2018

IMPACT AUDIT

TechnoServe

Mejoramiento Agrícola Sostenible

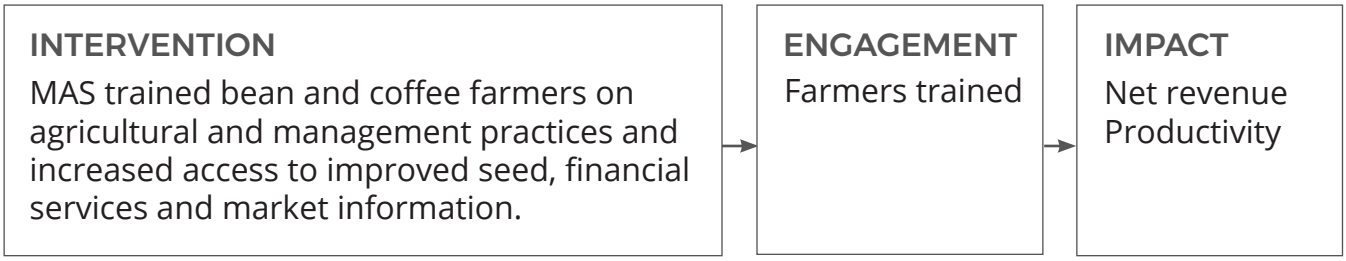
ImpactMatters

FINDINGS

Mejoramiento Agrícola Sostenible

MISSION To increase the net revenue and productivity of small and medium-sized bean and coffee farmers in Honduras.

PROBLEM Farmers lack knowledge of agronomy and marketing, access to finance, and high quality farm inputs to raise their revenues.



IMPACT AND COST

$7 in net revenue per $1 spent; 25 percent increase in productivity

IMPACT AND COST CALCULATION

The 7:1 benefit/cost ratio is impressive. We conservatively extend benefits three years after the end of the program. Costs include TechnoServe's expenses but do not include costs covered by farmers and partner organizations. If we include those costs, the benefit/cost ratio falls to 3:1. Taking the perspective of farmers, net revenue rose $9 for every $1 that farmers paid during the program.

QUALITY OF EVIDENCE

★★☆

QUALITY OF EVIDENCE ASSESSMENT

Our estimate rests on a medium quality study conducted by independent evaluators. That study found higher revenues and yields among participating farmers, relative to a comparison group. However, farmers were not randomly assigned to receive the intervention or not. As a result, they may have differed in important ways that affect their outcomes, such as their level of motivation and perseverance. The evaluators took measures to ensure the comparability of participants and non-participants along certain observable dimensions like productive farm area, but this does not eliminate entirely the risk of selection bias.

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1460 Broadway
New York, New York 10036
www.impactm.org • info@impactm.org

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EXECUTIVE SUMMARY

Program Description and Key Findings

TechnoServe's Mejoramiento Agrícola Sostenible (MAS) program, which means "sustainable agricultural improvement," aimed to increase the net revenues of small and medium-sized bean (legume) and coffee farmers in Honduras.

TechnoServe designed MAS to address the barriers farmers face to maximizing their net revenues, including their lack of knowledge of agronomic best practices and marketing, and access to finance and high quality seed. To help farmers break down these barriers, TechnoServe offered the following services:

- **Farmer field schools**, which provided 12 to 18 months of training in agronomic best practices, such as proper control of disease and pests, soil management and organic fertilization.
- **Community seed banks**, which gave farmers access to certified seed varieties that produce higher yields of higher quality. They also allowed farmers to build an emergency seed supply.
- **Access to financial services** to improve farmers' cash flow and ability to invest in equipment.
- **Access to market information** such as prices, sent to farmers in SMS text messages.
- **Marketing and management consulting for producer organizations** (groups of farmers that come together to market their crops).
- **Shared use of coffee exporters' equipment and infrastructure** like collection centers and mills.

This impact audit reviews the entirety of the MAS program, which began enrolling farmers in 2013 and concluded in 2017. Over that period, MAS trained about 26,900 bean and coffee farmers, of whom 18,700 were coffee farmers and 8,200 were bean farmers.

ImpactMatters estimates that each farmer earned an additional $2,600 in net revenue — defined as revenues less the cost of goods sold — over the course of five years, above what he or she would have earned in the absence of the program. Counting only the costs

paid by TechnoServe to implement the program, we estimate an impressive benefit/cost ratio of 7:1. Counting only the costs farmers incurred because of the program, the benefit/cost ratio is 9:1. Finally, if we include all costs caused by the program, regardless of who paid them, the benefit/cost ratio falls to 3:1. That ratio counts not only TechnoServe's and farmers' costs, but also the substantial contributions of partner organizations like foundations and government agencies.

In addition, MAS increased each farmer's productivity — defined as the weight of crops produced per area of land — by 25 percent over the same five-year period.

Our estimates are supported by medium quality evidence. Third-party evaluators ANED and Sigil Consulting Group conducted an independent assessment of MAS, measuring the productivity and gross revenues of participating farmers three years after the start of the program. They also surveyed a comparison group of farmers that did not participate in the program. However, farmers were not randomly assigned to treatment and control groups, leaving open the possibility that participants and non-participants differed in important ways that influenced their success, such as their intrinsic motivation and perseverance.

Impact and Cost

BENEFIT/COST RATIOS

We calculate three benefit/cost ratios: one from the point of view of TechnoServe, a second from the point of view of farmers and a third ratio taking account of all costs caused by the program, regardless of the payer. The numerator is identical in all three ratios: $2,600 in additional net revenue per farmer, earned over five years. The denominator of the first ratio is TechnoServe's cost of delivering the program ($360 per farmer), resulting in a benefit/cost ratio of 7:1. For every $1 spent by TechnoServe, farmers reaped $7 in net revenues, above what they would have earned had they not in fact participated in the program. The denominator of the second ratio is the average farmer's cost to participate in the program ($280), resulting in a benefit/cost ratio of 9:1. Spending $1 to participate in the program — in terms of time committed to training and implementing new, labor-intensive practices — earns farmers an additional $9 in net revenues. Finally, our third benefit/cost ratio takes as its denominator the total costs caused by the program ($980), including TechnoServe's costs, farmers' costs and the costs of partner organizations, who contributed technical assistance and credit for farmers. The resulting benefit/cost ratio is 3:1.

We calculate the impact of MAS on farmers' productivity and net revenues separately. Productivity was measured directly in the independent assessment by ANED and Sigil Consulting Group. Three years after the start of the intervention, they found the productivity of participating coffee farmers was 48 percent higher than that of non-participants. The productivity of bean farmers who participated in MAS was 14 percent higher than that of non-participants. We assume, based on the research literature on farmer field schools, that productivity remains higher for MAS farmers than non-participants for one more year, meaning the productivity levels of the two groups converged in year five after the program started.

The independent evaluation also found large increases in annual gross revenues at the three-year mark: Participating coffee farmers earned 99 percent more than non-participants; participating bean farmers earned 53 percent more than non-participants. To arrive at our final measure of impact, change in *net* revenues, we subtract from the change in gross revenues the change in farmers' costs caused by participating in the program. Then we assume MAS farmers continue earning higher net revenues than non-participants for one more year after the time of the independent assessment, meaning that their net revenues converge in year five after the start of the program.

DISPLACEMENT AND OTHER EFFECTS

Our measures of impact — productivity and net revenues — do not capture the full range of the effects triggered by MAS. Here, we describe the most important secondary effects.

Program staff shared anecdotal evidence that MAS farmers displace intermediaries, bypassing them and selling directly to exporters. While this may disadvantage intermediaries, we think it is a net social gain because intermediaries are generally better off than the farmers that MAS supports. Though intermediaries lose business, poor farmers can keep the cut of sales that would otherwise have gone to intermediaries.

MAS promoted environmentally beneficial best practices like soil and water conservation and more judicious use of chemical fertilizers. It also actively promoted women's participation in agricultural activities traditionally dominated by men. Results from ANED and Sigil Consulting Group's independent assessment of MAS demonstrate an increase in both adoption of environmentally friendly best practices and women's participation in coffee and bean farming.

Quality of Evidence ★★☆

To estimate the impact and cost-effectiveness of MAS, we draw heavily from the independent assessment conducted three years after the start of the program. ANED and Sigil Consulting Group surveyed a treatment group of farmers that participated in the program and a comparison group of farmers that did not. Treatment-group farmers were selected for the survey at random from a list of all participants. Comparison-group farmers were also selected at random — from the same geographic departments of Honduras, but from communities where the program was not originally offered. Farmers in the comparison group were filtered on certain characteristics, such as land size, to ensure their similarity to participants. Survey results show that the treatment and control groups, despite not being randomly assigned, were very similar along several dimensions, including: gender; types of coffee and bean cultivars planted; and the size of land used for growing coffee and beans.

