Evidences

Study #3912

Contributing Projects:

- P1624 - Inspire Scale-Up Winner 2018: Seeing Is Believing

Part I: Public communications

Type: OICR: Outcome Impact Case Report

Status: On-going

Year: 2020

Title: Picture-based crop monitoring is adopted by six institutions to improve their agricultural insurance and financing services

Short outcome/impact statement:
Picture-Based Insurance provides affordable high-quality crop insurance by using smartphone images of smallholders' crops for settlement of claims. The research led to adoption of picture-based crop monitoring by private companies HDFC ERGO General Insurance (India), Dvara E-Registry (India), and ACRE Africa (Kenya); government of India, and development organizaions including the R4 Rural Resilience Initiative (Ethiopia) and the Centre for Agriculture and Bioscience International (CABI) (India, Kenya), creating opportunities to strengthen crop insurance, financing and agro-advisories for millions of farmers.

Outcome story for communications use:
Millions of smallholder farmers around the world lack access to affordable high-quality crop insurance. Their farms are often too small and too remote for insurers to visit fields and verify damage in person. Index insurance addresses these constraints by settling claims based on a predetermined index (e.g. rainfall level) which is supposed to be correlated to crop losses resulting from weather and catastrophic events; however, the level of correlation between such indices and the actual damage to crops is often weak, resulting in discrepancies between losses and compensation.
Working with the private sector and the international development community, PIM researchers have assessed alternative types of insurance and found that the growing use of digital technology in developing countries, more specifically the use of smartphone cameras, provides an attractive insurance solution.
By relying on visible crop characteristics observed on farmers' smartphone pictures, picture-based insurance (PBI) [1] allows to detect damage at the plot level without the need for in-person visits by insurance agents, thus minimizing the costs of damage verification. A formative evaluation conducted in partnership with the Borlaug Institute for South Asia (BISA) and HDFC Ergo General Insurance in India has demonstrated the feasibility and economic viability of this approach [2].
As a result of this research, several institutions have become interested in PBI and incorporated it into their insurance or risk management operations. Since inception, the project has expanded to cover a wide range of crops and thousands of farmers in India, Kenya, and Ethiopia, with testing and adoption of picture-based crop monitoring by HDFC ERGO General Insurance (India), Dvara E-Registry (India), the Government of India, ACRE Africa (Kenya), the R4 Rural Resilience Initiative (Ethiopia) and the Centre for Agriculture and Bioscience International (CABI) (India, Kenya). These institutions provide agricultural risk management services to millions of farmers, highlighting the potential for scaling up.
A current focus of the project team is to ensure that the PBI products offered to farmers are inclusive [7] and benefit women as much as men – which may not naturally be the case due to existing gender gaps in smartphone ownership. Another promising area is the integration of information from ground images with satellite imagery for rapid automated claims settlement and loan disbursement.

Links to any communications materials relating to this outcome:
- https://tinyurl.com/ybz42qup
- https://tinyurl.com/ycrjedt2
- https://www.ifpri.org/project/PBInsurance

Part II: CGIAR system level reporting

Link to Common Results Reporting Indicator of Policies : No

Stage of maturity of change reported: Stage 1

Links to the Strategic Results Framework:
Sub-IDOs:
- Enabled environment for climate resilience
- Improved access to financial and other services
- Enhanced capacity to deal with climatic risks and extremes (Mitigation and adaptation achieved)

Is this OICR linked to some SRF 2022/2030 target?: Yes

SRF 2022/2030 targets:
- Increased rate of yield for major food staples from current 1%/year
- # of people, of which 50% are women, assisted to exit poverty

Description of activity / study: <Not Defined>

Geographic scope:

- Multi-national

Country(ies):

- India
- Ethiopia
- Kenya

Comments: <Not Defined>

Key Contributors:

Contributing CRPs/Platforms:

- BigData - Platform for Big Data in Agriculture
- CCAFS - Climate Change, Agriculture and Food Security
- PIM - Policies, Institutions, and Markets

Contributing Flagships:

- M3: Inspire

Contributing Regional programs: <Not Defined>

Contributing external partners:

- The University of Manchester
- NCFC - Mahalanobis National Crop Forecast Centre
- BISA - Borlaug Institute for South Asia
- HDFC ERGO General Insurance Company Ltd.
- ACRE Africa - Agriculture and Climate Risk Enterprise
- DER - Dvara E-Registry
- WFP - World Food Programme
- Government of India
- 3ie - International Initiative for Impact Evaluation

CGIAR innovation(s) or findings that have resulted in this outcome or impact:

Picture-Based Insurance is a new, innovative way of delivering affordable, comprehensive, and easy-to-understand crop insurance. By relying on visible crop characteristics derived from farmers' own smartphone pictures, the project aims to minimize the costs of loss verification and detect damage at the plot level, making crop insurance more attractive and accessible to small farmers. Importantly, such an instrument lends itself to natural synergies with agro-advisories, adoption of climate-smart practices, and other value added services.

Innovations:

- 1305 - Picture-Based Insurance tools for improved risk management for the poor (https://tinyurl.com/2n45qenf)

Elaboration of Outcome/Impact Statement:

A pilot implementation of picture-based insurance [1] with 750 farmers in the rice-wheat belt of India confirmed the feasibility of the approach: nearly two-thirds of the trained farmers were able to take at least four smartphone pictures (roughly one per growth stage), which was considered sufficient for loss assessment, and severe damage was visible from these pictures in 71 percent of affected sites, a significant improvement over index-based products (which identified severe damage in no more than 34 percent of affected sites) [2].

