

Evaluator's Lessons Learnt Series Brief 7, January 2022

Evaluation Findings: Vietnam Emissions Reduction Challenge Project

This brief summarises the [final evaluation](#) of the AgResults Vietnam Challenge Project, which successfully incentivised private sector and non-profit competitors to develop and disseminate emissions-reducing, yield-enhancing rice production technology packages for smallholder farmers. The main challenge for the project was measuring emissions reductions.

Project's objective and theory of change

The project's main development objective was to reduce GHG emissions from rice. AgResults offered a two-phase, \$3.5 million prize competition in which private sector firms and non-profit organisations ('competitors') competed to develop technology packages that would both increase yields and reduce emissions (Phase 1) and advance farmer adoption of the technologies (Phase 2).¹ All technology packages included some of the following GHG emissions-reducing components:

- Reduced planting density to increase tillers of rice from each stalk while reducing the number of stalks (methane and nitrous oxide are released through rice stalks).
- Water management through alternate wetting and drying practices to reduce build-up of methane-producing bacteria in flooded fields.
- Reduced use of nitrogen fertiliser to reduce soil nitrogen and thus nitrous oxide emissions.
- Crop residue management, e.g., by using bioenzymes to hasten the decomposition of straw and stubble and avoid burning it, which contributes to carbon dioxide emissions.

Evaluation's key findings

Private sector involvement: AgResults spurred substantial investment by competitors, demonstrating that PfR projects can spur the private sector to engage farmers—and local government officials—to address climate change.

Uptake: There is strong evidence that farmers collaborating with AgResults competitors adopted new technologies that are associated with lower GHG emissions.

Outcomes for farmers: AgResults farmers' yields increased by 14% over matched comparison farmers'. Their net harvest values (value of production less expenditures) were 11% higher than for comparison farmers.

GHG emissions: The accuracy of the emissions reduction estimates is uncertain. However, AgResults farmers were more likely than comparison farmers to use practices associated with lower GHG emissions, including low-density planting, reduced fertiliser use, and improved crop residue management.

Sustainability: Two of the four competitors are likely to continue promoting their technology packages because these packages align with their business models. Farmers were favourable about the technology packages but emphasized that their continued use depended on receipt of continued support.

¹ The total cost of the awards, verification, and in-country management in 2017 U.S. dollars, with discounting (12%), was \$3,572,778, with 33% spent on awards, 39% on verification, and 29% on in-country management. This cost excludes design costs and the AgResults Secretariat's costs.

Evaluation objectives and methods

The External Evaluator used rigorous quantitative and qualitative methods to assess the project's impact on private sector involvement in technology development and dissemination, as well as its impact on smallholder farmers and emissions reductions. The evaluation team conducted:

- **Qualitative analysis** of semi-structured interviews at baseline and endline with farmers, commune, and cooperative leaders; competitors; sector experts; traders; processors, and exporters; and the project's Advisory Council, Project Manager, and Verifier.
- **Quantitative analysis** of data from baseline commune-level surveys and endline surveys of more than 2100 farmers, of which about half worked with AgResults competitors and half were from a matched comparison group. These surveys allowed us to draw comparisons between AgResults farmers and comparison farmers, as shown below. In addition to the surveys, we also recruited two farmers from each of 262 cooperatives (out of 284 in Thai Binh) to record rice cultivation practices in diaries.



Evaluation findings

Private sector involvement. Because it successfully engaged the private sector, AgResults increased the supply of emissions-reducing inputs and technology packages, the number of farmers using the technology packages, and the availability of rice produced using these packages. Engagement was most successful, and most likely to sustain, among competitors for whom dissemination of the technology packages was consistent with their underlying core business models.

Dissemination of technology packages. In most cases, competitors had never promoted their technology packages as packages prior to participating in AgResults but had promoted individual components of the packages among farmers in Thai Binh or elsewhere in Vietnam. Competitors perceived that many farmers would be hesitant to depart from their traditional practices and would need training and reminders to implement the new, tailored packages consistently. Accordingly, competitors also described local extension services as important partners in the dissemination process and said that it would be important to convince local extension leadership, as much as the farmers themselves, of the merits of their respective technology packages. Competitors usually worked through cooperatives and local extension services to train farmers on the technology packages, although in some cases they provided training directly to farmers. In addition, an important part of the competitor–farmer relationship for two competitors was the use of buyback guarantees.