However, the issue remains: Did farmers who were offered and who subsequently accepted the intervention differ meaningfully from farmers who were not? Though participants and non-participants were similar in observable ways, described above, there may have been unobservable differences that predicted farmers' success. Participants who select into programs are often more motivated and possess other traits that predict greater success. If farmers who agreed to participate in the program have a greater likelihood of success than non-participants, our estimates of impact overstate the true impact of the program.

On the other hand, TechnoServe targeted the most isolated regions, likely with the weakest access to new information. If non-participants lived in less isolated regions and had better access to information, they might have learned on their own some of the agronomic best practices promoted by MAS. If that is the case, our estimates would tend to understate the true impact of the program.

The magnitude of these two biases — one up, one down — is unclear and so we do not know how the estimate is biased away from the true estimate of impact. But the conclusion is clear: Without sufficient measures to overcome non-random assignment, the quality of the evidence behind our estimates of impact is moderate rather than high.

NONPROFIT COMMENT

[PLACEHOLDER FOR COMMENT FROM TECHNOSERVE ON THE REPORT]

PROGRAM DESCRIPTION

This section summarizes the program's mission and constructs a theory of change that describes the problem, TechnoServe's intervention and ImpactMatters' chosen measures of impact.

Mission

To increase the net revenue and productivity of small and medium-sized bean (legume) and coffee farmers in Honduras.

TechnoServe's stated mission for Mejoramiento Agrícola Sostenible is to "increase agricultural productivity and expand trade of agricultural products in the coffee and bean value chains."[1] ImpactMatters measures achievement of this mission as the increase in productivity and increase in net revenues caused by the program among participating bean and coffee farmers.

Theory of Change

PROBLEM

Small and medium-sized bean and coffee farmers in Honduras lack knowledge of agronomy and marketing, and access to finance and high quality farm inputs to raise their revenues.

LACK OF AGRONOMY KNOWLEDGE

Mejoramiento Agrícola Sostenible (MAS), which means "sustainable agricultural improvement," targets farmers that live in poor, isolated regions of central Honduras.

Many have not completed primary school and are illiterate.[2] The only agronomy training they receive is from their parents. As a result, farm families have been growing beans and coffee the same way for generations. They are disconnected from opportunities to learn new techniques to improve yields, quality and resistance against crop diseases and bad weather.

LACK OF MARKETING KNOWLEDGE

Bean and coffee farmers have for generations been selling their crops to intermediaries at commodity grade prices — the lowest prices available in the market for beans and coffee that qualify for no specialty status.[2] Farmers are unaware of low cost changes in marketing that would increase the prices they receive from buyers. Indeed, many coffee farmers unknowingly grow specialty coffee, but because they have not subjected their beans to a professional assessment of taste and aroma, known as "coffee cupping," they are unable to market their product as anything other than commodity grade coffee. Additionally, most coffee farmers sell to intermediaries rather than to exporters through their cooperatives. This has two consequences. First, intermediaries take a substantial cut of the revenues. Second, intermediaries tend to mix coffees from multiple farmers before selling it to buyers, which results in a poor quality product and lower prices passed on to farmers. Lastly, it is common practice in Honduras for farmers to sell their crop by volume instead of weight. But according to TechnoServe staff, pricing by weight boosts farmers' earnings by 15 percent. While these solutions seem to be easy to achieve, poor farmers in isolated regions remain unaware of them because they do not have visibility into the broader value chain of which they are a part.

LACK OF ACCESS TO FINANCE

Small and medium-sized farmers in Honduras have extremely limited access to finance, leaving them unable to cope with natural disasters such as the 2012 epidemic of coffee-leaf rust.[3] They also know little about investing in infrastructure for harvesting and storage. According to TechnoServe, farmers cannot obtain loans because they cannot amass the necessary collateral. We do not know if the problem runs deeper — for instance, does the low status of their credit-worthiness trace back to basic insolvency of the farmers. They also face problems of cash flow because buyers in the sector can take three or more months to pay invoices.

LACK OF ACCESS TO HIGH QUALITY INPUTS

Finally, farmers also lack access to high quality seeds.[2,4] Community Seed Banks (C.S.B.s) give farmers access to registered and certified seed varieties that produce higher yields of

higher quality. They also allow farmers to build an emergency seed supply. But when MAS first began, there were only 16 C.S.B.s in the region[2] because registered and certified seeds are rare and costly to obtain in Honduras.[5] Farmers' lack of agronomy knowledge and limited access to finance only compound this problem: unaware of the benefits of using improved seed varieties and short of the necessary funds, they fail to band together to form mutually beneficial C.S.B.s.

ACTIVITIES

MAS trained farmers and producer organizations on improved agricultural and management practices. It also increased their access to improved seed, financial services and market information. The program comprised six components.

FARMER FIELD SCHOOLS

TechnoServe employed trainers to teach bean and coffee farmers improved agricultural practices such as proper control of diseases and pests, and organic fertilization. Participating farmers provided their own plots as demonstration sites (called "farmer field schools"), where training took place.[2] Training typically lasted one to 1.5 years.

COMMUNITY SEED BANKS

MAS helped establish and connect farmers to C.S.Bs. Important, MAS also shared more efficient production techniques with C.S.B.s, which reduced the price of registered and certified seeds by as much as half.[6] This increased farmers' access to good seeds, resulting in increased crop yields and higher quality product.

ACCESS TO FINANCIAL SERVICES

MAS increased farmers and producer organizations' access to financial services in two ways. First, program staff trained farmers and producer organizations in financial literacy and the loan application process. Second, MAS developed innovative financing mechanisms, including a guarantee fund and invoice factoring. MAS pooled money with the Honduran Coffee Institute and other partners and set up a fund that provided collateral for a large loan to small farmers.[3] MAS also set up a private-public partnership between the Foundation for Rural Development (FUNDER) and the Honduran government's Agriculture Marketing Institute (I.H.M.A.) to ease farmers' cash flow due to the long lag time between invoicing I.H.M.A. for coffee sold and receiving payment for it.[6] Farmers would sell their crops to I.H.M.A. and then "sell" the invoice from that transaction to FUNDER to receive an advance payment from FUNDER (typically up to 90 percent of the

value of the invoice), minus a factoring fee. FUNDER would later be paid in full by I.H.M.A., and pay farmers the balance of the invoice.

ACCESS TO MARKET INFORMATION

TechnoServe used text messages (SMS) and radio to disseminate timely market-price and climate information to farmers. Messages also included tips on agricultural best practices and accessing finance, to reinforce lessons taught in farmer field schools.[7]

MARKETING AND MANAGEMENT CONSULTING FOR PRODUCER ORGANIZATIONS

Producer organizations are legally constituted groups of farmers who come together to enjoy economies of scale by marketing their crops as a group and to lower their costs by sharing equipment.

TechnoServe conducted market assessments and practical workshops for producer organizations to improve their ability to market themselves and secure purchase agreements from specialty coffee buyers.[6] TechnoServe also trained producer organizations in good governance and organizational management.

ACCESS TO EQUIPMENT AND INFRASTRUCTURE

Finally, MAS formed partnerships with coffee exporters willing to provide producer organizations access to harvest and post-harvest infrastructure.[5] Producer organizations paid coffee exporters a commitment fee to access, at any time, two key resources: (1) funds to be spent on new infrastructure such as collection centers, dryers and weighing scales; and (2) and processing services such as milling, storage and packaging. In return, coffee exporters received not only the commitment fees from producer organizations, but also higher quality coffee.

MEASURES OF IMPACT

In this impact audit, the success of MAS is measured in two ways:

(1) **The increase in farmers' revenues**, caused by MAS, earned from the sale of beans and coffee **minus the increase in costs** that arise because of MAS. We call this **"net revenue."**

We have data on farmers' gross revenue, calculated as the quantity of beans and coffee sold in a given year multiplied by the selling price that year. But data on farmers' costs is

incomplete. We know that participating farmers spent more time farming as a result of MAS, so we attempt to measure the cost of that extra time. But if MAS drove up other farm costs, then our calculations would undercount costs and, therefore, exaggerate the positive impact of MAS on farmers' net revenues. In effect, below, we assume that costs other than extra labor hours did not change *because of* MAS.

(2) **Increases in productivity** for the average participating farmer.

Here, too, focusing on this variable can mislead in the case of beans. Bean farmers may compete in small markets, where their increased productivity might lead to lower consumer prices. This would leave consumers better off, but the impact on farmers is uncertain: Competition may leave them with only some, perhaps little-to-none, of the gains from productivity.

