



**TECHNOSERVE**

BUSINESS SOLUTIONS TO POVERTY



# TechnoServe Coalition for Smallholder Sourcing

**Leveraging mobile phone technology to improve engagement with suppliers**

Results and lessons from an experiment in Mozambique

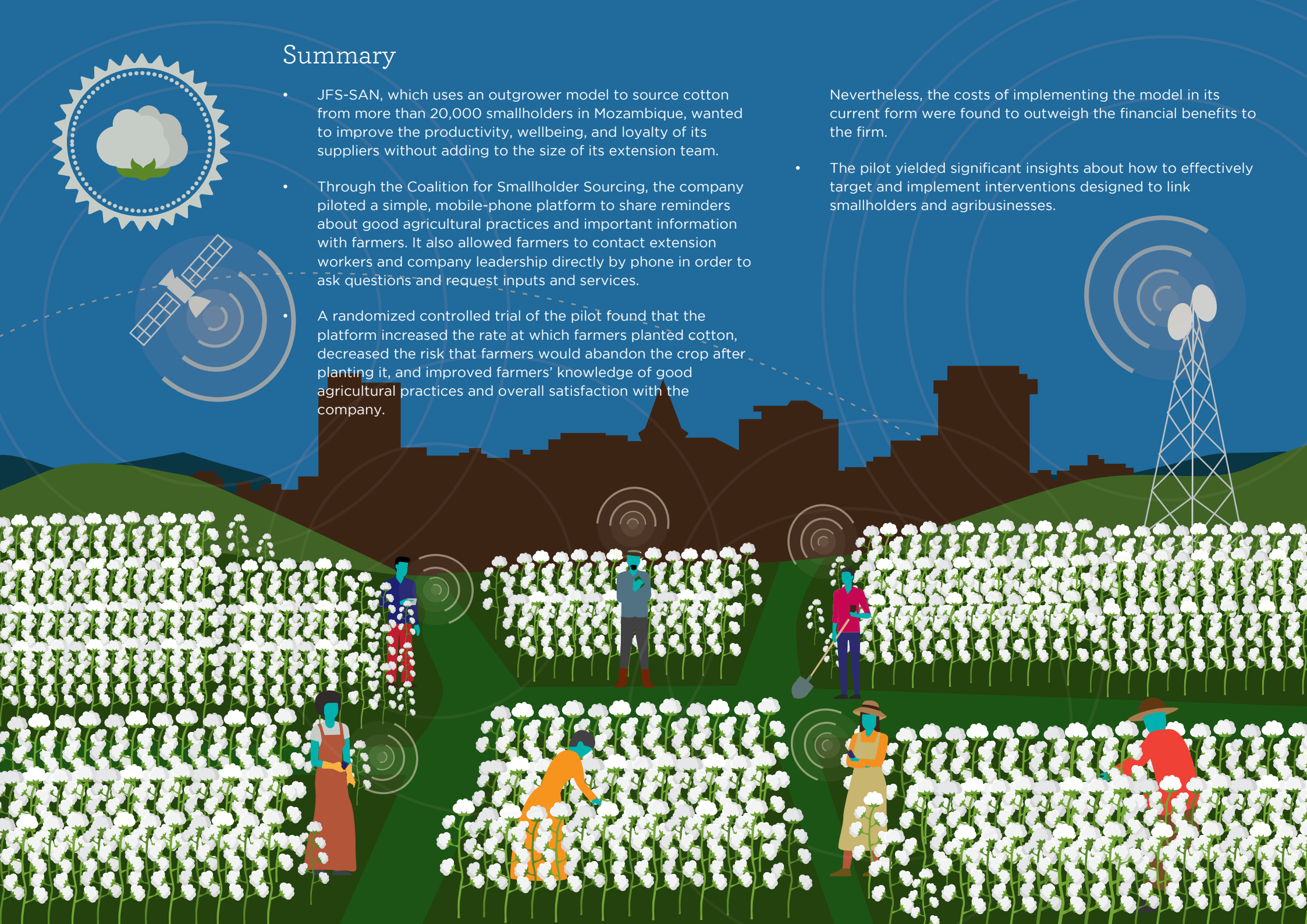


## Summary

- JFS-SAN, which uses an outgrower model to source cotton from more than 20,000 smallholders in Mozambique, wanted to improve the productivity, wellbeing, and loyalty of its suppliers without adding to the size of its extension team.
- Through the Coalition for Smallholder Sourcing, the company piloted a simple, mobile-phone platform to share reminders about good agricultural practices and important information with farmers. It also allowed farmers to contact extension workers and company leadership directly by phone in order to ask questions and request inputs and services.
- A randomized controlled trial of the pilot found that the platform increased the rate at which farmers planted cotton, decreased the risk that farmers would abandon the crop after planting it, and improved farmers' knowledge of good agricultural practices and overall satisfaction with the company.

Nevertheless, the costs of implementing the model in its current form were found to outweigh the financial benefits to the firm.

- The pilot yielded significant insights about how to effectively target and implement interventions designed to link smallholders and agribusinesses.







## Context

Smallholder sourcing arrangements have the potential to drive significant shared value in the context of African agriculture. These systems link networks of smallholder farmers with buyers and offer the promise of a symbiotic relationship where companies can access raw materials locally, and farmers have access to a reliable off-taker, inputs, financing, and technical expertise.

Despite the promise and potential, such arrangements face persistent challenges and risks. Farmers typically demonstrate low production and limited loyalty. Companies tend to face high sourcing costs, inconsistent supply, and the risk of side-selling. Market failures (e.g., missing credit markets, poor contract

enforcement, shortages of public extension services) can create constraints for farmers and limit the amount of investment private companies are willing to make in supporting farmers.

