

Case study: ACCORD

Advanced Coffee Crop Optimisation for Rural Development



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The 'Advanced Coffee Crop Optimisation for Rural Development' (ACCORD) programme used satellite technology and weather data in an innovative way to provide tailored information to smallholder farmers in Kenya and Rwanda on their coffee crops. The farmers could thus make more timely and informed crop management decisions that would increase their income.

The project ran for 3 years to March 2021. It was funded by the [International Partnership Programme](#) of the [UK Space Agency](#) which is committed to using the UK's space sector research and innovation strengths to deliver sustainable economic, societal and environmental benefit to those living in emerging and developing economies. IPP is funded from the Department for Business, Energy and Industrial Strategy's (BEIS) Global Challenges Research Fund (GCRF), supporting research and innovation on global issues affecting emerging and developing countries. The project was led by [Earth-i](#), with [WeatherSafe](#), [Coffee Management Services](#), [Kinini](#) and [San Francisco Bay Coffee](#) as consortium members, and with [Oxford Policy Management](#) leading the Monitoring, Evaluation and Learning (MEL) workstream.

Project Lead:



Project Partners:



Monitoring and Evaluation Lead:



Project Funded by:



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There is a real problem of low productivity in coffee crops on Africa's smallholder farms. Farmers make a series of critical decisions during the growing cycle on how best to use their limited resources to maximise the coffee crop and income, and to benefit their families. They need to buy and apply fertilisers, pesticides and insecticides to protect their crops, they need to prune and manage the coffee trees, and they may need to hire labour at peak times to help them. Climate change is leading to unpredictable weather patterns and an increased threat of disease and pests that can reduce coffee crop yields. Farmers cannot rely on taking the same action as they may have in the past when the weather was more consistent. The ACCORD project therefore provided farmers with specific weather information linked to good quality agronomic advice. This advice was delivered by SMS to farmers' mobile phones (see example in photograph on the right) and supported by visits from a qualified agronomist. The Theory of Change underpinning the project assumes that, as farmers use the advice given and change their farming practices, their harvest improves in terms of both quality and quantity. These improvements lead to increased incomes for the farmers. The project evaluation at the end of implementation gathered evidence to show that the SMS messaging system did lead to increased income from farmers. More information on how the evaluation was carried out is given in the box below.



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The ACCORD endline evaluation

Information was gathered from a wide range of primary and secondary sources. This included:

- Interviews with a total of 169 farmers in Kenya and 40 in Rwanda.
- 35 focus group discussions were conducted with farmers, listening to women and men separately.
- 15 follow-up, one-to-one interviews were held with farmers.
- The managers of six cooperatives in Kenya and four washing stations in Rwanda were interviewed either individually or in groups
- 14 agronomists shared their opinions in interviews.

As well as this community assessment there was a desk-based economic evaluation carried out, and a process evaluation to map the ACCORD service and to gather the views of consortium partners on project effectiveness. This was underpinned by a political economy analysis, the completion of the project log frame showing actual performance against targets, and further secondary data analysis. The results and conclusions were shared in a learning workshop in March 2021 and the feedback from that event has been integrated into this report. There were challenges in the gathering and use of this data relating to: isolating the specific effects of earth observation services; gathering field data during the COVID-19 pandemic; the quality and completeness of data received directly from cooperatives; and a lack of national-level, up-to-date data from both governments.

The project started early by mapping the farms and gathering information on the coffee trees and the farmers. The first SMS messages went out in Rwanda in November 2018 and six months later in Kenya. The agronomic advice in the messages was based on the analysis of satellite images, crop health monitoring, agricultural best practice and highly localised weather forecasts. By March 2021, 53,685 fields had been mapped and 42,628 farmers had received messages from ACCORD.

The context within which the project was implemented in Kenya and Rwanda from Feb 2018 to March 2021 posed some challenges to project performance. In Kenya and Rwanda, recent positive political and economic trends were dented by the COVID-19 pandemic in 2020/21. Restrictions on movement as a result of the pandemic impacted various stages of the coffee production cycle in Kenya and Rwanda, including increasing the costs of labour. In Kenya and Rwanda, a number of economic measures were taken to support citizens including tax cuts and increases in cash transfers.



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A summary of the results against targets is given below:

Impact: Increased coffee income for smallholder farmers	Average annual farmer income from coffee cherry sales		Actual of £143.85 (28%) against a target of £518.14
	Percentage of ACCORD farmers with self-reported improvement in crop health due to ACCORD		81% (women) and 85% (men) against a target of 90%
Outcome: Improved coffee quality and productivity for ACCORD coffee farmers	Percentage of total coffee cherries produced, graded as high quality		77% in Kenya and 88% in Rwanda against a target of 80%
	Cumulative percentage increase in coffee cherry yield in kilograms, over baseline levels (disaggregated by gender)		123% for women and 64% for men against a target of 100%. Kenya much higher than Rwanda.
	Coffee cherry yield in kg (disaggregated by gender)		6.5 m kg against a target of 5.8m for women (112%). 14.2m kg for men against a target of 17.4m (82%)
Outcome: ACCORD farmers implement good farming practices for coffee farming	Percentage of farmers who report an overall positive change in their farming practices		91% of women and 96% of men (target 90%)

The project results were analysed by five key questions:

