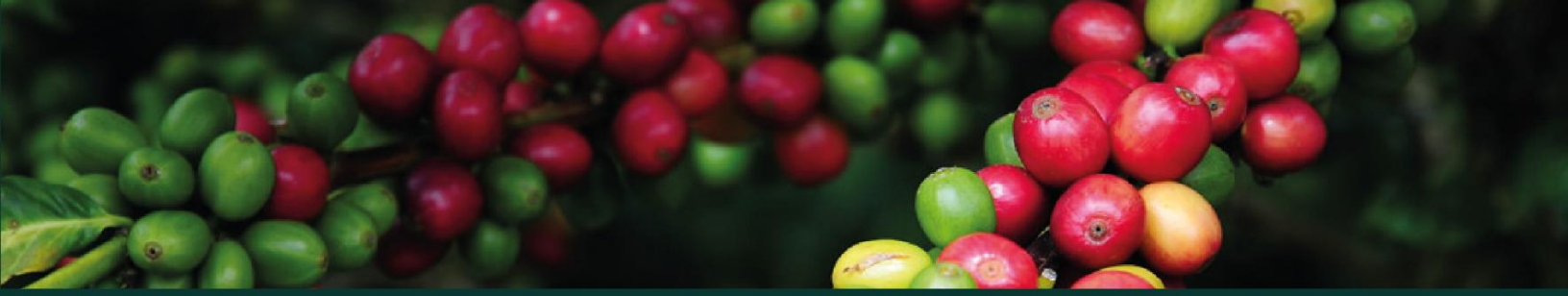

Maximizing Opportunities in Coffee and Cacao in The Americas (MOCCA) Project

Endline Evaluation Report

September 2025

Evaluation Team Members

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Executive Summary

Program, Context, and Theory of Change

The Maximizing Opportunities in Coffee and Cacao in the Americas (MOCCA) project was a United States Department of Agriculture Food for Progress–funded initiative, led by TechnoServe (coffee) and Lutheran World Relief (cacao) in partnership with Initiative for Smallholder Finance and World Coffee Research. With co-financing from leading coffee and food companies, MOCCA operated across six countries in Central and South America (Ecuador, El Salvador, Guatemala, Honduras, Nicaragua, and Peru) between 2019 and 2025, aiming to address barriers that prevent smallholder farmers from implementing good agricultural practices including renovating and rehabilitating their coffee and cacao trees. The project sought to increase farmer productivity, incomes, and market access while contributing to a more sustainable regional supply of coffee and cacao.

Grounded in a clear Theory of Change, MOCCA assumed that if farmers had the knowledge, skills, market integration, quality inputs, and affordable financing to implement good agricultural and renovation and rehabilitation practices, they could sustainably improve profitability and reinvest in their farms, creating a virtuous cycle for small coffee and cacao farmers. To achieve this, the project focused on training, market linkages, strengthening planting material suppliers, facilitating finance, improving research and research dissemination, and strengthening multi-stakeholder collaboration at local, national and regional levels. MOCCA aimed to train 120,000 farmers, integrate 36,000 into higher-value trading models, support more than 1,000 nurseries and clonal gardens, and facilitate $64 million in loans to smallholders, contributing to productivity gains of 30% across coffee and cacao value chains in the six target countries. Approximately 70% of project beneficiaries were small coffee farmers, and 30% small cacao farmers.

