



Three Million Farmers!

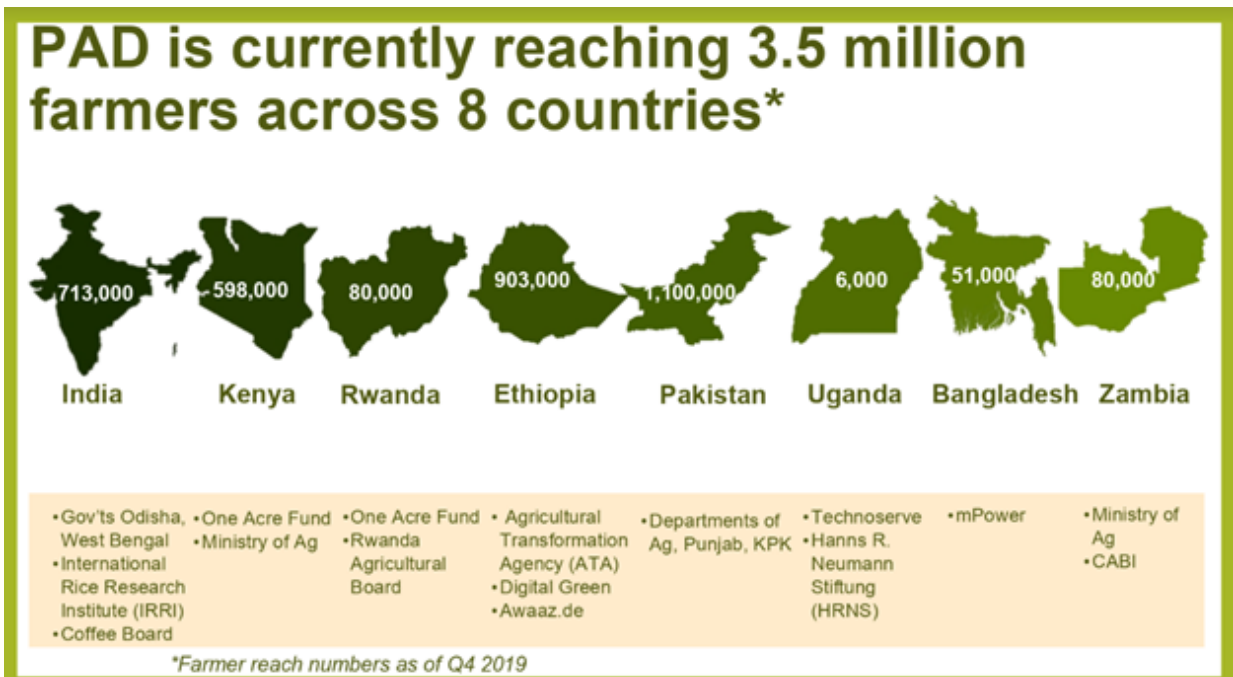
In the final quarter of 2019, Precision Agriculture for Development's (PAD) farmer reach surpassed three million with 3,529,494 farmers accessing our services in the calendar year. While scale is an integral component of our value proposition, we recognize that scale alone would be meaningless if we compromise the quality of our services or erode our ability to iterate to improve our impact. It is the additional value of our services to each individual farmer's productivity, income and household wellbeing - at scale - that is ultimately imperative.

To this end, we are simultaneously pleased with the results of a Randomized Control Trial (RCT) assessing the impact of a PAD implemented SMS campaign to promote a One Acre Fund initiative to encourage farmers to cultivate a more nutritious type of bean. The RCT demonstrated that farmers who received PAD's SMSs were 1.8 percentage points more likely to adopt the nutritious beans than farmers in the control group. While small in absolute magnitude, the messages almost doubled adoption of the recommended varieties over the control group. Further detail on the implications of this study will be highlighted in our forthcoming annual report.

The results of this RCT will add to the nascent body of evidence on the impact of digital extension and will enable us to improve PAD's services and enhance their poverty-alleviating potential. An additional - and critical - benefit implicit in scale is the ability to conduct rigorous tests to pilot innovations and evaluate their impact in support of poor farmers.

