up for FarmCloud and requested access to real-time data.

Outcome 2:
Extensive training helped farmers understand how to use the FarmCloud platform effectively

Following training, most farmers demonstrated increased understanding of how to use the FarmCloud platform effectively. According to the impact evaluation, 85% of farmers reported that the training improved their ability to navigate the USSD system, interpret weather and soil data and apply advisories in their farming decisions.

"FarmCloud empowers me with real-time data to respond quickly to climate threats. With weather forecasts, I can anticipate droughts and extreme weather instead of being caught off guard. When my crops show signs of stress, I receive advisories via USSD. Field agents guide me on irrigation, fertiliser use and soil conservation. This has helped me reduce losses, improve my yields and better protect my farm from unpredictable weather."

– Male, FarmCloud USSD user, smallholder farmer

Lesson 3:
Engaging community networks accelerated outreach, improved trust and drove uptake of FarmCloud

A key lesson was the importance of leveraging existing community structures to introduce the FarmCloud platform. Synnefa found that collaborating with trusted organisations significantly strengthened its outreach programme and drove adoption of its digital services, ultimately improving its ability to scale. Synnefa's strategy evolved from a purely product-centered approach to a more partnership-driven, community-led model. Initially, the focus was on direct farmer sign-ups through mobile outreach and platform visibility. However, it soon shifted to working closely with trusted local actors to drive adoption, including village administrators, community-based organisations (CBOs) and NGOs.

Partnerships with local NGOs were also crucial in recruiting field agents. These organisations helped to identify the right field agents across Makueni and Kitui counties who could engage effectively with the community and support farmers in using the platform. Female field agents were crucial to engaging women in the community, helping to spread the word about the platform and increase registration rates.

Willingness to pay for FarmCloud was also closely tied to demonstrated value and local support, prompting Synnefa to embed training and feedback loops at each stage of the platform roll out. The role of trusted local field agents, combined with practical, on-farm demonstrations of how to access and interpret satellite data via USSD, contributed to high turnout and engagement. By working with local CBOs and cooperatives, Synnefa reduced the cost and time required to reach new users, while also improving service engagement and retention.

"FarmCloud has given us control over our farming. Now we plant smarter, use fewer resources and earn more. I never knew I could prepare so well for the dry season. Before, it was a lot of guesswork and gambling, but with FarmCloud USSD, I now get real-time weather updates and soil data that help me make the right decisions at the right time. This has protected my crops from extreme weather and reduced my losses."

– Female, FarmCloud USSD user, smallholder farmer

Outcome 3:
FarmCloud enhanced farmers' productivity, resilience and decision-making

The FarmCloud project in Makueni and Kitui counties significantly enhanced farmers' productivity and resilience to climate change by delivering real-time weather forecasts, satellite imagery and agronomic advisories. Improved productivity outcomes included better crop yields, which increased from 4.66 to 7.37 bags per season (58% increase), and increased income, which rose from KES 11,660 to KES 16,188 per season (39% increase).[2] Farmers reported that improved productivity allowed them to better feed their families, sell surplus products and invest in future production.

The project also strengthened farmers' resilience to unpredictable weather patterns, with the impact evaluation reporting a 34% reduction in crop failure due to timely weather and soil data. The platform enabled farmers to anticipate droughts, adjust irrigation schedules and adopt climate-smart practices such as mulching, composting and soil conservation. 61% of farmers adopted new farming techniques in direct response to FarmCloud alerts and guidance.

By improving access to timely, location-specific information, FarmCloud allowed farmers to make data-informed decisions. This helped them safeguard their harvests and maintain productivity, despite climate shocks.

"Before FarmCloud USSD, I struggled to recover after droughts because I never knew what to expect. Now, I get weather updates that help me prepare, and soil data shows me when my crops need water or nutrients. This has helped me protect my farm and bounce back faster after harsh conditions."

– Male, FarmCloud USSD user, smallholder farmer

"FarmCloud USSD helped me navigate Makueni's dry and unpredictable weather. With weather forecasts, I knew when to irrigate, soil data guided my fertiliser use and satellite insights helped me monitor my crops early. This allowed me to grow more food and keep my family secure despite the harsh conditions."

– Male, FarmCloud USSD user, smallholder farmer

Lesson 4:
New tech solutions require ongoing testing and adapting

Synnefa encountered several technical issues with the USSD system during the project, including character limits and session timeouts. This occasionally affected the ability to send detailed weather and soil moisture data to farmers, highlighting the need for ongoing improvements. In response, the team redesigned the menus to be comprehensive, presenting all available options upfront so the user only needed to enter the number corresponding to their specific request. While the session timeout issue could not be resolved directly (as this is under the MNO's control), making the process clear and concise significantly reduced the turnaround time for each request.