Against these ambitions, MOCCA achieved strong results in most areas. The project surpassed its training target, reaching over 130,000 farmers, and achieved its goal of hectares under improved management. Adoption of improved practices was widespread, and yields reached 94% of the target in coffee and 73% in cacao. Access to finance was an area of success, with over $116 million facilitated—167% of the target. Similarly, the project exceeded targets for supporting nurseries and clonal gardens, strengthening over 1,500 providers of planting material. Achievements in market linkages were more modest, reaching 93% when including information from the last farmer surveys in 2025 for sales and volumes, reflecting persistent challenges in strengthening market access. Overall, MOCCA met or exceeded most of its targets. This achievement was realized despite strong contextual factors that challenged implementation, including the COVID-19 pandemic, climatic episodes as two category 5 hurricanes hit Central American cacao and coffee sectors hard, the El Niño and La Niña weather phenomena, which affected productivity in the 2024-25 harvest (the reference year for this evaluation), periods of political instability in three countries, price hikes in both coffee and cacao, etc. These results demonstrate MOCCA's operational strengths to adapt to changes in context, including across a diversity of sectoral and country contexts, while keeping on track to achieve targets. These results also suggest that MOCCA has made a strong contribution to building farmer capacity and driving systemic changes in the coffee and cacao sectors, even as challenges remain in fully realizing sustainable market integration that translates into greater incomes for farmers.

Evaluation: Purpose and Methodology

The evaluation of MOCCA was anchored in its Theory of Change and employed a mixed-methods approach to capture both farmer-level and market system-level impacts. Quantitative and qualitative methods were combined, including household surveys, focus group discussions, key informant interviews, and secondary data review, with findings triangulated through contribution analysis to assess the plausibility of MOCCA's influence on observed outcomes. Data were collected at baseline, midline, and endline across multiple countries, with Nicaragua excluded from country-level analysis due to country context constraints but retained in the aggregated farmer-level results.

At the market system level, the evaluation assessed the extent to which MOCCA partners and other actors incorporated new practices, business models, and services in line with the project's systemic change objectives. Using a market systems framework, the analysis examined the depth and sustainability of changes across exporters, farmer organizations, sectoral associations, financial institutions, public entities and research institutes - including both MOCCA partners and non-partners. Data were drawn from document reviews, Theory of Change elicitation sessions, and interviews with over 270 individuals representing more than 90 coffee and cacao market system actors in Ecuador, El Salvador, Guatemala, Honduras, and Peru. The findings were mapped against MOCCA's causal pathways and analyzed through contribution analysis to distinguish MOCCA's role relative to other contributors and factors in driving systemic change.

At the farmer level, the evaluation adopted a before-and-after design—adjusted from the original quasi-experimental plan due to COVID-19 restrictions—to measure changes in yields, income, and adoption of agronomic practices among beneficiaries. A large-scale panel survey was implemented at baseline and endline across more than 3,000 farmers in all six countries, with robust sampling strategies to ensure representativeness and adjustments for attrition. Econometric models with fixed effects were applied to control for confounding factors and strengthen the validity of findings, supplemented by descriptive statistics and disaggregated analysis by sex and age.

Main Findings

Coffee

Strengthening Market Systems

MOCCA worked with 83 partners across Ecuador, El Salvador, Guatemala, Honduras, and Peru, including anchor firms, producer organizations, public institutions, and financial and research institutions, among others, to reinforce sectoral governance and service delivery for smallholder farmers. Contributions included:

- **Training:** Standardized curricula, participatory methodologies, and expanded coverage enabled widespread adoption of good practices, stronger trust between farmers and buyers, and improvements in productivity and quality.