PAD's 2019 farmer reach more than doubled year-on-year (2018: 1,475,195) and is almost twelve times the farmer reach we achieved in 2017 (275,591). The increase in farmers was achieved over a mix of partnership types, geographies, project types and project maturity. Approximately half of the increase in overall farmers is accounted for by operations in Pakistan; a quarter accrued through the scaling of existing work in India, particularly in Odisha; one in ten new farmers added in 2019 is located in Ethiopia; and this quarter we welcomed 80,000 new farmers in Zambia, who accounted for 4% of 2019 farmers.

Gratifyingly, scale is enabling us to reduce average costs per farmer, which almost halved year-on-year to \$1.09 per farmer per year. As we continue to scale we will further spread our fixed costs to reduce our cost per farmer and increase our benefits relative to costs.



India

PAD India is making progress in engaging female farmers. In Odisha, where we surpassed 600,000 farmers this quarter, the number of female farmers accessing our services almost tripled from 29,012 (9% of users) in Q2 to 88,486 (15%) in Q4. We have also launched a pilot focused on delivering content to support kitchen gardens, for which women tend to be the primary decision-makers. The mix of crops, and relative productivity of kitchen gardens can positively impact household nutrition and well-being.

This quarter, PAD expanded our Odisha advisory services to cover 12 crops (including pulses and oilseeds, and food, cash, and horticultural crops); serviced questions on more than 40 crops; and launched a hybrid call center in which farmers call to register their question with an agent, and answers are then delivered to farmers via pre-recorded calls. Next quarter, PAD will test the effectiveness of this model relative to our existing mobile phone-based IVR service in Odisha.

In Q1 2020, PAD India will begin planning the transition of management for Odisha operations to the state government, and lay the groundwork for an impact evaluation of Odisha services to run over the next one and a half years.

In Karnataka, the Coffee Board of India is meeting all additional costs associated with expansion to an additional 35,000 farmers by October 2020. Following a successful pilot in two districts, PAD expanded operations to a new district (Coorg), and now covers all the major coffee regions in the state.

In West Bengal, PAD received government approval to extend operations for another year to serve 40,000 farmers, and to pilot content focused on fisheries to approximately 5,000 farmers. During Q4, an A/B test found that farmers receiving weekly advisory services were twice as likely to use PAD's missed call-based advisory service to access additional features, such as asking questions, compared to farmers who had not received weekly advisory content. The magnitude of these effects was significantly stronger for farmers trained by PAD, who were 38% more likely to place a missed call than farmers who had not received weekly advisory content.



PAD India has made strides in reaching more female farmers.
Picture: Claudia Carbajal Morelos, PAD Global Research Manager

Uganda

This quarter, a subset of 919 farmers enrolled in the Uganda Coffee Agronomy Training (UCAT) program, but who are not receiving in-person training from TechnoServe (kept as a comparison group as part of the impact evaluation being conducted by IFPRI), began receiving “stand-alone” IVR extension services. This service will offer these farmers the same content that would have been received through in-person training, through IVR extension.

In addition to receiving weekly push calls, these farmers are able to call in to an automated question and answer platform (Q&A), record a question, and receive an answer in their local language via push call within 48 hours. This IVR service integrates knowledge accrued through implementation of a similar service by PAD in Karnataka, India. By early December, a total of 658 questions had been asked by 326 farmers (of 1,699 farmers in the “stand-alone” group, i.e. farmers not receiving in-person training from either TechnoServe or HRNS), with 76% of farmers who provided feedback indicating that they found the answers helpful.

During Q4 of 2019, our mobile extension services in Uganda experienced challenges because of telecommunication and aggregate outages, and technical difficulties which compromised the quality of service delivery to UCAT farmers. Next quarter PAD looks forward to resolving these issues and, as farmers continue to engage with the Q+A platform, to gleaning insights from monitoring data.

Throughout the second growing season of 2019, 118,000 farmers on the Kenyan MoA-INFO platform received farming advice on two crops (chosen from a list of six). We partnered with CABI to pilot the Pest Risk Information Service (PRISE), an outbreak forecasting service which integrates earth observation technology, satellite positioning, and plant-pest lifecycle information to generate customized advice to farmers on how to manage pests, and when to optimally apply pesticides (reducing unnecessary, and over use, of pesticides). The PRISE pilot targeted 5,200 farmers with advice about the Fall Armyworm (FAW). A phone survey will be conducted next quarter to collect feedback on the service.