Smallholder farmer adoption. The project reached 28,031 unique farmers across the four seasons of the competition, touching about 3% of Thai Binh's rice production area or 6% of the rice farmers. All competitors incorporated close collaboration with cooperative leaders, in large part because irrigation is controlled by local governments and cooperative leaders are very influential in rice cultivation.

Cooperative leaders reported that farmers were motivated and willing to participate due to technical assistance, discounted prices for inputs, and the anticipation of yield and income benefits.

As shown in the table below, our farmer survey found that AgResults farmers generally applied the recommended practices, although their implementation sometimes fell a little short of recommendations. As shown in the table, the average AgResults farmer differed from comparison farmers in all areas, except for water management where AgResults farmers performed better in the dry season, but not in the rainy season.

Practice	AgResults' farmers adherence to recommended practice	AgResults farmers compared to comparison farmers
Reduce planting density	AgResults farmers reduced planting density, though a little less than recommended.	AgResults farmers' planting density was 7% less than comparison farmers'.
Reduce use of water	AgResults farmers did not reduce use of water quite as much as recommended.	The two groups were similar over the course of the year, but in the dry season, AgResults farmers used less water than comparison farmers.
Tailor use of nitrogen fertiliser	AgResults farmers generally used the recommended type of fertiliser, used a little less than recommended, and applied it the recommended number of times.	AgResults farmers applied fertiliser 11% more frequently than comparison farmers, in smaller amounts, resulting in 13% less nitrogen overall .
Manage crop residue	AgResults competitors did not make recommendations about whether to burn crop residue. Some recommended use of bioenzymes on straw, which reduces the need for burning.	AgResults farmers were 14% less likely to burn straw than comparison farmers. They were over seven times more likely to use bioenzymes on straw.

Yield: As shown in the bar chart below, our farmer survey found that plots where farmers applied competitors' technology packages had 14% higher yields compared to the matched comparison group.

Net value to farmers. We examined the net value of all the rice on a plot, using current local market prices, so that we could compare all farmers regardless of whether they sold rice or kept it for home consumption. As shown in the bar chart below, the average net value of AgResults farmers' rice was 11% higher than comparison farmers' rice, and this difference was statistically significant. To find this result, we defined the net value of the rice harvest as the total amount harvested times the sales price of the rice, minus production expenditures.²

Net value without competitor incentives. To understand whether the AgResults technology packages lead to increased revenue even without the provision of free or discounted inputs or rice sales price differentials associated with participation in AgResults, we analysed expected income using market prices for inputs and rice sales. We used input price information from the comparison farmers to estimate what AgResults farmers would have paid to use the technology packages if they had faced the same input costs as the comparison farmers; we used rice sales price information from comparison farmers as well. Net value decreases at market-based input and rice sales prices, but remains positive. At market prices, average net value per season is 3% higher for farmers using AgResults competitors' technology packages, but this difference is not statistically significant.

² For the sales price, we used the price the farmer got for any sale of the harvest. If the farmer did not sell the rice, we imputed the sales price using information from farmers in the same commune who sold the same rice variety. We also standardised all prices to the same moisture level.

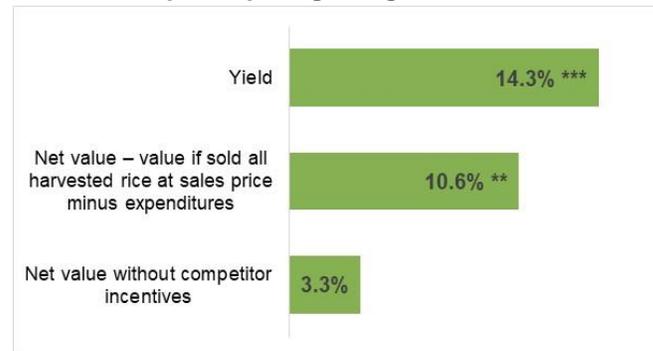
GHG emissions. Like all AgResults projects, the project relied on the Verifier to assess results against prize criteria. The Verifier found between GHG emissions reductions among participating farmers of 3%–10% in the four seasons. However, our assessment is that the GHG emissions reductions estimates are uncertain due to small sample validation exercises, large statistical confidence intervals, lack of time to test the refined estimation procedure in more than one crop season, and repeated lack of correlation between emissions estimates and practices generally believed to reduce emissions.