- **Markets:** MOCCA was the primary driver of more direct and stable buyer-seller relationships in El Salvador, Guatemala, and Honduras. These efforts facilitated certification, improved quality (especially in Honduras), and expanded integration of small farmers into supply chains.
- **Research & Dissemination:** National commodity institutions adopted new behaviors, including alignment of research to sectoral priorities, allocating funds for research, training researchers, disseminating results through diverse platforms, and enabling broad participation in knowledge exchange. Farmers increasingly accessed research outputs at no cost, a notable improvement compared to baseline.
- **Genetic Material:** MOCCA partnered with over 1,100 coffee nurseries, helping 76% adopt three or more improved agronomic practices. DNA testing was carried out for two hundred and forty-five seedlots across MOCCA countries to identify providers of highly genetically-compliant seed for 15 coffee varieties, forty-five seed lots were verified for genetic purity, and seed regulations advanced in El Salvador, Guatemala, and Peru. In Guatemala, the first 100% pure ANACAFE 14 lot was established. Prospects for sustainability are strongest where institutional backing is robust.
- **Finance:** Partners introduced or redesigned credit products tailored to coffee farmers. Loan terms improved in several countries, especially Peru, where repayment periods lengthened and average interest rates dropped by more than 50%.
- **Strengthening Sectoral Coordination:** MOCCA supported the establishment of coordinating entities (e.g., Instituto Salvadoreño del Café in El Salvador, Cajamarca platform in Peru), expansion of technical assistance channels (e.g., Asociación Nacional del Café radio program), and strengthened national institutes' regulatory and research roles.
- **Regional Exchange:** At the regional level, MOCCA strengthened the Programa Cooperativo Regional para el Desarrollo Tecnológico y Modernización de la Caficultura , launching a Competitive Research Fund supporting 11 projects, redesigning the Knowledge Center into a geoportal to share applied research and georeferenced data, increasing exchange of information and genetic materials across countries

Farmer-Level Outcomes

- **Yields & Income:** Despite a 4% overall decline in yields (linked to renovation cycles and extreme weather), coffee incomes rose significantly in El Salvador, Honduras, and across the project, surpassing USD 1.9 billion in sales (95% of the target). While this increase was largely driven by favorable international price trends, farmers linked to MOCCA-supported anchor firms saw higher yields and incomes, particularly in Peru. Monitoring data across the project cycle suggests that, in years not affected by abnormal weather, productivity improved substantially (45% at mid-term and 34% in 2023). Although these results cannot be causally attributed to MOCCA, given the lack of a control group, they do suggest that MOCCA interventions likely enhanced productivity, even if climate shocks masked these gains in the final year. Further, secondary data from ENVERITAS suggest that yields have decreased between the 2019/2020 harvest (MOCCA's baseline year) and 2023/2024 harvest (one year prior to MOCCA's endline year of reference) in all countries, ranging from a 10% decrease in Guatemala and Peru to a 31% decrease in El

Salvador. Since the decrease observed over time among MOCCA farmers was not statistically significant (except for Guatemala), this could indicate that MOCCA beneficiaries' yields either remained stable or decreased less than those of farmers who did not receive technical assistance.

- **Adoption of Good Practices:** A total of more than 79,000 coffee farmers, equivalent to 84% of MOCCA's coffee beneficiaries, adopted at least one improved practice, and 70% adopted three or more. Notable gains included increased use of fertilizers, disease control, pruning, waste management, and record-keeping. Adoption of 11–19 practices rose markedly (from 35% to 55% between baseline and endline).
- **Sex (women/men)& Youth:** Joint female–male household decision-making on coffee income increased in Guatemala, Honduras, and Peru, correlating with higher rates of rehabilitation investments. A women's empowerment tool piloted in El Salvador has been scaled independently by exporters.
- **Migration:** The percentage of households reporting recent migration declined significantly across all project countries.

Cacao

Strengthening Market Systems

MOCCA worked with 90 partners across all six countries, with a strong emphasis on empowering producer organizations as last-mile service providers. Key results included:

- **Training:** Farmers received an average of 13 training modules, with participatory approaches and digital tools such as *Cacao Móvil*. Participation was sex-balanced-balanced, as women and men attended trainings in similar proportions across all countries. Most farmers rated training as useful or very useful.
- **Markets:** Producer organizations improved capacity to assess and negotiate cacao based on sensory and quality attributes, grounded in internationally recognized standards, which MOCCA helped develop, introduce, and build capacity for. Producer organizations also expanded direct and stable commercial relationships.
- **Research & Dissemination:** The share of farmers accessing cacao research rose from 22% to 35%, with 92% applying this information to farm management. The share of farmers facing costs to access such research declined from 13% to 4%, indicating greater free availability facilitated by MOCCA. Country-specific data on cadmium and cacao varieties became more widely available, while the exchange of research results between institutions and with broader stakeholders became more structured and consistent. To reach non-specialist audiences, visual materials were increasingly used, making findings more accessible and practical. As a result, farmer organizations gained better access to research and began applying these insights to improve the technical assistance they provide to producers.