Coffee, on the other hand, is a global commodity. MAS coffee farmers are so-called "price takers" with virtually no influence on coffee prices. They will likely enjoy the full extent of gains in productivity, selling more coffee, using the same or fewer resources, at global prices.

Productivity is measured by kilograms of coffee and beans produced per hectare of land — a ratio of farm output to one farm input (land). A rise in that ratio indicates that farmers are growing more crops from their land, forging the possibility that they will be better off after taking the product to market. But the measure alone does not capture the impact of changing prices (either of inputs or of the coffee and beans). If revenue and productivity are both rising, then farmers will be better off unless there are large, perverse movements in prices.

TechnoServe's mission as an organization is to create more competitive farms, businesses and industries. It aims to increase economic activity across market systems, not limited to the market actors that participate directly in its programs. TechnoServe measures system-wide effects as the change in gross revenues of its program participants, reasoning that a share of those revenues is distributed to the farm laborers, financial institutions and other market actors with whom participants do business. As such, in TechnoServe's view, our chosen measure of impact (net revenues accruing to program participants) does not capture the full extent of its intended market effects.

We do not agree that change in gross revenue is a useful indicator, whether of benefits to the participant or to the market system. Focusing on change in gross revenue overlooks change in costs caused by the program. Further, the research community has yet to confirm the system-wide benefits of such programs as TechnoServe's. We believe our analysis of the change in net revenues accruing to program participants is an appropriate reflection of the impact of TechnoServe's programs. In the section on Displacement and Other Effects (in the Impact and Cost chapter), we also briefly discuss the potential benefits (and harms) to third parties.

ASSUMPTIONS

With six overlapping components of the program, MAS naturally relied on many entities outside of its direct control to drive impact. The following assumptions had to be true for MAS to achieve its intended impact.

Banks and "factors" (entities that "buy" invoices from producer organizations for a fee) had to be willing to provide services to producer organizations with no credit history or formal track-record of performance. They had to be willing to bank on crops that are subject to climatic and global price shocks. MAS greatly eased the decision for banks by securing collateral on behalf of producer organizations.

Similarly, coffee exporters had to be willing to extend lines of credit and share coffee-processing equipment with producer organizations. They needed to agree that the commitment fees and higher quality crops from producer organizations were a worthy payment. TechnoServe took advantage of its reputation and connections to establish these deals with coffee exporters.[5] The outcome would likely have been very different had producer organizations approached the exporters on their own.

MAS relied on the community trainers it hired to not only disseminate accurate information but also meet targets for the number of farmers trained, which were not always possible.[2]

Lastly, MAS relied on communication systems to work and be regularly used by farmers. If cell and radio towers failed, or if farmers could not or did not check their mobile phones and radios, time-sensitive price and climate information would lose value.

RISKS

MAS had to manage several risks that could potentially undermine its impact.

The biggest risk was severe environmental shocks. Droughts, heavy rains and crop disease epidemics can wipe out fields without warning.[2] MAS mitigated these risks by training farmers to boost the immunity of their crops against such shocks, encouraging farmers to build emergency seed supplies in C.S.B.s and establishing emergency funds in the wake of large disasters.

Environmental shocks elsewhere can translate to global price shocks felt by MAS farmers.[2] Favorable weather and better-than-expected crop yields across the globe could flood the market with excess product and bring commodity prices down worldwide.

Farm communities in Central America often face the risk of violence. Gangs from neighboring El Salvador have ties with the rural sector in Honduras.[2] In addition, some communities reacted to MAS with hostility because in linking producer organizations directly to exporters, it effectively took business away from the middleman. As a result, it was not always safe for MAS trainers and farmers to travel to attend trainings, to the extent where MAS had to cease operations in one site altogether. To avoid safety risks, MAS relied on farmers to gather information about the safety of a location before trainings took place and local leaders accompanied MAS trainers to ensure their safety.

Program Details

GEOGRAPHY

MAS was implemented in five departments in the central region of Honduras: El Paraíso, Francisco Morazán, Olancho, Comayagua and Yoro.

STAGE

MAS reached the "validation" stage.[i] This is TechnoServe's first instance of implementing an agronomy program in Honduras as multidimensional as MAS and its first attempt at evaluating the impact of such a program.

AGE AND SCALE

MAS accepted its first participants in 2013 and ceased activities in 2017. By the end of the program, MAS had trained about 26,900 bean and coffee farmers, of whom 18,700 were coffee farmers and 8,200 were bean farmers.[6]

FUNDING

TechnoServe spent $11 million to deliver MAS, or an annual average of $1.8 million over its six years. By our calculations, MAS accounted for about 2 percent of TechnoServe's total annual expenses over that time period.

[i] ImpactMatters classifies programs on a continuum from "design" stage to "validation" and "scale." At the design stage, the program is focused on discovering the right way to implement intervention. Programs at the "validation" stage are focused on testing that the intervention is cost-effective, before expanding access to the program. Programs at the "scale" stage are focused on expanding access to the program, to the extent warranted by its cost-effectiveness.

IMPACT AND COST

WHY WE ESTIMATE

Impact audits estimate the philanthropic impact and cost of a nonprofit's programmatic interventions. We base those estimates on best available evidence, however imperfect, drawn from the auditee (internal evidence) and research literature (external evidence). As such, our estimates are the best possible evidence-based gauge of philanthropic success.

HOW WE ESTIMATE

First, we identify outcomes that best capture the auditee's mission. We then settle upon ways to measure progress against those outcomes, relying on the tools of modern social science.

Second, we report our estimate of "impact," the change in outcomes that can be attributed to the auditee's intervention over a designated period of time. We take explicit account of counterfactual success — the change in outcomes that would have occurred without the program. And whenever possible, we take explicit account of third-party effects, especially unintended harm to vulnerable individuals because of the auditee's intervention. For benefits that accrue over time — for example, the increased earnings from high school graduation — we discount these future benefits (at a 5 percent discount rate). The length of time over which benefits are assumed to accrue is based on the specifics of the intervention under review and available internal and external data.

Third, we report total costs. Total costs include marginal costs (direct costs of delivering the intervention) and fixed costs (for example, administrative overhead) regardless of who bears those costs (nonprofit, public agencies, private funders or participants). For programs that generate commercial revenue, the revenue is treated as a subtraction of costs. For costs that kick in over time, we discount (as we do benefits). The length of time over which costs accrue depends on the specifics of the intervention under review and available internal and external data.

Fourth, we report the ratio of impact to cost (a benefit/cost ratio).

Finally, we analyze key factors — for example, stage of development, whether the nonprofit be in pilot phase or expansion phase — relevant for understanding the audit findings.

Typically, impact is estimated on a single outcome. However, if an auditee's intervention affects several outcomes, we report impacts on distinct outcomes separately. Concretely, suppose that a program seeks to raise incomes and improve health status. We do not, as yet, attempt to combine the impact on multiple outcomes into a single aggregate outcome — concretely, by combining the value of the income effects and health-status effects. To aggregate, we would need weights — the relative value of outcomes — that would reflect the nonprofit's or funder's values (not those of ImpactMatters as auditor).

Findings

ImpactMatters measures the impact of Mejoramiento Agrícola Sostenible (MAS) as the increase in net revenue and productivity of bean and coffee farmers in Honduras, net of the gains or losses they would have experienced even if they had not in fact participated in the program.

We present three versions of benefit/cost ratios for MAS. The numerator is the same for all three calculations. But the denominator — the measure of costs — changes, depending on whose perspective defines the calculation.

First, from the perspective of TechnoServe: ImpactMatters estimates that MAS raised the net revenue of the average participating farmer by $7 for every $1 that TechnoServe spent on the program (an excellent benefit/cost ratio of 7:1).[i] The change in net revenue is calculated by subtracting the change in farmers' costs of producing coffee or beans from the change in gross revenues (the value of coffee or bean sold). Coffee farmers gained $3,400 in net revenue over five years, two of which were spent in the program and two of which came after the program concluded. Bean farmers averaged an increase of $800 in

[i] All figures are presented in 2016 U.S. dollars. Figures originally denominated in Honduran lempiras were converted at purchasing power parity.

net revenue over the same period. The weighted average of the two is an increase in net revenues of $2,600 per MAS farmer.

Second, from the perspective of the participating farmers, their net revenue increased by $9 for every $1 spent by the farmers because of their participation.

Third, from a society-wide perspective, we count all costs incurred because of the program, regardless of who bears them. This includes costs borne by TechnoServe, farmers and TechnoServe's partner organizations (foundations and government agencies who collectively shouldered almost as much cost as did TechnoServe itself). The benefit/cost ratio falls to 3:1. Farmers reap $3 in net revenue for every $1 spent collectively by all payers.