Next quarter, we plan to refine existing content on MoA-INFO and develop content for new crops (tomato and sorghum). We have learned that opting users into default crops does not produce substantial returns in terms of user engagement. We plan instead to test and optimize opt-in and develop new strategies to increase engagement and retention.

Our partnership with Tulaa, a private company providing inputs on credit and market access to smallholder farmers, continues - we sent Irish potato advisory messages to 3,800 farmers in Q4.



Fall Armyworm wreaking havoc with local maize in Kenya.

Picture: Daniel Adjokatcher, CABI

Zambia

In Q4, PAD successfully launched an SMS campaign in partnership with the Zambian Ministry of Agriculture and the not-for-profit CABI. We are excited to be piloting the first large-scale digital extension campaign for farmers in Zambia on the Zambia Integrated Agriculture Management Information System (ZIAMIS), a government-owned e-subsidy platform. We are particularly motivated by the digital potential implicit in ZIAMIS which has more than 1.6 million farmers registered on the system. This is our first initiative in Zambia, and PAD's eighth country.

In collaboration with CABI and the Zambian Ministry of Agriculture, PAD has developed a set of SMS messages to address the invasive FAW. The content of the SMS's incorporates lessons learned from PAD campaigns to address FAW in Kenya. A total of 39 messages will be sent to approximately 80,000 farmers in four provinces to assist farmers to identify, manage, and control FAW in their fields throughout the season.

Priorities for the next quarter will be to collect data from farmers receiving our messages through a phone survey and begin assessing the outcomes of the SMS campaign.

Rwanda

In Q4, PAD concluded our first voice campaign with a subset of Rwanda's approximately 14,000 extension workers: 537 village extension workers received weekly, two minute-long, calls about the campaign to distribute 10 million trees free of charge to farmers which is run by One Acre Fund and the Rwanda Agriculture Board. We encountered some difficulties because IVR is not available in Rwanda and as a consequence we had to push calls from Kenya. Moreover, the phone number masking technology of the firm we hired did not perform as well as we had hoped.

PAD launched a pilot with Root Capital to reach farmers associated with two coffee cooperatives in Rwanda. The pilot will send weekly SMS or push call advisory messages to approximately 900 farmers. PAD had expected SMS delivery rates of 70% with these farmers, but only 30-60% of SMS messages were delivered to farmers after one send. Given these low rates, PAD conducted resends of messages to farmers which boosted average delivery rates above 70%.

We have found that farmers from these cooperatives already have high levels of agronomic knowledge and that their farming practices are generally sound. As a consequence, PAD doesn't anticipate significant improvement between baseline and endline survey outcomes. However, this remains a unique opportunity to test our services (SMS and voice) in Rwanda beyond our partnership with One Acre Fund, to strengthen our expertise in the coffee sector, and to develop our collaboration with Root Capital.

Pakistan

This quarter PAD Pakistan pursued five primary initiatives: nationwide expansion, the development of advisory for major and minor crops; the development of an Interactive Voice Response (IVR) system and establishing two-way communication with farmers; soil health cards; and the utilization of satellite data to increase agricultural productivity. The initiatives complement each other to enhance overall impact and have been pursued in collaboration with government stakeholders.

The success of PAD's initiatives in Pakistan, and the goodwill that we have developed with our government stakeholders, has opened doors to expand our work from our existing base in Punjab to a nationwide footprint. A significant amount of work has already been implemented towards achieving this goal. In this quarter, the number of farmers accessing PAD services in Pakistan more than doubled from just over 494,000 farmers to approximately 1.1 million. Continued expansion will be a priority in the coming year.

PAD is in the process of initiating and implementing an RCT on remote sensing and soil health report cards which will be our first large scale experiment in Pakistan. We plan to initiate A/B tests through the IVR system, "soft launched" this quarter, once it is populated with content. Challenges encountered this quarter related to the distribution of soil health cards, improving IVR functionality and setting up channels for content and updates.

Next quarter, PAD will also focus on using satellite data to increase agricultural productivity. We expect that this will allow us to carry out new types of interventions, conduct additional A/B testing, run an RCT and gather additional evidence from other experiments.