- **Genetic Material:** MOCCA strengthened nurseries, clonal gardens, and certification systems across countries, building technical capacity in grafting, pruning, and fertilization. Partnerships (e.g., with Instituto Nacional de Investigaciones Agropecuarias in Ecuador) expanded certified nursery networks and introduced new, locally adapted varieties. Catalogues organized information on available materials to inform planting decisions. The availability and use of certified planting material expanded, contributing to higher standards and more sustainable cacao production systems. The most significant impacts were seen at the market system level, where MOCCA left behind stronger capacities, infrastructure, and supply networks, ensuring long-term benefits for smallholder farmers and the broader cacao sector.
- **Finance:** In El Salvador, Ecuador, and Peru, financial institutions co-developed new products with MOCCA, offering favorable terms such as lower interest rates, harvest-aligned repayment schedules, and guarantees, expanding the offer of cacao-relevant credit. Efforts to digitalize BanEcuador's lending processes, initiated by MOCCA, continue to advance beyond the Project's life.

Farmer-Level Outcomes

- **Yields & Income:** At the project level, the value of annual cacao sales increased over the evaluation period, surpassing USD 367 million in sales (115% of the target), particularly in Peru, Ecuador, and El Salvador. However, this increase is associated with factors such as increases in production volumes and the rise in global cacao prices during the evaluation period. Yields increased slightly (about 11%), but this change was not statistically significant; external factors such as weather and pest pressures likely offset larger potential gains.
- **Adoption of Good Practices:** Nearly 30,000 farmers adopted improved practices, enabling MOCCA to exceed its adoption target by 7%. Adoption of 11–19 practices rose from 21% to 41%, with statistically significant increases. More than 38,000 hectares of cacao were brought under improved management
- **Sex (women/men) & Youth:** Household decision-making over cacao income shifted toward greater inclusion—joint decision-making rose from 12% to 34%, male-only decision-making declined, and spousal consultation increased from 29% to 66%. Older farmers (>30) experienced greater income and yield gains than younger ones, likely reflecting stronger experience and market linkages.

Project Relevance, Effectiveness, and Sustainability

Key Findings: Relevance

MOCCA's interventions were consistently rated as relevant to very relevant by market system actors across all countries and both crops. In coffee, the project's emphasis on expanding technical assistance, strengthening farmer organizations, supporting improved production practices, and facilitating access to markets and services directly addressed pressing challenges such as high costs, labor shortages, and limited land availability. Similarly, in cacao, MOCCA filled a critical gap in specialized technical training, including best practices in nurseries, grafting, fermentation, and shade management. The project's approach of training local technical assistance providers was considered particularly effective for ensuring knowledge transfer, local adaptation, and trust.

Beyond technical support, stakeholders emphasized MOCCA's contributions in building stronger connections between farmers, financial institutions, exporters, and public sector actors. The project was also valued for promoting equity by engaging women, youth, and historically excluded groups. While these contributions were widely recognized, some stakeholders noted that MOCCA's limited coverage constrained its overall relevance, suggesting that its approaches could have had even greater impact if scaled to reach more farmers. This will be the challenge partners will need to carry forward over the next several years to expand and extend the approaches introduced by the project.

MOCCA also demonstrated flexibility and responsiveness to external shocks. It rapidly adjusted its service delivery model during the pandemic, promoted low-cost and biological fertilizers in response to rising input costs, and addressed gaps in regulations for genetic materials. While adaptation to climate shocks and price-driven competition was more limited, overall the project was seen as highly relevant in both its objectives and its ability to respond to changing circumstances.