Sustainability. Sustainability is likely to be driven by competitors' and farmers' perceptions of benefits of the technology packages, and the degree to which local officials support continue promotion of the systems. Two of the four competitors continued to invest in disseminating their technologies, engaging roughly 12,000 farmers to produce rice using their technology packages in the first season after the competition. Both are very likely to continue to invest in the dissemination of their technology packages given the alignment between the technology packages and their core business models. There were not strong indications that the other two competitors' promotion of their technology packages among Thai Binh rice farmers would be sustained.

Our qualitative endline interviews revealed that farmers were generally positive about their experience with the competitors and technology packages and considered continued engagement with the competitors to be important to their continued use of the technology packages. Our interviews revealed that farmers and cooperative leaders require ongoing support to continue using the technology packages.

A consideration with respect to sustainability (and replicability in other areas) is the ability of farmers and cooperatives to manage water. The drainage systems are public utilities and thus not an area of investment that a private sector actor would typically pursue. Forty-five percent of cooperative leaders interviewed stated that water management is a challenge. They cited difficulties persuading farmers to use less water, but also difficulties with infrastructure including old drainage systems and non-level fields. Central authorities' encouragement of technology package uptake may be best matched by simultaneous investments in infrastructure to support the technology packages' water management requirements.

AgResults farmer outcomes compared to similar farmers not participating in AgResults



Source: AgResults External Evaluator's Farmer Survey. ***/**/* implies significance at the .01, .05, and .10 levels, respectively.

Reflections and recommendations to future PfR sponsors

AgResults' Vietnam project is one of the first emissions reduction projects conducted with large numbers of smallholder farmers, and the first to use PfR. We offer the following recommendations to address this challenge and build on Vietnam's experience in future projects:

Private sector involvement. The Vietnam project demonstrated that PfR approaches can spur the private sector to develop and disseminate technologies to address climate change. The reach and sustainability of a PfR project could potentially be increased by aligning desired project outcomes with market opportunities. With regards to agricultural emissions, for example, sponsors could create incentives for competitors to link to carbon offset markets or markets for specialized rice produced using the technology packages.

Public-private sector collaboration. Like many climate initiatives, GHG emissions reduction in Vietnam required action and leadership from the public sector. This project demonstrated that PfR can motivate the private sector to affect public sector action. In some cases, competitors' close collaboration with cooperative leaders led to changes in water management. Future projects may want to add elements encouraging public sector investment in critical infrastructure, such as for water management.

Emissions verification. Future efforts should be aware of measurement challenges, especially when relying on low-cost, indirect observation to facilitate data collection on a large scale. Future project sponsors may consider investing in improved emissions measurement methodologies. It is especially important to ensure reliability of outcome measures in a development phase before continuing to the dissemination phase. The goal is for sponsors to have confidence that they are truly "paying for results."

Innovation. PfR projects can create a diversity of innovations. The AgResults Vietnam Challenge Project allowed for the promotion of packages that differ markedly in guidelines even for a single rice variety in the same season. Future work on emissions reduction practices for rice could refine the technology packages and further study which are the best at reducing emissions.

Prize structure. The AgResults Vietnam prize structure, where winners received prizes proportionate to their results, allowed sponsors to promote multiple outcomes (yield, emissions, farmers reached). Emissions, however, were weighted at only 20%. The grand prize winner ultimately won by disseminating its technology package to large numbers of repeat farmers, but it is unclear whether it substantially reduced emissions. Future prize competitions should carefully consider how to best incentivise achievement of the main development outcome.



Recommended citation

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Contact

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AgResults is a \$152 million multilateral initiative incentivizing and rewarding high-impact agricultural innovations that promote global food security, health, and nutrition through the design and implementation of Challenge Projects, which provide payments for results intended to foster the creation of sustainable markets benefitting smallholder farmers.

Abt Associates, in partnership with Denise Mainville Consulting, is an external impact evaluator of AgResults. Abt Associates uses rigorous evaluation methods to answer critical questions about the impact of PfR projects and to identify best practices in their design and implementation. These briefs summarise our lessons learnt on individual projects, as well as cross-cutting topics.

The contents of this brief do not necessarily reflect the views of the AgResults partners. For more information about AgResults, visit: <http://www.agresults.org>.