Related studies found that the stream of images could be used to quantify important phenological stages in agricultural crops that are not registered by common satellite remote sensing vegetation indices [3], which can help support crop modeling, extension and insurance efforts [4]. Other research found that PBI improves willingness to pay for insurance without inducing moral hazard or adverse selection [5].

This research has led to adoption of the innovation by multiple insurance programs:

- HDFC ERGO General Insurance has provided PBI products for weather index-based insurance to 1,000 farmers in Haryana, Odisha and Tamil Nadu (India); insurance premiums have been reduced following PIM's formative research.
- Dvara E-Registry applies picture-based crop monitoring for credit scoring, partners with HDFC ERGO General Insurance to insure the resulting loans, and facilitates scaling through machine learning and linking with remote sensing.
- The Government of India's Mahalanobis National Crop Forecast Center is piloting picture-based crop monitoring for village-level yield estimation, with future applications in the Pradhan Mantri Fahsal Bima Yojana, India's national crop insurance scheme, which reaches millions of smallholder farmers across the country.
- ACRE Africa has provided PBI products for weather index-based insurance to 2,000 farmers (Kenya) and shares the associated data to advance artificial intelligence for agriculture.
- The R4 Rural Resilience Initiative uses PBI in its weather index-based insurance program (Ethiopia), which has thousands of farmers enrolled.
- The Centre for Agriculture and Bioscience International (CABI) successfully tested the PBI approach for providing agro-advisories [6] and is now working to provide agro-advisories and insurance at a larger scale in its PlantWise program in Tamil Nadu (India) and Kenya.

The effort specifically sought to understand and mitigate barriers to access to women farmers (particularly due to lower mobile phone ownership) and to develop the capacity of financial service institutions to integrate new, digitally-enabled methods to expand financial services, even to the most vulnerable populations.

References cited:

[1] Picture-Based Insurance Project website: https://www.ifpri.org/project/PBInsurance
[2] Ceballos, Francisco; Kramer, Berber; and Robles, Miguel. 2019. The feasibility of Picture-Based Insurance (PBI): Smartphone pictures for affordable crop insurance. Development Engineering 4: 100042. https://doi.org/10.1016/j.deveng.2019.100042
[3] Hufkens, Koen; Melaas, Eli K.; Mann, Michael L.; Foster, Timothy; Ceballos, Francisco; Robles, Miguel; and Kramer, Berber. 2019. Monitoring crop phenology using a smartphone based near-surface remote sensing approach. Agricultural and Forest Meteorology 265(February 2019): 327-337. https://doi.org/10.1016/j.agrformet.2018.11.002
[4] Afshar M.H., Foster T., Higginbottom T.P., Parkes B., Hufkens K., Mansabdar S., Ceballos F. and Kramer B. 2020. Improving performance of index insurance using crop models and phenological monitoring.
CCAFS Working Paper no. 337. Wageningen, the Netherlands: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). https://hdl.handle.net/10568/110712
[5] Ceballos, Francisco; and Kramer, Berber. 2019. From index to indemnity insurance using digital technology: Demand for picture-based crop insurance. IFPRI Discussion Paper 1890. Washington, DC: International Food Policy Research Institute (IFPRI). https://doi.org/10.2499/p15738coll2.133524
[6] Ceballos, Francisco; Foster, Tim; Hufkens, Koen; Jadhav, Arun; Kannan, Samyuktha; and Kramer, Berber. 2018. Seeing Is Believing: Using Crop Pictures in Personalized Advisory Services. Project Note. Washington, DC: International Food Policy Research Institute (IFPRI).
http://ebrary.ifpri.org/cdm/ref/collection/p15738coll2/id/133017
[7] Ceballos, Francisco; Kannan, Samyuktha; Singh, Vartika; and Kramer, Berber. 2019. Digital technologies for financial inclusion of smallholder farmers: Needs assessment in three states of India. MTID Project Note 4. Washington, DC: International Food Policy Research Institute (IFPRI). https://doi.org/10.2499/p15738coll2.133534

Quantification: <Not Defined>

Gender, Youth, Capacity Development and Climate Change:
Gender relevance: 1 - Significant
Main achievements with specific **Gender** relevance: Main achievements with specific Gender relevance: In India (Odisha), the innovation enabled a microfinance
institute to increase agricultural lending to female microfinance clients. In Kenya and India (Tamil Nadu),
gender-responsive programming included working through champion farmers tasked with enrolling both women and men in their communities to overcome gender gaps in smartphone access and ownership [7].
Youth relevance: 0 - Not Targeted
CapDev relevance: 1 - Significant
Main achievements with specific **CapDev** relevance: Main achievements with specific CapDev relevance: The project activities have developed the capacity
of partners to use smartphone images to strengthen financial services. These partners now taking the lead in testing and providing such services, including crop insurance, agricultural credit and agro-advisories.

Climate Change relevance: 1 - Significant
Describe main achievements with specific **Climate Change** relevance: Describe main achievements with specific Climate Change relevance: PBI products have been
designed to improve farmers' capacity to adapt to climate change, both through enabling them to better cope with shocks and through giving them easier access to investments in resilience-enhancing technologies such as drought-tolerant seeds.

Other cross-cutting dimensions: No

Other cross-cutting dimensions description: <Not Defined>

Outcome Impact Case Report link: Study #3912

Contact person:
Berber Kramer, Research Fellow, IFPRI, b.kramer@cgiar.org