International Initiative for Impact Evaluation

Impact evaluation brief

Agriculture, fishing and forestry

Using technology and incentives to test innovative approaches to agricultural extension in Cambodia

Developing countries have allocated considerable government resources to improving agricultural practices by encouraging farmers to use improved intermediate inputs and adopt new technologies. However, farmers generally lack either knowledge of new cultivation practices or the skills required to optimally employ such practices. This has led governments and other organisations to invest in agricultural extension programmes.

There is limited evidence as to whether sending extension workers to farmers is a cost-effective means of improving farmers' agricultural knowledge. It is unlikely to be effective if extension workers lack adequate levels of education, training or skill required to transfer techniques and technologies.

Additionally, extension worker visits are costly to monitor due to the spatial dispersion of agriculture. Most evidence of extension services in low- and middle-income countries comes from India or East Africa; there is very little evidence from South East Asia.[1]

Highlights

- The ePADEE software and tablets had varied effects on farmers. Quantitative data reflected no learning effects; however, qualitative data suggest that the software and tablets may have increased learning amongst farmers.
- Extension services were well-received by farmers in the Agriculture Services Programme for Innovation, Resilience and Extension (ASPIRE) pilot, who frequently listened to instructional voice messages in their entirety even after receiving messages for several months.
- In general, receiving extension services did not translate into adoption of recommended practices, though there were small effects on the adoption of certain practices.
- The ASPIRE intervention, with its low marginal costs, appears to be more scalable than the Project for Agricultural Development and Economic Empowerment (PADEE) intervention.

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Intervention

Through PADEE, the Cambodian Ministry of Agriculture, Forestry and Fisheries provided dedicated extension workers to work with farmers' groups, and developed software that allowed extension workers to provide personalised recommendations on seeds, fertilisers and pest control (ICT group). In another treatment group, PADEE extension workers also received monetary incentives based on how effectively they disseminated information to their client farmers (ICT Plus group).

The ministry's ASPIRE also connected extension workers with farmers' groups; however, some farmers also received automated voice messages to their mobile phones with information on recommended farming practices.

Researchers varied the timing of these messages to explore their effectiveness at different times. They also sent messages to some farmers who were not part of a farmers' group to explore how information about agricultural practices diffuses through social networks.

PADEE was rolled out in five Cambodian provinces in 2012, whereas ASPIRE began its operations in 2016 in five additional provinces not covered under PADEE. According to the 2008 population census, these 10 provinces comprise approximately 50 per cent of Cambodia's total population.

Main findings

PADEE intervention

- **Use of ePADEE software and tablets:** Data from farmer surveys did not reveal any effect of ePADEE on farmers' knowledge, although both mobile support teams (MSTs, i.e. extension workers) and farmers believed the software and tablets helped MSTs to give better advice. The ePADEE software was also effective in increasing contact between MSTs and farmers. Given the lack of impact on knowledge, it is not surprising that ePADEE appears to have had no effect on input expenditures or rice yields.
- **Frequency of MST visits and delivery of extension services:** During the initial months of the intervention, MSTs in the treatment group had a high rate of visits to farmers in their areas, although this tapered off in the later months of the intervention. Some possible explanations are that the bonuses offered to MSTs for gains in farmers' knowledge were too small to motivate them, or that MSTs did not receive sufficient monitoring or assistance. Nonetheless, farmers in the treatment groups were approximately 50 per cent more likely to report receiving extension services than the control group.
- **Adoption of improved practices:** Treatment effects on adoption were present, but were inconsistent and limited. In both treatment groups (ICT and ICT Plus) the percentage of farmers who reported following seed and fertiliser recommendations increased by about 5 and 12 percentage points, respectively. Some farmers reported not following procedures recommended by MSTs. Probable reasons are lack of water or key inputs and a slow learning curve.