MAS also boosted productivity by 25 percent per farmer above the productivity growth they would have achieved without MAS. The increase in productivity for coffee and bean farmers was 30 percent and 13 percent, respectively.

Below, we explain ways in which these estimates might overstate or understate the impact of MAS.

Table 1. Impact and Cost Findings

Specification	Total
TOTAL FARMERS REACHED DURING PROGRAM	26,900
INCREASE IN NET REVENUE PER FARMER (OVER FIVE YEARS)	$2,600
BENEFIT/COST RATIO, COUNTING ONLY COSTS COVERED BY TECHNOSERVE	7:1
BENEFIT/COST RATIO, COUNTING ONLY COSTS COVERED BY FARMERS	9:1
BENEFIT/COST RATIO, COUNTING ALL COSTS, REGARDLESS OF PAYER	3:1
PRODUCTIVITY INCREASE PER FARMER (OVER FIVE YEARS)	25%

STRATEGY FOR ESTIMATING IMPACT

NET REVENUE

TechnoServe's "quasi-experimental" study of MAS,[8] conducted by third-party evaluators ANED and Sigil Consulting Group, is the basis for our estimate of impact. The study was quasi-experimental in that TechnoServe did not randomly assign farmers to participate or not participate in the program. Rather, of the farmers who were offered the program, TechnoServe randomly selected a sample to be surveyed. Non-participants were also randomly selected from the same geographic departments of Central Honduras, but from communities where the program was not offered. We do not know the degree to which the communities where the program was and was not offered are similar. This leaves open the possibility that changes observed among the treatment group were not a result of the program but instead due to other factors.

The study did not ask farmers about their costs. Interviews with program staff indicate farmers incurred no added financial cost as a result of the program,[4] but did spend more time farming.[9] We assign a monetary value to those extra labor hours, as well as hours spent in training, and subtract it from the change in gross revenue to arrive at the change in net revenue.

Our model of impact for coffee farmers and bean farmers is as follows:

$$\Delta\ Net\ Revenue = \sum_{t=1}^{5} (R_{MAS,t} - R_{control,t} - C_{MAS,t})$$

where:

$\Delta\ Net\ Revenue$ = Impact measured as the increase in net revenue per farmer (dollars)

$\sum$ = Sum of the equation $R_{MAS,t}$ - $R_{control,t}$ from $t=1$ (year one) to $t=5$ (year five)

t = Time, measured in years after the start of the program

$R_{MAS,t}$ = Average gross revenue per participating farmer, earned over the last year and measured at time t (dollars)

$R_{control,t}$ = Average gross revenue per non-participating farmer, earned over the last year and measured at time t (dollars)

$C_{MAS,t}$ = Average increase in annual cost per participating farmer at time t (dollars)

Impact is measured separately for bean and coffee farmers. Farmers who were trained in coffee agronomy did not also receive training in bean agronomy and vice versa.

We sum up impacts until year five, when we assume impacts terminate based on both high quality research literature and TechnoServe's findings from the 2016-17 quasi-experimental evaluation of MAS. A recent systematic review of 92 studies found that "farmer field school" interventions like MAS have statistically significant effects on farmers' yields and profits, but fail to produce long-term effects two years after the conclusion of the intervention.[10] According to the systematic review, the difference in net revenues between participants and non-participants should shrink to zero in year five. However, we extend the duration of benefits by one year because we expect farmers will continue to apply the best practices they learned from MAS into the future. In TechnoServe's quasi-experimental evaluation, over 92 percent of the 473 coffee farmers surveyed said they would continue implementing the best practices taught by MAS.[8] Over 93 percent of the 484 bean farmers surveyed intended to continue applying best practices as well. Since these self-reported intentions might overestimate farmers' future compliance with best practices, we cap the extension of benefits to just one more year (year five after the start of the program).

PRODUCTIVITY

We adopt an identical strategy for measuring the impact of MAS on productivity.

$$\Delta\, Productivity = \sum_{t=1}^{5} Y_{MAS,t} - Y_{control,t}$$

where:

$\Delta\, Productivity$ = Impact measured as the increase in yield per farmer (kg per hectare)

$\sum$ = Sum of the equation $Y_{MAS,t}$ - $Y_{control,t}$ from $t=1$ (year one) to $t=5$ (year five)

t = Time, measured in years after the start of the program

$Y_{MAS,t}$ = Average yield per farmer, harvested over the last year and measured at time t (kg per hectare)

$Y_{control,t}$ = Average yield per non-participating farmer, harvested over the last year and measured at time t (kg per hectare)

We present Δ *Productivity* as a percentage of the yields achieved by non-participating farmers.

CALCULATIONS

NET REVENUE

Based on TechnoServe's quasi-experimental evaluation, participating and non-participating coffee farmers earned $4,800 in annual *gross* revenue before the start of the program. Three years later, participating coffee farmers earned twice as much in annual gross revenue than non-participants: $4,400 compared to $2,200. According to the authors of the study , the fall in revenues of both participants and non-participants was due to a 70 percent drop in international coffee prices between 2013 and 2016, but MAS farmers were better able to weather this external price shock than non-participants.[8] To estimate the movement in revenues over time, we assume linearity: For participating farmers, revenues are assumed to fall in equal amounts from $4,800 in year one to $4,400 in year three. For non-participants, revenue is assumed to fall in equal amounts from $4,800 in year one to $2,200 in year three.

We have no reason to believe gross revenues continued dropping for both groups of farmers after year three. Coffee markets are volatile and the initial drop may well have been followed swiftly by a rise in revenues. Instead of attempting to follow coffee market trends and speculate about their effects on MAS farmers, we simply take a four-year moving average to predict the revenues of *non-participating* farmers in years four and five.

According to interviews with program staff, MAS did not cause coffee farmers to incur any more costs than usual. Farmers did, however, spend about 80 more hours each year applying the agronomy techniques taught by TechnoServe. Extra hours spent farming coffee and beans might mean fewer hours earning income somewhere else, perhaps farming other crops. We therefore multiply additional hours worked by the minimum wage for agricultural workers in Honduras.[11] By our calculations, costs increased by $300 per farmer. We subtract this cost from gross revenues to arrive at net revenues.

Finally, we assume that the net revenues of participating and non-participating farmers converge in year five. We again assume linearity, to a convergence at about $3,200, which is the amount we predict non-participating farmers will earn based on the four-year moving average described above.

The average coffee farmer who participated in MAS earned $3,400 in additional net revenues over the course of five years, relative to farmers who did not participate. This

impact is represented by the area between the two curves in Figure 1 below.