Key Findings: Effectiveness

MOCCA achieved strong progress in strengthening market systems and farmer adoption of improved practices, although results for yields and incomes varied by crop. In coffee, adoption of improved agronomic practices increased across all countries, with particularly strong results in Guatemala and Peru. Income gains were also observed in all countries, with the largest effects in Peru, though these were significantly influenced by favorable global coffee prices more than productivity improvements alone. The baseline endline comparisons show that yields remained broadly neutral across most contexts. This reflects both the long time required for agronomic changes to take effect and the impact of external factors such as climate variability and pests. Market system changes were confirmed in all countries for most support services, particularly in technical assistance, genetic material, and financial services, followed by market access, while progress was less consistent in research and sectoral coordination. These improvements contributed to higher adoption of practices and, in some cases, improved farmer incomes.

In cacao, adoption of improved practices increased across all countries, especially in Peru, where MOCCA contributed to improvements across nearly all targeted services. However, no significant gains were observed in yields or income, as the promoted practices require longer time horizons to generate measurable productivity improvements. Market system outcomes were strongest in technical assistance, genetic material, national platforms, and market access, though weaker in research and financial services.

Overall, MOCCA was effective in promoting behavior change among market system actors and farmers. Its impact on productivity and incomes was more apparent—though modest—in the coffee sector than in cacao. While observed productivity effects at endline were small, complementary evidence from MOCCA's midterm evaluation and annual farmer panel surveys suggests that, on average, yield did increase pointing to positive effects under more favorable conditions. While these findings cannot be causally attributed to MOCCA, they do suggest that MOCCA's interventions may have helped farmers realize productivity gains that were masked by adverse external shocks in the final year of the project. In this sense, the endline yield results should be interpreted with caution, as they do not control climatic events that indeed took place.

Key Findings: Sustainability

The sustainability of the changes introduced by MOCCA at market system level without ongoing financial and technical support is mixed and varies by sector and country. In coffee, sustainability prospects are strongest in genetic material systems, financial services, technical assistance and national platforms, with Guatemala, Peru, and Honduras showing the most evidence for continuity. As an example, JDE Peet's has invested $12.5 million to continue technical assistance, following MOCCA's model, with 30,000 farmers in Guatemala, Honduras and El Salvador. El Salvador shows weaker potential for sustaining changes. While farmers experienced income increases during the project, these were largely driven by temporary global price spikes, suggesting that future gains will depend on improvements in productivity, quality, and market access. Neutral yield results underscore the importance of continued technical support and strengthening climate resilience strategies for long-term sustainability.

In cacao, sustainability is strongest in technical assistance, genetic material, and national platforms, while the challenges to continuation in financial services, research, and market are larger. Ecuador, Peru, and Guatemala are best positioned to sustain project achievements, while El Salvador and Honduras face greater risks of losing momentum without further support. Although adoption of practices is expected to continue in the short term, the absence of yield and income gains may erode farmer incentives to maintain adoption over time.

Across both sectors, the areas most likely to sustain progress are technical assistance, genetic material, and national platforms. Guatemala, Peru, and Ecuador emerge as the countries with the greatest potential to maintain and expand MOCCA's achievements, while El Salvador and Honduras show weaker prospects. The long-term sustainability of MOCCA's contributions will ultimately depend first on whether adoption of practices leads to measurable productivity and income gains, creating the incentives and resources necessary for farmers to continue investing in improved practices without external support and second whether changes in market system actors are sustained due to improved business models and regulatory support.

Conclusions

1. **MOCCA delivered strong contributions despite major shocks.**
   Despite the pandemic, climate shocks, and volatile input and commodity prices, MOCCA met or exceeded most of its targets. The project surpassed goals for farmer training and access to finance, and established new norms in technical assistance, genetic material systems, and multi-stakeholder coordination.

2. **The systems-based, partnership-driven approach was highly effective.**
   MOCCA engaged more than 170 partners across six countries, from farmer organizations and nurseries to exporters, banks, and research institutes. This enabled structural improvements in key services for smallholders—technical assistance, market access, research, finance, and genetic material supply—with evidence of sustained behavior change by local actors.