Mobile technology is a key platform for driving innovation and a vital tool in delivering digital and financial inclusion in sub-Saharan Africa.<sup>1</sup> Within the context of the Coalition for Smallholder Sourcing (see text box), JFS-SAN tested how a simple mobile-based, customer-supplier relationship management (CSRM) platform can be leveraged to improve the relationship between smallholder suppliers and agribusiness.



## The Coalition for Smallholder Sourcing

The Coalition for Smallholder Sourcing is a TechnoServe-led partnership between three private agribusinesses with large-scale outgrower schemes in place (Gulu Agricultural Development Company, JFS-SAN, and Plexus Mozambique Limited) and a high-caliber research partner (IDinsight). The Coalition allows for the piloting and rigorous evaluation of company-led innovations (e.g., new strategies, models of engagement, technologies) that have win-win potential for the participating companies and smallholder farmers.



## The Innovation

JFS-SAN is a cotton ginning and export business operating in Mozambique's Niassa province. JFS-SAN operates within a concession system: the government of Mozambique requires JFS-SAN to provide all smallholder farmers in Niassa with access to basic cotton inputs (on credit) and extension services. In return, the company has exclusive rights to purchase seed cotton in the province.

JFS-SAN works with between 20,000 and 50,000 smallholder farmers each year. The company's management not only sees these smallholder farmers as its suppliers, but also as customers of the company's input and extension services. The company has a team of extension officers that is responsible for delivering inputs and extension services to these customers. JFS-SAN has typically

relied on its extension team to be the communication link between farmers and the company.

JFS-SAN's approach does face several operational challenges. Because JFS-SAN has an obligation to provide inputs to all farmers that request them, farmers often take inputs during the growing season, but don't end up selling cotton to the company. Farmers may use the inputs they take from JFS-SAN for other crops (e.g., sesame, food crops, etc.), or may plant cotton but abandon it in the fields if they expect particularly low yields. In such cases, the company is unable to recover its costs associated with providing inputs and extension to these farmers. Additionally, farmers select which crops to plant each year, and if they perceive that they will receive better returns from alternatives like sesame or food crops, they will abandon cotton.