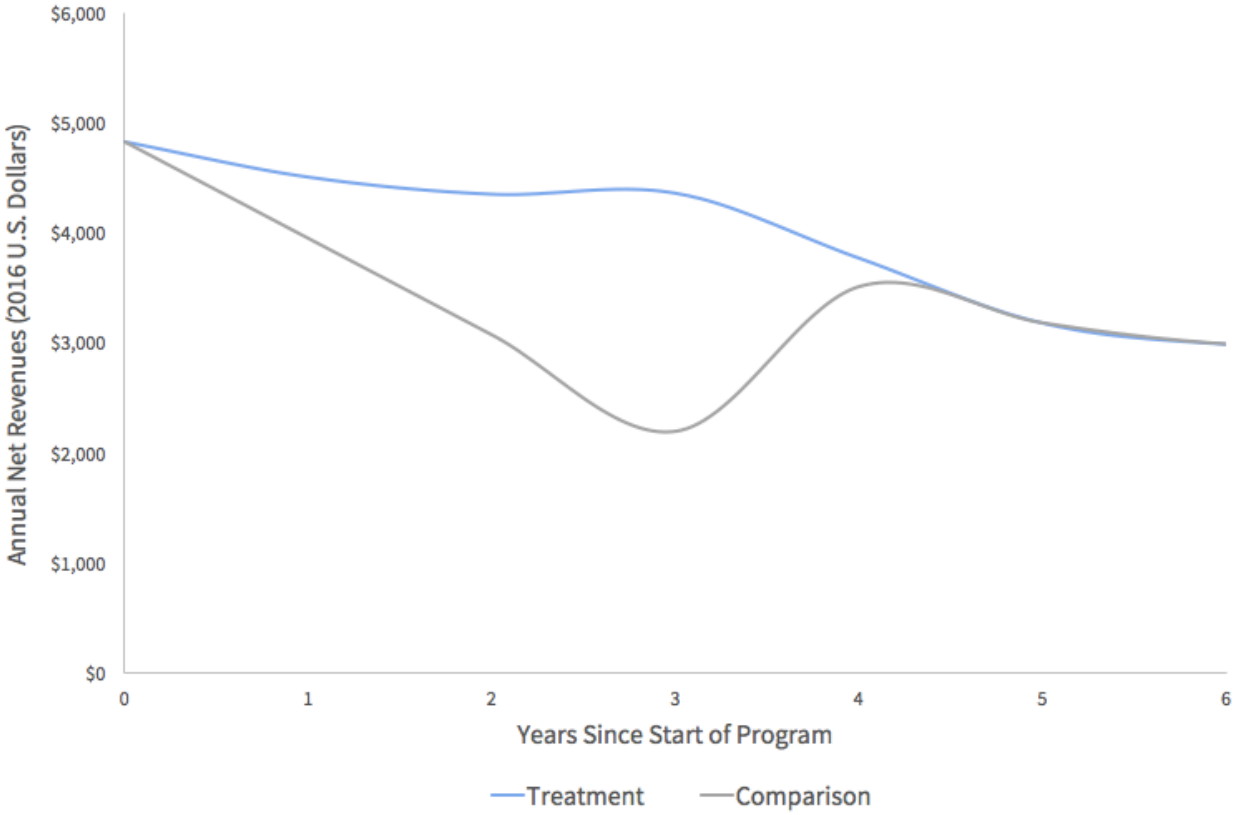

Figure 1. Increase in Coffee Farmers' Net Revenues

We take a very similar approach to calculating the impact on bean farmers' net revenues. Participating and non-participating farmers both started out earning $880 in annual *gross* revenues, according to the quasi-experimental study of MAS. Then, the study showed participating farmers' revenues grew to $1,400 in year three. Meanwhile, non-participating farmers' revenues barely changed.

As with coffee, bean farmers purportedly did not incur any new monetary costs as a result of participating in MAS, but did spend about 40 hours more each year on their farms. We estimate the value of these extra hours of labor was about $200 per bean farmer. We subtract these costs from gross revenue to arrive at net revenue.

Again, we assume that the net revenues of participating and non-participating farmers converge in year five. We estimate that the average bean farmer who participated in MAS earned a total of $800 in additional net revenues over five years, compared to farmers who did not receive MAS' intervention. This impact is illustrated by the area between the two curves in Figure 2 below.

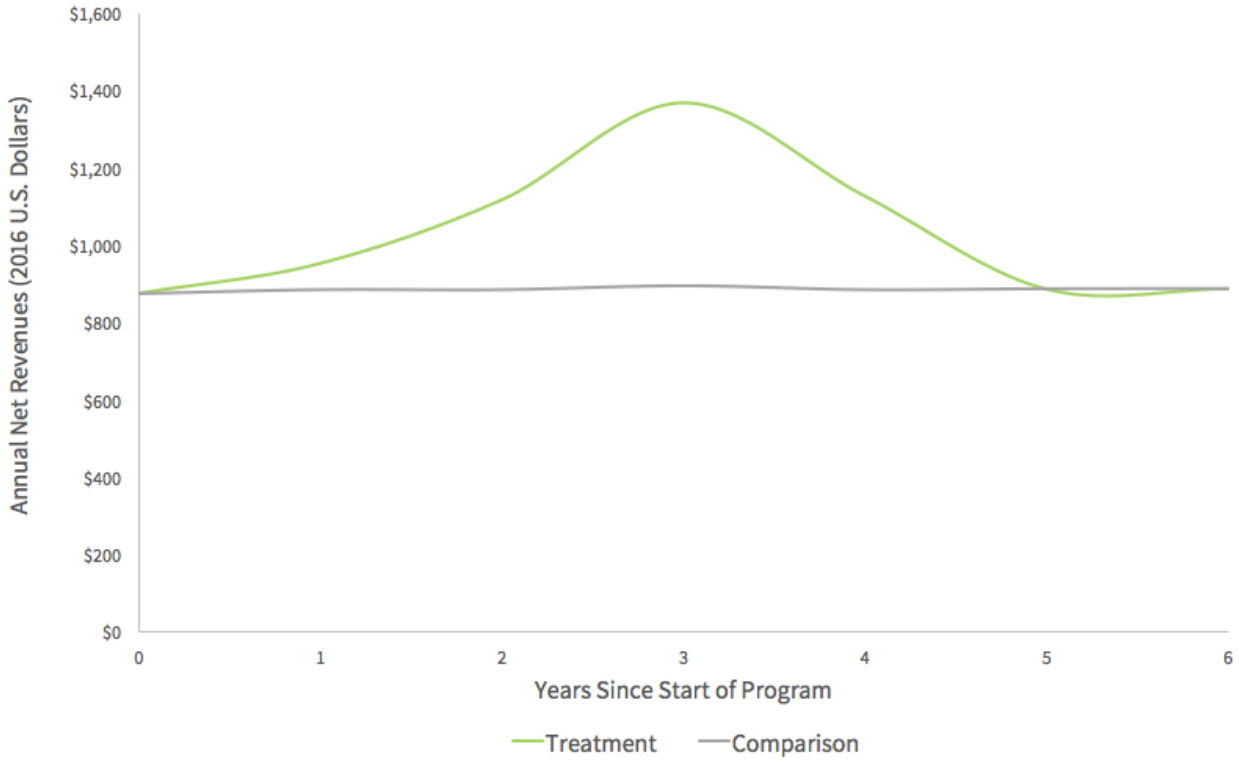

Figure 2. Increase in Bean Farmers' Net Revenues

The weighted average impact per MAS farmer, whether they farmed coffee or beans, is $2,600 in net revenues, earned over five years.

PRODUCTIVITY

Over five years, we estimate that coffee farmers who participated in MAS achieved a 30 percent increase in yield (kilograms of coffee produced per hectare) above what they would have achieved without MAS. Yields grew from about 3,000 kilograms per hectare to a peak of 4,700 kilograms per hectare in year three, according to the quasi-experimental study of MAS. In our model, we assume yields then taper off to converge with those of non-participants at 3,100 kilograms per hectare in year five.

We estimate productivity improved by approximately 13 percent per participating bean farmer over the course of five years. Yields started out at about 1,100 kilograms per hectare for participants and non-participants at year zero, as reported in the quasi-experimental study. By year three, participants harvested yields of 2,000 kilograms per hectare. Our model assumes yields then gradually decreased to meet those of non-participants at 1,600 kilograms in year five.