Another technical issue was that the sender ID was initially set as promotional, which resulted in most messages to farmers being blocked. This was resolved by obtaining a transactional sender ID, which ensures messages are delivered without being blocked. Synnefa was also unable to reach users on networks other than Safaricom, limiting access and impact for farmers on other mobile networks.

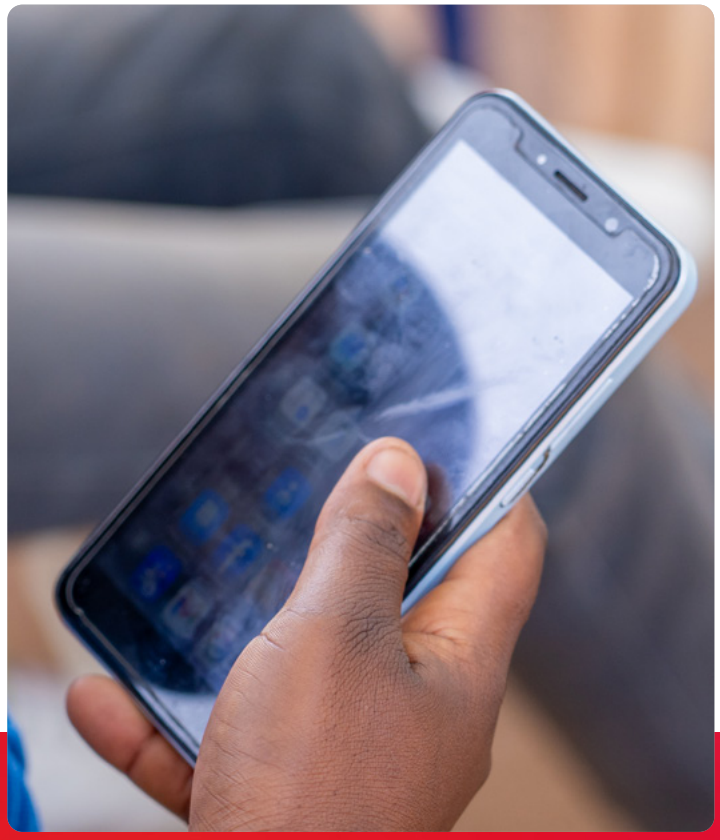
The initial plan was for field agents to use smartphones to support farmers, however this proved impractical due to the data-intensive nature of the tasks, so tablets were procured for field agents to address this issue. These challenges reinforced to Synnefa the importance of continuous testing and iterating to ensure the platform can continue to serve and inform smallholder famers in Kenya and beyond.

2. The evaluation employed a mixed-methods approach that combined both quantitative and qualitative data to assess the outcomes and effectiveness of the FarmCloud Satellite Project. The primary aim was to evaluate how access to digital agricultural information influenced farmer behaviour, productivity and resilience in Makueni and Kitui counties. Surveys were administered with a sample of 221 farmers. Interviews were also conducted with key stakeholders, including agricultural extension officers, CBOs, farmer cooperatives and Synnefa field agents. Focus group discussions were organised with selected farmer groups to explore user experiences, challenges with adoption and perceptions of impact in greater detail. The study also reviewed secondary sources, including training records, usage analytics from the FarmCloud platform, agronomist support logs and weather data dissemination reports to triangulate findings from primary data.

What's next for Synnefa?

Business model evolution

While Synnefa initially focused on free access to FarmCloud to encourage adoption, the evaluation found that 57% of respondents were willing to pay a small subscription to access the services. A tiered pricing model was introduced to cater to different farmer segments, from a freemium bronze account to a platinum package for aggregators and exporters.[3]



Scaling FarmCloud

Synnefa is aiming to scale FarmCloud by developing a mobile app version to deliver many of the additional features requested by users, including market information and linkages, pest and disease detection, agronomy support through photos and more localised data. In the endline survey, Synnefa found that 60% of farmers owned a smartphone, making a mobile app suitable for the target user base.

The company is hoping to scale the service and new app to an additional 8,000–10,000 farmers in arid and semi-arid regions of Kenya. It is also exploring regional expansion beyond Kenya, building on a successful roll out in Rwanda in 2024. Synnefa is currently fundraising and seeking partnerships to support this expansion. By enhancing features, FarmCloud can further empower farmers to adopt smarter, data-driven farming practices and improve anticipatory action in the face of increasingly unpredictable weather events.

3. More details on the pricing tiers can be found on the Syneffa website here.

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GSMA Mobile for Development

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