<sup>1</sup> GSMA, <https://www.gsmaintelligence.com/research/?file=7bf3592e6d750144e58d9dcfac6adfab&download>

Within this context, JFS-SAN wanted to harness mobile technology to more effectively communicate and engage with farmers without increasing the size of its team. At the same time, JFS-SAN management wanted to give farmers a direct communication link with the company headquarters so that they could hold staff accountable for service delivery levels. The company's vision was that this would create a win-win by allowing farmers to access a higher level of service, thereby driving up farmer productivity and loyalty to the company and cotton.

In 2016, through the Coalition for Smallholder Sourcing, JFS-SAN developed and deployed a mobile-based CSRM platform to engage and communicate more regularly and directly with farmers. JFS-SAN developed a two-way mobile-based communication platform linked to a farmer database. While mobile network penetration had improved dramatically in rural Niassa in the past year, phone ownership and usage amongst JFS-SAN's farmer base was still quite low (17 percent).<sup>2</sup> The company distributed simple mobile phones to 6,000 farmers in 109 markets and registered farmers on the CSRM platform. The phones cost approximately US\$7 per unit.<sup>3</sup>

A small team, reporting directly to management, sent farmers two SMS or voice messages each week on a variety of topics: cotton agronomy practices, input distribution and application, weather, timing of cotton buying, as well as health and social issues. Farmers were also able to directly call or message the headquarters-based team with questions and requests for inputs and services, as well as to learn when the company would be arriving to buy cotton. Farmers could use their phones to directly call their extension



## The Experiment

In line with the Coalition's objective to rigorously measure impact, the incentive scheme was piloted as a randomized controlled trial (RCT), and evaluated by IDinsight. An RCT is the gold standard in impact evaluation techniques and one used routinely in the field of medicine.

officer, as well as friends and family. A sticker with the company's name and phone number was pasted on the back of the mobile phone. Farmers were required to spend their own funds to charge their mobile phones and purchase airtime to send SMS messages or call the company.

This innovation was designed to increase cotton sales to JFS-SAN through several different impact channels:

- **Increased loyalty to cotton and to the company due to more regular and efficient communication and better service delivery.** We expect that continuous, regular communication, as well as on-time delivery of inputs and services will reduce diversion of inputs to other crops and increase the proportion of farmers planting cotton, harvesting cotton, and bringing cotton to market for sale to JFS-SAN. Further, better information about the time and place at which JFS-SAN will buy cotton may increase the proportion of farmers showing up to sell. In addition, the free mobile phone itself could create an at-least temporary increase in loyalty to the company.
- **Increased yields due to higher adoption of good agricultural practices and better application of inputs due to on-time delivery.** We expect the extension team will be more effective at sharing knowledge around good agronomic practices through SMS or voice messages, and that timely reminders to apply inputs or adopt certain practices will increase farmer yields. On-time delivery of critical inputs can also improve yields. We expect the yield impact to manifest over a longer time period.

IDinsight randomly selected 109 markets to be in the treatment arm of the program. In treatment markets, all cotton farmers were given a mobile phone and registered on to the CSRM platform.<sup>4</sup> IDinsight randomly selected another 109 villages to serve as a control. In these control villages, no farmer received a mobile phone or access to the CSRM platform.

<sup>2</sup> Mobile penetration is 47 percent for Mozambique, but this statistic masks inequalities in access for and rural populations, as well as women. <sup>3</sup> JFS-SAN purchased feature phones from Movitel, a Vietnamese mobile network operator in Mozambique.

<sup>4</sup> A cotton farmer was a farmer that had sold cotton for the past three seasons, and was committing



## The Results

Results from IDinsight show that the CSRM platform had encouraging first-season outcomes. The average cotton farmer in villages that had phones and access to the CSRM platform sold 12 percent more cotton to JFS-SAN in the 2016-2017 cotton harvest. Further analysis shows that there were several factors driving this result:

**Higher probability of farmers planting cotton.** In treatment villages, 86 percent of historic cotton farmers chose to plant cotton in the 2016-2017 season, compared to 82 percent in control villages. On average, cotton farmers in the treatment markets earned 12 percent higher net income from cotton than the average farmer in control markets. Some of this impact is likely driven by the free phone rather than the communication and content, and further analysis is required to assess the ongoing and sustained impact.