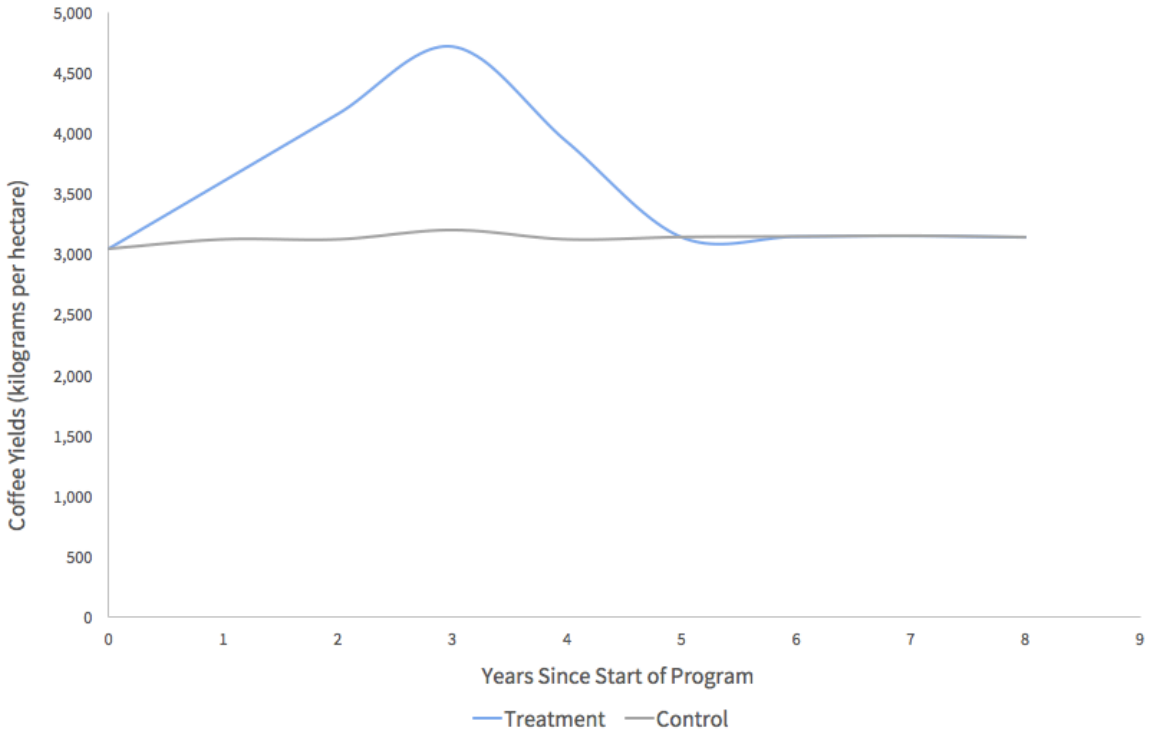

Figure 3. Impact on Coffee Farmers' Productivity

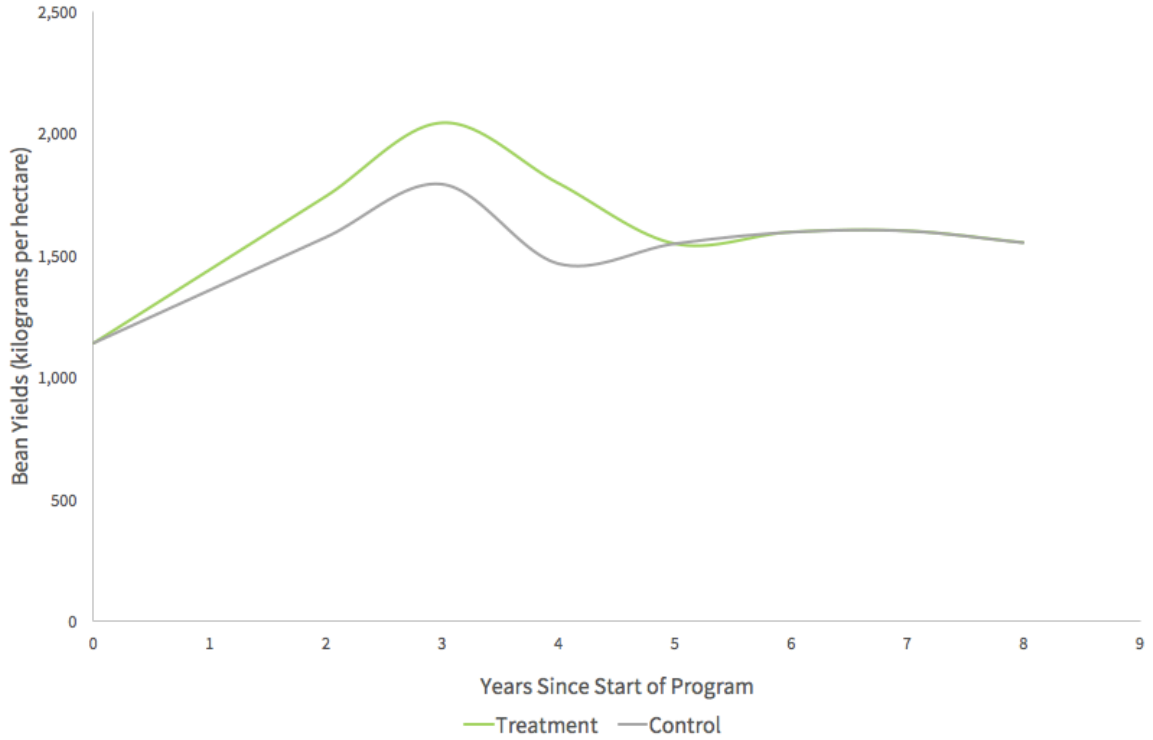

Figure 4. Impact on Bean Farmers' Productivity

Because of MAS, productivity among bean and coffee farmers increased by a weighted average of 25 percent over five years.

BENEFIT/COST RATIOS

TechnoServe spent $9.6 million to implement the program, or $360 per farmer.[i] The corresponding benefit/cost ratio, using TechnoServe's cost as the denominator, is an outstanding 7:1.

Taking instead the farmer's perspective, therefore counting only the costs incurred by farmers, the average farmer reaps a return of $9 for every dollar she spends (a benefit/cost ratio of 9:1).

A key feature of MAS is its smart leverage of monetary and in-kind contributions from partner organizations like the Hanns R. Neumann Stiftung Foundation and Molinos de Honduras ("mills of Honduras"). Partners contributed $9.2 million, almost as much as TechnoServe's own cost to deliver the program, providing technical assistance, research on improved seed varieties, collateral for loans and other forms financial assistance.[12] Counting the contributions of partners as well as the costs incurred by farmers and TechnoServe, the cost per participant was $980. The corresponding benefit/cost ratio is 3:1.

Displacement and Other Effects

DISPLACEMENT

EFFECT: POSITIVE

MAS helped over 7,000 coffee farmers and 1,800 bean farmers sell directly to exporters rather than to intermediaries.[2] While this allowed farmers to sell their coffee at higher prices, intermediaries no doubt lost some business in the process. Some intermediaries reacted with hostility against MAS staff, causing a termination of program activities in one site.

It is unclear what happens to intermediaries who lose business due to MAS. Are they able to sell to other exporters? If they go out of business entirely, are they able to find other

[i] Our figures are presented in 2016 U.S. dollars and may therefore appear slightly different from TechnoServe's financials.

employment opportunities or start other businesses? Whatever the consequences, there is good reason to believe farmers are poorer than the intermediaries and therefore, that the benefit to poor farmers participating in MAS overshadows the consequences to relatively wealthier intermediaries. Redistribution from rich to poor is a social gain and might be a good rationale for scaling up the program.

ENVIRONMENTAL AND HEALTH BENEFITS

EFFECT: POSITIVE

The quasi-experimental evaluation of MAS in 2016–17 shows that both coffee and bean farmers applied environmentally beneficial best practices such as: soil and water conservation; crop rotation; no burning of crop residues; and more judicious use of chemical fertilizers.[8]

In addition, farmers in Honduras typically apply chemical inputs to their farms without wearing any protective gear.[2] MAS trains farmers not only to protect themselves, but also how to build their own protective equipment in order to avoid respiratory problems and exposure to potentially harmful chemicals.

GENDER EQUALITY AMONG PARTICIPANTS

EFFECT: POSITIVE

Like many other TechnoServe programs, MAS aimed to promote gender equality. Specifically, MAS aimed to increase the participation of women in agricultural activities traditionally dominated by men. MAS distributed posters on gender equality throughout participating communities and incorporated messages on gender equality into agronomy training. MAS also deliberately hired female trainers to deliver agronomy trainings, allowing female and male farmers to witness models of female leadership.[8]

The quasi-experimental evaluation of MAS found women's participation in coffee farming increased from 16 percent in 2013–14 to 19 percent in 2016–17, with men making up the balance. Women's participation in bean farming increased from 14 percent to 23 percent.

QUALITY OF EVIDENCE

WHY WE RATE

Quality of evidence reflects our confidence in the impact and cost estimates. For programs with high quality evidence, the impact and cost estimates are more likely to accurately reflect the effectiveness of the program. Quality of evidence reflects only that data we used to construct the impact and cost estimate.

HOW WE RATE

Quality of evidence is rated using an adaptation of the GRADE methodology, a systematic approach to judging evidence. Initially, studies are ranked by whether they are observational, quasi-experimental or experimental. Then, each study is assessed against quality criteria: risk of bias, inconsistency or results, indirectness of evidence, imprecision, risk of publication bias, magnitude of effect, evidence of a dose-response relationship and attenuation bias.

In the ideal case, data from the program are solely used to estimate the impact of the program. However, external data can be used to identify quantitative and qualitative parameters or to link behavior change to outcomes. When the analysis is substantively based on data from multiple sources, the quality of each is assessed. If only very-low-quality internal data is available, high-quality external data may be substituted. In addition, external evidence can serve to confirm or contradict internal evidence.

Star Rating	Quality of Evidence
☆☆☆	Quality rating is “very low”; or
	Quality rating is “low” but high quality external evidence contradicts its findings
★☆☆	Quality rating is “low”; or
	Quality rating is “medium” but high quality external evidence contradicts its findings; or
	Quality rating is “very low” but high quality external evidence corroborates its findings

★★☆	Quality rating is “medium”; or
	Quality rating is “high” but high quality external evidence contradicts its findings; or
	Quality rating is “low” but high quality external evidence corroborates its findings
★★★	Quality rating is “high”; or
	Quality rating is “medium” but high quality external evidence corroborates its findings

Rating

★★☆

From the point of view of TechnoServe, ImpactMatters estimates that over five years, Mejoramiento Agrícola Sostenible (MAS) increased the net revenue of coffee and bean farmers in Honduras by $7 per business for every $1 that TechnoServe spent on the program. From the point of view of the farmers, MAS increased net revenues by $9 per farmer for every $1 that farmers spent on their farms because of MAS. Taking account of all costs caused by the program — whether paid by TechnoServe, farmers or TechnoServe’s partner organizations — MAS increased net revenues by $3 per farmer for every $1 spent. MAS also boosted the productivity of each farmer by an average of 25 percent over five years.