3. **Farmer incomes rose; external factors played an important role.**
   Coffee income increased across all countries, largely reflecting favorable global prices rather than productivity gains. Cacao incomes also increased, also due to favorable global prices, and given the limited gains in yields, these income improvements may not translate into sustained

economic benefits for producers. This underscores the need for continued agronomic support to translate adoption into productivity-driven income gains.

4. **Sustainability potential is strong in some areas; ongoing support will be needed in others.** Evidence of autonomous action by market actors—especially in genetic material systems, national platforms, and technical assistance—indicates that some outcomes are likely to endure, particularly in Guatemala, Peru, and Ecuador. However, reliance on external resources remains significant in El Salvador and Honduras, and financial services uptake is still limited. It is important to recognize that system/behavior level changes take longer than the duration of MOCCA and we find it positive to see evidence for continuation already at project close, in some cases among non-partners.

5. **Future resilience depends on continued investment and coordination.** MOCCA strengthened institutional platforms and farmer representation, laying foundations for more collaborative, inclusive responses to climate, political, and market shocks. Realizing long-term benefits will require sustained incentives for adoption, expanded local investment, and follow-on support to consolidate the gains achieved. The rising political instability within the region will be an important challenge to address.

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List of acronyms

AAER	Adopt, Adapt, Expand, Respond
AHPROCAFE	Asociación Hondureña de Productores de Café
AMCES	Alianza de Mujeres en Café en El Salvador
ANACAFE	Asociación Nacional del Café
BL	Baseline
CENTA	Centro Nacional de Tecnología Agropecuaria y Forestal
EL	Endline
FL	Farmer Level
FUNCAFE	Fundación de la Caficultura para el Desarrollo Rural
Ha	Hectares
IHCAFE	Instituto Hondureño del Café
INIAP	Instituto Nacional de Investigaciones Agropecuarias
ISC	Instituto Salvadoreño del Café
ISF	Initiative for Smallholder Finance
JDE	Jacobs Douwe Egberts
Kg	Kilograms
LWR	Lutheran World Relief
MAG	Ministerio de Agricultura y Ganadería (El Salvador)
MDF	Market Development Facility' s approach
MIDAGRI	Ministerio de Desarrollo Agrario y Riego
MOCCA	Maximizing Opportunities in Coffee and Cacao in the Americas
MS	Market Systems
MT	Metric Tons (1000 kg)
NCI	National Coffee Institute
PMACC	Plataforma Multiactor del Café de Cajamarca
PROMECAFE	Programa Cooperativo Regional para el Desarrollo Tecnológico y Modernización de la Caficultura

R&R	Renovation & Rehabilitation
SAG	Secretaría de Agricultura y Ganadería de Honduras
SENASA	Servicio Nacional de Sanidad Agraria
std dev	Standard Deviation
TA	Technical Assistance
TNS	TechnoServe
ToC	Theory of Change
USDA	United States Department of Agriculture
WCR	World Coffee Research

1 Introduction

The Maximizing Opportunities in Coffee and Cacao in the Americas (MOCCA) project sought to help farmers overcome barriers that limit their capacity to renovate and/or rehabilitate (R&R) their coffee and cacao plants by increasing their productivity while improving their marketing capacity, incomes and livelihoods (TechnoServe, 2019). TechnoServe (TNS) led the Consortium, and also led coffee activities as well as communications, access to finance efforts, and monitoring, evaluation, and learning activities, while Lutheran World Relief (LWR) led activities in cacao. Other members of the Consortium included Initiative for Smallholder Finance (ISF) and World Coffee Research (WCR). The project, with a total budget of approximately USD 45 million, was funded primarily by the United States Department of Agriculture (USDA) through its Food for Progress program, with contributions from The J.M. Smucker Company, Jacobs Douwe Egberts (JDE), Keurig-Dr. Pepper, Peet's, Nespresso, McDonald's, and Kellogg, implemented cacao activities in Ecuador, El Salvador, Guatemala, Honduras, Nicaragua and Peru, and coffee activities in all countries with the exception of Ecuador.[1]