**Lower farmer “drop out” between planting and sales.** In treatment villages, attrition – the rate at which farmers abandoned the cotton they had planned to harvest and sell – was lower, and the proportion of farmers repaying their loans was 4 percent higher than in control villages.

**Increased knowledge of good agricultural practices.** Farmers in treatment markets experienced a small increase in overall knowledge of good agricultural practices compared to the control group, largely driven by a significant increase in knowledge of cotton planting. In the first year, however, this did not translate into higher yields among treatment farmers.

**Increased farmer satisfaction with JFS-SAN's service levels.** One of the subtler impacts of the program is increased farmer satisfaction with the company, which can drive loyalty and trust between the company and farmers. IDinsight found that 93 percent of farmers surveyed in the treatment arm reported being highly satisfied with the CSRM program because they found the messages useful and timely. Forty-eight percent indicated that they learned something new from these messages. Qualitative interviews indicated that even though the messages did not necessarily contain new information, they served as a nudge or reminder to farmers to execute important activities.

With co-funding from the Coalition for Smallholder Sourcing, JFS-SAN invested approximately US\$35 per farmer in the first two years to set up and operate the CSRM innovation. Fixed costs incurred on the company side were for purchasing phone and charging hardware, developing the CSRM software, and hiring a team to distribute phones and train farmers on how to use the system. Ongoing costs include the cost of purchasing bulk SMS messages and the operational costs of running a call center. Based on the modest results from the first year, this innovation will not generate a positive financial return for JFS-SAN, and we do not recommend replicating this innovation as is. However, this pilot offers several valuable operational lessons around the use of mobile technology with smallholder producers in rural contexts in sub-Saharan Africa, and with a few critical design and operational improvement we could expect greater impact and a positive financial return.



## Challenges and Learnings

This innovation pilot offers a few valuable insights and learnings around how to leverage simple mobile phones and SMS technology with smallholder farmers. The most significant challenge JFS-SAN faced was around low levels of farmer engagement with the system. A survey conducted by IDinsight revealed the following statistics.

Twenty-six percent of farmers surveyed did not have the phone in their possession at the time of the survey. These are farmers who had likely given their phone to a relative or sold their phone. In

retrospect, requiring farmers to pay a small amount for the phone could have likely reduced the size of this group.

Twenty-seven percent of farmers had their phones switched on, and 23 percent recalled receiving voice or text messages from JFS-SAN; 44 percent did not have their phones charged or switched on; and 24 percent of farmers had contacted or engaged with JFS-SAN using their mobile phone.

JFS-SAN's pilot offers several valuable recommendations that may benefit other businesses or organizations that are considering replicating this or a modification of this innovation elsewhere.

1. **Better targeting of phones can drive up impact and lower costs.** JFS-SAN chose to give mobile phones to farmers at no cost, with the requirement that farmers cover phone usage costs out-of-pocket. The company's rationale was to quickly drive up phone ownership in an inclusive manner and without excluding traditionally marginalized groups (e.g., women, poorer farmers). This design element, however, blunted basic economic forces and likely led to inefficiencies by including farmers that did not have inherent demand for the phone and the CSRM service. Requiring payment of a small (subsidized) cost towards the phone would have likely resulted in these farmers opting out. We recommend creating strong awareness around the service and its value to farmers, and then requiring a small opt-in payment to reveal demand. In more mature markets, where mobile phone ownership is higher, a company may be able to replicate a similar program without having to purchase hardware altogether.
2. **Delivery receipts can allow for better targeting of content to active users.** Due to technology limitations, JFS-SAN was not able to check SMS delivery confirmations to assess which phones were active and receiving content, and which ones were not.<sup>5</sup> Having technical capabilities to track delivery of messages, and target future messages to active phones is critical to driving cost effectiveness and impact.
3. **Field testing of hardware is a critical requirement.** JFS-SAN experienced a steep learning curve in terms of selecting the right phone hardware. JFS-SAN procured un-branded phones in a pre-pilot, and these proved to be of very poor quality. Subsequently, JFS-SAN tested a variety of locally available mobile phones in the field with farmer groups to assess quality, durability, ease of use, and solar charging speed. In a similar program that includes phone hardware, we recommend rigorous field-testing of hardware to determine durability and ease of use.
4. **Despite low literacy levels, we found voice messaging to be only marginally more effective than SMS, at nearly triple the**