ASPIRE intervention

- **Calls and messaging:** In the ASPIRE intervention, the voice messages were well-received by farmers – so much so that even after 12 weeks, approximately 60 per cent continued listening to the full messages. In all treatment groups, farmers felt that the messages helped them to increase their production of rice and chicken. When messages were timed to coincide with the agricultural season and were delivered to both group member and non-member farmers, the content of the messages was more likely to be shared with other farmers.
- **Agricultural income:** The treatment groups experienced a marginally significant increase in net agricultural income of 15 per cent above the control group. Since there was no significant effect on agricultural productivity, the evaluation was not able to identify the reasons behind this income increase.
- **Change in knowledge:** Households in the treatment groups were no more likely to possess additional poultry varieties, to have sold poultry, or to have had additional production value or income from selling poultry. This indicates that although some knowledge has increased, production patterns likely have not changed. However, there have been positive effects on knowledge, knowledge sharing and fertiliser use.

Cost information

The cost per farmer for the ePADEE software intervention was approximately US$14 more per farmer than the basic PADEE model. The marginal cost of sending voice messages through the ASPIRE programme was US$2.39 per farmer. The voice message component of the ASPIRE intervention appears particularly scalable given its low marginal costs.

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Lessons and conclusions from PADEE and ASPIRE evaluations

The table below summarises the authors' recommendations for both the PADEE and ASPIRE interventions.

The PADEE and ASPIRE interventions fit well into what is a developing body of evidence about how information and communication technology can be used to enhance agricultural extension. In general, technology is increasingly being used to propagate information in a fast and cost-effective manner.[2,3,4]

However, the best methods for using digital technologies and the extent to which they can help are still undetermined The authors note that some evidence indicates that video may be a more effective format for delivering tailored messages to farmers, and suggest that the Ministry of Agriculture, Forestry and Fisheries explore this possibility.

Cambodia is unique in that text messaging is not widespread amongst farmers, as many phones currently in use do not support the Khmer script. As smartphones become more common amongst farmers, however, text messages may become a more viable communication option.

PADEE intervention	ASPIRE intervention
MSTs could be trained to overcome the limitations of the ePADEE software, which provided rather automated recommendations.	To maximise the impact of the phone calls, there should be options to repeat the messages.
The ePADEE software was limited to a rice module and should be diversified to other crops that offer additional revenue channels to farmers.	It is vital to explore secondary sources of data to assess the comparability of farmers in this evaluation's sample to the other areas where the pilot would be extended.
Performance monitoring of MSTs is crucial to ensure proper implementation. The MST incentive system may also need modification to ensure it is both fair and motivating.	Research tools could be constructed such that specific stakeholders are targeted for accurate and attributable data.

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Lessons for policy and practice

Monitoring results from ASPIRE show a clear desire amongst farmers for more access to basic extension information. As a result, the government should continue exploring ways to provide basic information to farmers through a more targeted approach and at lower cost.

The use of mobile phones and other technologies also indicates that there are opportunities to involve the private sector in providing extension services and finding ways for farmers to pay for it. Mobile providers and other technology companies may have good incentives to offer access to call-in systems or even to sign farmers up for direct call extension, as these services could be a means of maintaining their customer base.

Given the relatively short-term nature of this evaluation, it would be valuable for future research to explore whether more sustained exposure to innovative extension models can spur increases in outcomes such as productivity, income and food security. Future research could also explore the viability and effectiveness of relying on private-sector technology companies to deliver extension services.

About this impact evaluation

This brief is based on an impact evaluation report by Miguel Almanzar, Siddhartha Baral, Alan de Brauw and Eduardo Nakasone, *Testing innovative approaches to extension in Cambodia: using technology and incentives to improve the PADEE and ASPIRE projects*, published in 2019.

Endnotes

[1] Lopez-Avila, D, Husain, S, Bhatia, R, Nath, M, Vinaygyam, RM, 2017. *Agricultural innovation: an evidence gap map*, Evidence Gap Map Report 12. International Initiative for Impact Evaluation (3ie), New Delhi.

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