The project's Theory of Change (ToC) postulated that if farmers understand the benefits of R&R, possess the knowledge and skills, and have access to high-quality inputs and affordable financing, they will implement low-cost R&R practices. Practice adoption will allow an increase in their profitability and catalyze a cycle of R&R investments that will lead to a more secure and sustainable supply of coffee and cacao for U.S. and other regional and international markets (TechnoServe; Lutheran World Relief, 2018). To achieve this, MOCCA focused on seven major activities: 1) increase farmer knowledge and skills through training (technical assistance), 2) facilitate buyer-seller relationships, 3) augment research and dissemination, 4) strengthen suppliers of genetic material for planting, 5) facilitate access to financing, 6) support trade association service provision, and 7) bolster regional platforms.

MOCCA started as a five-year initiative that began in FY 2018. However, the project received an extension to end activities in FY 2025. The project aimed to benefit 120,000 coffee and cacao farmers, integrate over 36,000 farmers into higher-value trading models, support more than 1,000 nurseries and clonal gardens, facilitate over $64 million in loans to more than 29,000 farmers, and increase productivity by 30 percent. During the first year, project implementers identified partners (called anchor firms) directly supporting farmers (providing services, financing, buying crop outputs, etc.) to establish a collaboration with them.

The project included a study to evaluate the impact of its activities. The Alliance of Bioversity-CIAT (hereafter "the Alliance") led the MOCCA project evaluation, focusing on two levels of project impact: the **market systems level** to test systemic changes in the coffee and cacao market systems, and the **farmer level** to evaluate the effect among beneficiary farming households and at the aggregate project level across all countries. The evaluation strategy included the use of a mixed methods approach (combining qualitative and quantitative methodologies), took into consideration the seven major activities to define data needs and methods of analysis, and included baseline (2019), midline (2022), and endline evaluations (2025). The baseline evaluation provided an assessment of the country specific cacao and coffee market systems prior to project implementation, and a snapshot at the characteristics of the farmers before becoming project beneficiaries; the midline evaluation provided an overview of

[1] Hereafter, we refer to these as MOCCA countries.

the project's progress halfway through its life cycle, and included actionable project-level recommendations to prioritize investments for the remainder of the project.

The main objective of this endline report is to highlight the contributions of the project to observed changes in the indicators of interest, at the market systems and farmer levels. Particularly, we evaluate the project strategy implementation and results, focusing on the interventions with market systems actors and farmers; and provide results about changes that market systems actors did because of the project, and practices promoted by the project that farmers adopted and their effect on yields and income. The contribution analysis responds to the following evaluation questions:

1. What changes do we observe among MOCCA partners and non-partners?
2. Did MOCCA enable farmers to improve yields, increase profitability, and catalyze renovation and rehabilitation investments by adopting best agronomic practices?
3. What are the contributions of the MOCCA project to these changes? And what other elements contributed?
4. How likely are the changes to be sustained over time by MOCCA partners?
5. What has been the project's relevance, effectiveness, and sustainability?
6. What lessons can be drawn from the project's implementation that can inform the design of future projects?

This report is organized in seven sections. Section 2 describes the methodology implemented to evaluate the project; section 3 highlights the progress of the project against its performance indicators; sections 4 and 5 detail the evaluation results for coffee and cacao, respectively; section 6 presents the assessment of the project's relevance, effectiveness and sustainability; and the last section provides conclusions and recommendations.