End of Year Financials

PAD's operating costs in 2019 totalled \$3.9M, \$400k below our forecast.

As we scale our programs while increasing our capacity to measure impact, there is currently a \$2.7M gap in funding PAD's 2020 budget, as well as limited funds for 2021. To fund a minimal budget forecast for this year, the gap is \$500k.



A farmer in SWAT Valley, Pakistan, November 2019
Picture: Hassan Ammar, PAD Project Manager

ORGANIZATIONAL UPDATES

This quarter, Amrita Ahuja joined PAD's Board of Directors. Amrita is a founder of Evidence Action where she led the start-up of Dispensers for Safe Water, and chaired the board of Deworm the World as it scaled to reach 30 million children. Amrita leads the Douglas B. Marshall, Jr. Family Foundation, an innovative funder with a focus on international education. Amrita previously worked as a Management Consultant at the Monitor Group. She holds a Ph.D. in Business Economics from Harvard University. In addition to her service to PAD, Amrita currently serves on the boards of the Global Innovation Fund (UK), STIR Education, and Evidence Action.

Additionally, Ilana Kessler is PAD's new Global Director of Programs, bringing to PAD her expertise in innovation and strategy for scaling impact. Jonathan Faull is PAD's new Global Director of Communication. This quarter, Emmanuel Bakirdjian became PAD's Africa Regional Director, and Niriksha Shetty became our Deputy Country Director in India.

At the country leadership level, we welcomed Berhanu Gebremedhin (Ethiopia Country Director) and Vijay Badhani (India Director of Programs and Strategic Alliances), along with Hannah Timmis (India Research Manager) and Otini Mpinganjira (Odisha State Lead).

After three and a half years, we bid adieu to Madhur Jain (India Country Director). Madhur's leadership has been a critical component of PAD's success, stewarding PAD India as it grew to become one of the largest private agricultural advisory players in India. Thank you, Madhur! We wish you the best of luck as you embark on your next professional adventure.

Thank you to Goldsmith, the Sall Family Foundation, Mulago, and our longstanding anonymous donor for your renewed commitments. We are also very grateful to have added a new anonymous donor in the past quarter.

PAD by the Numbers

	Q3 2019	Q4 2019	Change
Farmer Reach	2.88 M	3.53 M	+.65 M
Avg. Cost/Farmer*	\$1.25	\$1.09	-\$0.16
Active Operations	14	15	+1
PAD Team Size**	193	212	+19
Operating Costs*	\$3.6 M	\$3.86 M	+\$0.26 M

* Counted in 12 month cycles

** Includes our 150 seconded and Odisha call center staff

NOBEL NEWS

In case you missed it, our co-founder and current board member, Michael Kremer was a co-recipient of the Nobel Memorial Prize in Economic Sciences in December. Shawn Cole (PAD Co-founder and Board Chair), Amrita Ahuja (Board Member), Owen Barder (CEO), Tomoko Harigaya (Chief Economist and Director of Research), and Carolyne Nekesa (Chief People Officer) attended the festivities as his guests.

In his [Nobel Lecture](#), Michael highlighted the potential of digital development to alleviate poverty at scale, and his excitement about PAD's trajectory:

"The spread of mobile phones, the availability of large data sets and the development of machine learning are opening up tremendous opportunities for digital development in areas from education to agriculture... Precision Agriculture for Development, an NGO which I helped co-found, is now working with governments and private firms in multiple countries to provide digital agricultural extension to millions of farmers. This is just the beginning. We need to encourage a variety of new approaches to take advantage of new opportunities, test new approaches, refine them and scale up the most effective solutions."



"Nobel Oblige" PAD team in Sweden, December 2019

Science

December also saw the publication of a groundbreaking paper entitled [Realizing the potential of digital development: the case of agricultural advice](#), co-authored by Michael Kremer, Raissa Fabregas and Frank Schilbach in the prestigious journal, [Science](#). PAD's Chief Economist, Tomoko Harigaya, reflected on the implications of Michael's prize and paper for PAD's work in a [blog post on PAD's website](#). PAD CEO, Owen Barder, and Michael Kremer discussed the implications of the paper on the BBC podcast [Digital Planet](#).