The evidence that undergirds these estimates is of medium quality. Our estimates are largely built on the findings of an independent assessment of MAS commissioned by TechnoServe.[8] That study compared participating farmers at the end of the program to similar farmers in the area who did not participate — a “simple difference” research design. The study had an adequate sample size and protocols in place for data cleaning and analysis. However, it did not adequately ensure that participants and non-participants were identical (but for participation in MAS), thereby precluding proper estimation of counterfactual impact — the changes in net revenues and productivity, net of changes that would have occurred in the absence of the program.

Review

RESULTS OF THE QUASI-EXPERIMENTAL STUDY OF MAS

TechnoServe contracted third-party consultants to conduct pre-intervention (baseline), midterm and post-intervention (endline) evaluations of MAS. The farmer surveys collected at baseline were of poor quality: Farmers in the comparison group ended up attending MAS trainings, rendering them a poor representation of counterfactual effects (what would have happened to participating farmers had they not in fact participated). Further, the survey instrument used was poorly designed. TechnoServe and its research partners rightly discarded the data.[8,13] To assess the impact of MAS, the evaluators chose instead to compare the results of the *midterm* survey to those of the endline survey.[14] However, one consequence was that the midterm survey, unlike the baseline and endline surveys, did not include a comparison group of comparable farmers who did not receive the intervention. This prohibited a "difference-in-differences" comparison, which would have compared the outcomes over time of treatment-group farmers against the outcomes over time of control-group farmers. Instead, the comparison was effectively the "simple difference" between treatment-group and comparison-group farmers at the time of the endline survey. We are uncertain whether this led to underestimation or overestimation of the true impact of MAS.

TechnoServe and its research partners found participating farmers had higher gross revenues and productivity than farmers in the control group. Compared to non-participating farmers, MAS coffee farmers earned almost 100 percent higher gross revenues at end of intervention (about $4,400 compared to $2,200) and produced 16 percent more coffee per hectare of land (about 4,700 kg per hectare compared to 3,200 kg per hectare).[8] Bean farmers earned 53 percent higher gross revenues than their non-participating counterparts at end of intervention ($1,400 compared to $900). Unlike coffee, beans are harvested twice a year. In the first harvest, MAS farmers produced 14 percent more beans per hectare of land (about 2,000 kg per hectare compared to 1,800 kg per hectare), but the difference between groups in the second harvest was small and not statistically significant. In total, about 1,800 farmers were surveyed: almost 960 participating coffee and bean farmers and 850 farmers in the comparison group.

QUALITY OF THE QUASI-EXPERIMENTAL STUDY OF MAS

RESEARCH DESIGN

We consider the MAS study to be of medium quality.

Our primary concern with the study is its simple-difference research design, which did not randomly assign farmers into treatment and comparison groups. Random assignment, if conducted properly, would ensure farmers in the comparison group are virtually identical to participating farmers, allowing evaluators to draw conclusions about counterfactual impact. Instead, TechnoServe chose areas in Central Honduras that were poor, isolated and in most need of its intervention. TechnoServe staff approached farmers in those areas and invited them to join the program. TechnoServe then constructed a comparison group of farmers in the same geographic departments of Central Honduras, sharing the same climate conditions and demographics, but from communities where MAS was not originally offered. The problem: participants volunteered to join the program, which would require investing their time in training and applying more labor-intensive practices. Farmers that accepted TechnoServe's invitation might have been more motivated than the average farmer. On the other hand, comparison-group farmers volunteered no such commitment. This difference between treatment and comparison-group farmers might cause the quasi-experimental study to overstate the impact of the program.

However, TechnoServe did filter out farmers from the comparison group if they were deemed too dissimilar from participants, for instance if they owned and farmed more than a certain amount of land. The survey results show this effort was mostly successful: The treatment and comparison groups shared the same gender split; a very similar proportion of farmers were heads of their household; and the size of land used for farming coffee and beans was similar.

We have some concern that higher literacy and land holding (which, in other contexts, tends to signal higher wealth) affects the way a farmer engages in the program and the gains she reaps out of it. Literacy rates among treatment-group farmers were higher by nine and 10 percentage points for reading and writing, respectively, than those of the comparison group. A farmer who can read and write might be faster at learning how to keep records and make better use of market-price information. In addition, the average coffee farmer in the treatment group owned 76 percent more land than the average farmer in the control group. According to TechnoServe, owning larger amounts of land does not necessarily indicate greater wealth in the context of rural Central Honduras. Land that is not being farmed is typically either mountainous, rocky or forest. It is considered unproductive in that it is neither cultivated, used for raising livestock nor

typically accepted as collateral for loans. In other words, the extra land does not generate income. Further, TechnoServe states the land is often obtained through squatter's rights rather than a formal purchase.

TechnoServe's comments allay our concerns considerably, but not fully. In addition to the qualitative, contextual information that TechnoServe provided, we would be further convinced by statistical balance checks, such as a "t-test" to calculate the probability that differences between the two groups are simply due to chance (as opposed to due to inherent differences). Even so, such statistical tests would only demonstrate the comparability of treatment and control groups in terms of observable characteristics. Only random assignment would ensure that the two groups share certain unobservable characteristics like motivation and an entrepreneurial spirit.

SUBSTITUTION OF MIDTERM DATA IN PLACE OF BASELINE DATA

Our second concern with the MAS evaluation is its substitution of midterm data for baseline data upon finding the latter were of unusable quality. We commend TechnoServe and its research partners for recognizing and discarding poor-quality data. However, we call attention to the potential knock-on effects of replacing the baseline data with midterm data. Because our calculation also relies on this substitution, we must be sensitive to the consequences of the decision.

The midterm survey took place in 2013–14, one year after the baseline survey and start of the program in 2012–13. The substitution would be inconsequential if the percentage changes in revenues and productivity were the same in year one as in subsequent years, but we do not know. Enthusiasm among farmers might have been at its highest in the first year. Farmers might have adopted with gusto the best practices they were taught, achieving higher increases in revenues and productivity than in years two and three. On the other hand, there might have been a learning curve in the first year. Farmers might have achieved lower increases in revenues and productivity than in later years, when they were more practiced. Without a true measure of the magnitude of impact in the first year, TechnoServe's evaluation might overestimate or underestimate the total impact of the program.

Unlike the baseline survey, the midterm survey did not include a comparison group: It surveyed participating farmers only. To evaluate the program's impact over time, TechnoServe simply compared the outcomes of *both participants and non-participants* in 2016–17 to the outcomes of *participants* in 2013–14. As participants and non-participants were not randomly assigned, we cannot be sure that the two groups are comparable, as discussed above. Measuring the outcomes of the comparison group separately in the

midterm survey would have ameliorated some of this concern. It would make possible a "difference-in-differences" comparison which would control for the pre-intervention differences (or in this case, mid-intervention differences) between groups in terms of the outcomes of interest, revenues and yields.

DURATION OF BENEFITS

We assume the benefits of MAS last for five years: two years in the program and three years thereafter. This assumption is based on a combination of high quality research literature and the MAS evaluation.

A recent systematic review synthesized the results of 92 quasi-experimental studies of farmer field school interventions like MAS.[10] The authors of the systematic review were unable to find any experimental studies that used randomized assignment. Of the 92 quasi-experimental studies identified, 77 were at high risk of producing a biased assessment of the effect of the intervention for reasons such as systematic differences between treatment and control groups (selection bias) and lack of a baseline measurement. The remaining 15 studies were at medium risk of producing biased results. Of those 15, only five had tracked participants at least four years after the start of the program and none of them found evidence of impact at the four-year mark.

We think MAS participants might fare slightly better than participants of programs included in the systematic review. The review found small, statistically significant effects on participants' knowledge about beneficial agronomy practices (standardized mean difference of 0.21 standard deviations) and on adoption of beneficial practices (standardized mean difference of 0.22 standard deviations). By contrast, MAS found almost twice as many participants than non-participants adopted at least two-thirds of the best practices they were taught. At endline, 92 percent of coffee farmers and 93 percent of bean farmers surveyed said they intended to continue implementing best practices.[8] We do not think farmers had any incentive to inflate their intentions when answering the endline survey, other than the universal bias of wishful thinking. We therefore assume benefits cease in year five instead of year four, which was the result reported in the systematic review.