1. Does the advice service (via SMS) provide useful information that coffee farmers want and need?
 2. Does the delivery of farming information and advice via SMS work? How is the productivity and quality influenced by the app versus other options such as the regular, physical provision of timely and useful farming advice?
 3. How have the livelihoods of coffee farmers changed as a result of participating in the project?
 4. Is there sustained interest and action from farmers, coffee companies and other stakeholders (both working with the project and external) in investing in this product?
 5. Does the cost of the service justify the benefits or are there less costly alternatives that are just as effective?
1. Overall, the ACCORD services provided relevant information that farmers wanted and needed. While the service has reached more than 42,000 farmers, this is only around 85% of the target. However, farmers are very happy with the service with 95 and 97% of women and men reporting their satisfaction. Almost 100% of farmers answered 'yes' when asked if they received messages when they needed them and again almost 100% reported that they can take action on the messages, and that the messages are useful. The messages have maintained their utility over the project life: this view was shared by women and men, across both countries. Compared to other sources of information and advice that farmers use, the ACCORD service provides better quality, accessible and timely content through a cost-effective service. The need for better weather information and appropriate agricultural advice is confirmed in the relevant literature,

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and in interviews with national level stakeholders held in Kenya as part of this evaluation. Other companies are piloting similar approaches in Kenya.

2. The delivery of farming information and advice via SMS is working as intended. However, improvements to the service suggested during the mid-line were not implemented, and some partners suggested that there were issues with message accuracy. In terms of whether the service had been affected by the pandemic, there was the consistent view from a range of stakeholders that the frequency and content of the messages had remained consistent, although agronomist visits decreased or stopped due to travel restrictions.

96% and 97% of interviewed farmers in Kenya and Rwanda respectively reported taking action on the messages sent by ACCORD. Most frequently these related to the application of inputs - applying the right inputs (fertilisers or chemicals), in the right way, in the right quantities, at the right time - and hiring labour at the right time. Farmers also reported using techniques such as pruning and mulching more consistently. Farmers also used their improved techniques on crops other than coffee. However, many farmers reported that they were not always able to take action on the messages due to lack of funds, lack of inputs or lack of available labour. COVID-19 complicated this situation further, causing a decrease in available labour and reduced input availability or higher costs.



3. There were challenges in quantifying the impact of the project on coffee yields; the interviewed farmers reported substantial improvements in yields, but these were not visible in the coffee production data obtained from a sample of ACCORD's coffee cooperatives. On the one hand: 82% and 95% of those farmers interviewed in Kenya and Rwanda respectively reported they have been harvesting much more since receiving the messages. The agronomists and cooperative/ washing station managers agreed. On the other hand, the coffee production data also showed a big increase in production, but this was driven by a rise in farmer numbers, with productivity per person and productivity per hectare actually falling by 25% relative to the baseline. In terms of coffee quality, most farmers were of the opinion that the quality of their harvest had improved, although measuring changes in quality is complex and is significantly dependent the way in which the coffee is processed. Barriers to productivity improvements that are outside the control of the project include access to inputs, access to labour, pests and diseases and weather conditions.

There were also challenges in quantifying the impact of the project on farmer incomes from coffee; the interviewed farmers again reported substantial improvements in incomes, but these were not visible in the coffee sales data obtained from a sample of ACCORD's coffee

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cooperatives. On the one hand, 84% of interviewed farmers in Kenya and 72% in Rwanda reported an increase in income with just 5% and 26% respectively reporting that their income had stayed the same or decreased. As well as increased income from coffee, farmers noted the decrease in costs due to improved agricultural practices as wastage of inputs was reduced. This view was corroborated by both agronomists and cooperative/washing station managers. The coffee income was used for saving and investments as well as meeting household needs. For example, in Rwanda more than 3/4 of farmers spent money on house construction, 2/3 on basic household items and more than half on health costs including insurance and school fees. On the other hand, the coffee sales data showed a 25% increase in incomes compared to baseline, partly driven by an inability to separate out early adopters from latecomers, and partly driven by a variety of external factors reducing coffee incomes in 2020.

4. Looking at sustainability, the knowledge and skills that farmers have developed through ACCORD will continue – though most respondents see the benefit diminishing over time. Most farmers reported that they were willing to pay for the service in future, although some expressed concern over their ability to pay, citing financial problems. Cooperative managers added that farmers would need to be convinced of the benefits and recommended good consultation and awareness raising.

Moving on to the commercialisation of the service, progress has been slower than expected due in part to COVID-19. At project end (March 2021), there is no agreement to continue to provide the service through CMS, although a proposal has been shared and is under discussion. Other relationships between consortium memberships are likely to continue. Earth-i are focusing on two approaches: the ACCORD baseline service which works in a similar way to the project; and the ACCORD insights approach. This is targeted at coffee trading companies and delivers ground mapping, farm profiling and crop health data from satellites. Once integrated with weather data, insights and predictive analysis can be made using machine learning. A report on a pilot of this service with brokers Marex is available separately.

5. In terms of whether the benefits of the project justify the costs, the conclusion is that for every £1 spent on accord there is a £12 benefit. This increased to a benefit of £14.69 when considered over five years from 2018. The approach used by ACCORD was more cost effective than providing the same service with drones or with a traditional extension worker model.

The evaluation concluded that there are several lessons coming out of ACCORD which will help similar future projects be more effective. The project was relevant and coherent with policies and projects in Rwanda and Kenya. It provided useful and timely information that was used by farmers to change their farming practices, improve their coffee harvest and therefore their income. While the project adapted during implementation it took time to build the team, and learning opportunities across the consortium were missed. Stronger project management, localised to East Africa, and earlier in implementation may have avoided these problems.