**cost.** JFS-SAN ran a sub-pilot where it sent voice messages to a random sub-set of farmers, and compared outcomes for these farmers against those that receive the standard SMS messages. IDinsight's research found that farmers who received voice messages recalled 5 percent more message content relative to farmers who received text messages. On average, voice message recipients recalled 31 percent of the information in messages compared to 26 percent by text message recipients. There was no significant difference in the rate of contacting JFS between voice and text message recipients. Qualitative interviews suggested that if farmers couldn't read themselves, they asked a family member or neighbor, to read the messages for them. On the cost side, voice messaging was 2.5 times more expensive than SMS messaging.

5. **Even with basic feature phones, rigorous and structured training is needed to improve adoption.** Even though mobile phone penetration is rapidly growing in Mozambique and other parts of sub-Saharan Africa, JFS-SAN found that farmers in their remote, rural context were cut off from this trend and did not have basic phone literacy. Farmers benefited a great deal from a structured, rigorous training session on phone hardware and usage of the CSRM platform, delivered by JFS-SAN staff. We recommend this as a critical success factor in a similar program.
6. **Solar charging infrastructure is still emerging.** Despite the proliferation of mobile networks, we found charging infrastructure is lagging. JFS-SAN did put in a few design elements to address phone charging limitations. Prior to selection of treatment markets, JFS-SAN did a survey around access to charging facilities and selected markets that were within walking distance of a charging facility. The company also purchased 12 solar panels and leased these out to local micro-retailers in targeted markets for onward sale of charging services to farmers. Despite this, 40 percent of the farmers who had their phones switched off at the time of an IDinsight survey reported it was due to lack of battery. Qualitative interviews revealed that access to charging panels was low and expensive. With the proliferation of distributed solar technologies (e.g., M-Copa) and mobile money-based solar pay-as-you-go payment platforms (e.g., Fenix), we expect that

<sup>5</sup> This was due to a limitation in the technology of the SMS delivery company used in Mozambique.

this constraint will be relaxed soon. Charging infrastructure is still a critical requirement to harness mobile technology with smallholder farmers and should be a serious design consideration.

Understanding the full effectiveness of the CSRM system at JFS-SAN will require assessing the effects of the innovation in subsequent seasons. IDinsight's evaluation only captured the effects of the first season of this program. As the impact of the intervention is likely to change in future seasons, fully assessing the CSRM platform's impact will require examining retention and knowledge of good agricultural practices after multiple seasons. JFS-SAN's senior management believes that the innovation's impact will grow over time. CEO Francisco Santos said, "Farmers have phones in their hands, and we can reach farmers with the click

of a button, like never before." JFS-SAN expects that the impact will grow over time and will manifest in a variety of ways, both expected and unexpected. According to Santos, "disruption in the delivery of other products and services in rural areas will be highly based on mobile technology, and so the faster a company engages, the better." JFS-SAN is currently working on adding on financial services, mobile payments, and training services for farmers through mobile technology.

Engaging with farmers through mobile technology has promise and potential, but this experiment offers some lessons and demonstrates that there are still significant operational challenges that limit the potential of mobile technology for smallholder farmers.