COMPARISON TO THE RESEARCH LITERATURE

Looking only at the systematic review's 15 studies with medium risk of bias, the impact of farmer field schools was a statistically significant increase in net revenues of 19 percent among participants, relative to comparison farmers.[10] According to our calculations, which

are based on the MAS evaluation, MAS increased net revenues by a comparable 15 percent. On the other hand, the systematic review found a statistically significant increase in productivity of 13 percent, whereas MAS found an increase of 25 percent. We are not sure what factors are driving the difference between the research literature and our estimates. It may simply be that MAS was a better-executed program than those under study in the systematic review. Perhaps a more likely hypothesis is that weaknesses in research design, detailed above, put the MAS evaluation at risk of attributing an inaccurate amount of participants' success to the intervention.

ANNEX

Nonprofit Information

NAME	TechnoServe
CHARITABLE STATUS	501(c)3 nonprofit
WEBSITE	www.technoserve.org
CONTACT EMAIL	info@technoserve.org
ADDRESS	1120 19th Street NW, 8th Floor Washington, DC 20036

Audit Information

RELEASED	
PERMALINK	www.impactm.org/a/technoserve/4
STANDARD	Version 0.3
ACTIVITIES	Literature review, document and data review, senior management interviews, field staff interviews and key informant interviews.
AUDIT TEAM	Tamsin Chen and Ben Mazzotta
REVIEW TEAM	Elijah Goldberg and Michael Weinstein
CONFLICT DISCLOSURES	None

Benchmarking Estimates of Impact and Cost

ImpactMatters estimates that each farmer served by MAS earned an additional $2,600 in net revenue over five years, above what she would have earned in the absence of the program. Taking the perspective of TechnoServe, MAS increased net revenue by $7 for every $1 that TechnoServe spent on the program (a benefit/cost ratio of 7:1).

In their systematic review of the research literature on "farmer field school" interventions like MAS, Waddington and White identified four cost-effectiveness studies and obtained cost data from a further set of 337 interventions.[15] They found farmer field school interventions cost implementing organizations an average of $56 per farmer, though most cost between $20 and $40 per farmer. These figures do not take into account the costs to farmers of attending trainings and implementing labor-intensive practices. The equivalent cost to TechnoServe of delivering the MAS program was much higher, at $360.

However, our calculations show very favorable benefit/cost ratios for MAS despite a relatively high cost per farmer. Our ratios are also consistent with the highest estimates presented in the research literature to date. The highest benefit/cost ratio Waddington and White identified was 6.8 — for program that trained farmers in Bangladesh on integrated pest management (I.P.M.). Meanwhile, we estimate TechnoServe's benefit/cost ratio at 7:1 (counting only costs spent by TechnoServe to deliver the program). The lowest benefit/cost ratio in Waddington and White's search was 0.42 for a program in China that trained cotton farmers in I.P.M.

Glossary

Bias

Bias is a non-random error in a statistical estimate. Whenever estimates are based on a sample from a larger population, there will be random error in that estimate: no two samples will produce exactly the same estimates. An estimate is biased when those errors lead it to be consistently above or below the true value that is being estimated.

Comparison Group; Control Group

A comparison group, in contrast to the treatment group, is a group that did not receive the intervention. Comparison groups enable nonprofits and researchers to compare what happened to participants of their program to what might have happened if they were not in the program. ImpactMatters refers to comparison groups as “control groups” if they were constructed using probabilistic sampling, meaning if control-group members were chosen at random from the same population as the treatment group.

Counterfactual; Counterfactual Evidence

The counterfactual is what would have happened in the absence of a program or other event. Understanding the counterfactual is essential to understanding the impact of a program. Participant outcomes may change over time for many different reasons not related to the program. By comparing the difference between participant outcomes and counterfactual outcomes, the impact of a program can be estimated.

The counterfactual cannot be directly measured, as researchers cannot observe the same participant both participating and not participating in the program. However, it can be approximated by randomizing participants into an intervention group and a control group, and then comparing outcomes across the two different groups.

Difference-in-differences

A statistical technique that compares the change over time in the outcome variable of the treatment group, to the change over time in the outcome of the comparison group. It may be used for multiple time periods and multiple groups. Common variations of the term include “difference in difference” and “difference-in-difference.”

Discount Rate

People tend to value benefits in the future less than benefits in the present, for three primary reasons. First, benefits today can be reinvested and generate some return.

Second, the future is uncertain, and we are often uncertain if future benefits will actually materialize. Third, most people are impatient, and prefer immediate gratification over future gratification. A discount rate captures this by discounting or reducing future benefits compared to current benefits.

Effect Size

How large the measured impact was on outcomes in the group receiving the program compared to a similar group that did not receive the intervention.

GRADE

Grading of Recommendations Assessment, Development and Evaluation (GRADE) is an approach to rating the quality (or certainty) of evidence and strength of recommendations. ImpactMatters' assessments of quality of evidence are inspired by the GRADE approach.

Impact

Impact is a change in beneficiary outcomes attributable to a nonprofit’s intervention, net of counterfactual effects.

Independent Evaluator

An independent evaluator can include a research organization or academics engaged to analyze the impact of a program. Independent evaluators are not directly employed by the program, although they may be paid through program resources.

Intervention

An intervention is what researchers study and nonprofits implement. An intervention includes anything from a medical procedure to a conditional cash grant. ImpactMatters studies the intervention that a nonprofit implements, mapping that intervention to the evidence base on that particular intervention. Also referred to as the nonprofit’s program.

Purchasing Power Parity

The purchasing power of a currency is the quantity of the currency needed to purchase a common basket of consumer goods and services. P.P.P. equalizes the purchasing power of two given currencies by accounting for differences in the cost of living and inflation in the two countries.

Quality of Evidence

Quality of evidence captures ImpactMatters' confidence in our impact and cost estimates. For programs with high-quality evidence, the impact and cost estimates are more likely to accurately reflect the effectiveness of the program. Quality of evidence reflects only the data used to construct the impact and cost estimate. It is rated using an adaptation of the GRADE methodology, a systematic approach to judging evidence.

High-quality evidence under the GRADE rubric is the best scientific evidence that the program has its intended impact. Randomized designs are presumed to be in this category unless our analysts are concerned about flaws in the methodology or weak results.

Medium-quality evidence under the GRADE rubric has some flaws that might render estimates of impact inaccurate. Quasi-experimental designs are presumed to be in this category unless flaws are mitigated and results are convincing. Those designs can also be rated down to low quality if our analysts are concerned about the methodology or results.

Low-quality evidence under the GRADE rubric limits our confidence in the estimate of impact. Observational studies are presumed to be of low quality unless flaws are mitigated and the research shows very convincing results, such as with a large effect size and a clear dose-response curve.

Very-low-quality evidence under the GRADE rubric gives us very little confidence in the estimate of impact. Flawed observational studies, and even quasi-experimental or experimental studies with multiple, serious flaws, might fall into this category.

Quasi-experimental Design

A study with a quasi-experimental design tests a causal hypothesis, but lacks random assignment of test subjects to treatment and control groups, perhaps due to logistical or ethical constraints.

Randomized Controlled Trial (R.C.T.)

A randomized control trial is an evaluation design by which individuals (or groups) are randomly allocated into treatment and control groups, where the treatment group receives the program. The outcomes of the two groups are then compared in order to estimate effect size.

Sample; Sample Size

The sample is the portion drawn from a population for testing or analysis that is intended to enable statistical estimates of the behavior or attributes of the whole population. The

sample size is the number of units that comprise the sample; a large enough sample size allows inferences about the whole population to be made.

Social Costs or Societal Costs

Social costs include all costs incurred by society as a result of the nonprofit's program. Different from accounting costs, which include just the costs that appear on the nonprofit's accounting statements, social costs may include, for instance, the opportunity costs of participants' time spent in the program and the costs to other organizations and governments of helping to delivering the program.

Statistical Power

Statistical power is the probability that a test will correctly reject the null hypothesis (the hypothesis that there is no statistically significant difference between the samples being compared). An underpowered test will likely yield large p-values and confidence intervals, and will lack the evidence to reject the null hypothesis.

Statistical Significance

A statistically significant result (often a difference of means of the main outcome of interest) is a result that is unlikely to arise as a result of chance. This doesn’t mean the finding cannot be due to chance – just that it is very unlikely.

Systematic Review

A type of literature review that collects and analyzes multiple research studies in order to answer a research question. After a research question is defined and appropriate research studies identified, data from the studies are extracted, assessed for their quality, analyzed, sometimes statistically combined in meta-analyses, and reported in such a way as to address the research question.

Theory of Change

A theory of change connects the problem to the intervention the nonprofit runs to expected process and outcome metrics. The objective of a theory of change is to provide a testable hypothesis for why the intervention is solving some problem that will lead to positive changes for the targeted beneficiaries.

Treatment Group

In an experiment, the treatment group is comprised of experimental subjects that receive the treatment being evaluated.

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