2 Methodology for MOCCA's Evaluation

2.1 Overall Evaluation Strategy

The project's evaluation is anchored in its Theory of Change (ToC) and employs a mixed-methods design that integrates both quantitative and qualitative data sources, drawing from monitoring, household surveys, focus groups, key informants, and secondary data. The evaluation is conducted at two complementary levels: i) at the market system level to assess institutional changes in market system actors, vis a vis provision of support services for small farmers in line with MOCCA's ToC; and ii) at the farmer level to measure changes in the adoption of agronomic practices promoted by the project, yields, and income, as well as increased access to better markets. We used contribution analysis to assess the changes that the project influenced among market system actors and farmers. This methodology explores attribution through assessing the contribution of a program or project to observed results (outcomes), by verifying the ToC behind the project while taking into consideration other influencing factors (Mayne, 2008) (Mayne, 2001). The project's evaluation strategy included conducting: (i) a baseline assessment in 2019 for the market systems level, and farmer-level data collection for the 2020 and 2021 harvest years; (ii) a midline assessment in 2022 for both levels; and (iii) an endline assessment capturing 2024 harvest data in Peru and 2025 harvest data in Central America and Ecuador, for both levels.

At the market system and farmer levels, the analysis was done by country. Further, at the farmer level, we analyzed changes for the project (i.e., all countries together). While the initial evaluation strategy included Nicaragua, given the recent political context in that country, we excluded it from the country-level analysis (except in the methods section) but included it when assessing the farmer-level impact of the project (i.e., all countries together). Thus, in some cases, the changes in Nicaragua may drive changes in the analysis for all countries.

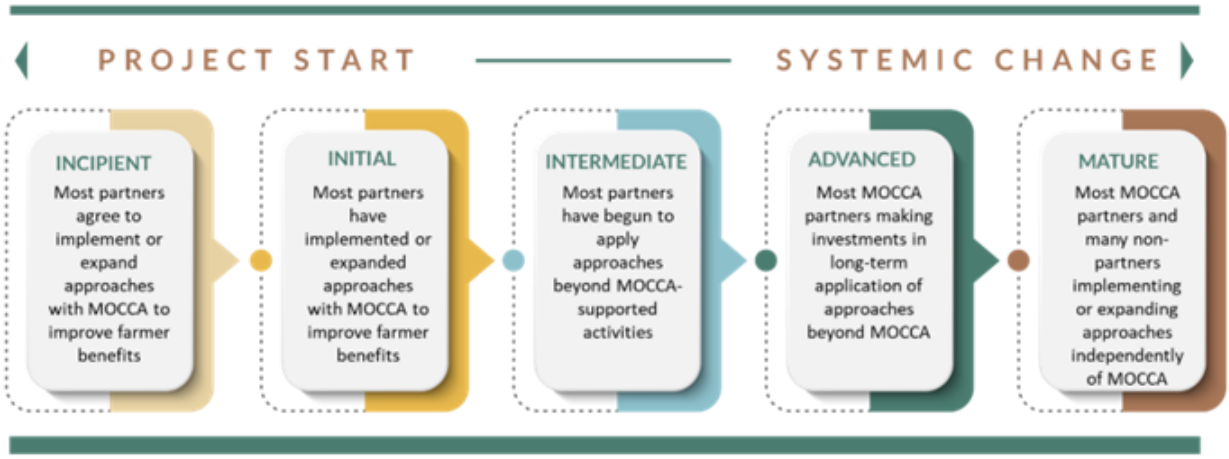
2.2 Market-system level Evaluation

2.2.1 Evaluation Design

At the market system level, this report focuses on exploring the degree to which MOCCA partners had incorporated changes into their business models, practices or workplans in response to the incentives and support provided by the project. The evaluation also sought to assess to what degree those changes were likely to expand or continue beyond project support or project end. The overall framing for the assessment uses the Systemic Change Pathway (**Figure 1**) developed by the Market Development Facility[2], which defines stages of systemic change related to project implementation and helps to visualize the depth of the changes brought about by MOCCA among target businesses and institutions within the market. The approach uses four stages to mark levels of change, see below. We have added a preliminary stage (incipient) to capture where partners have made commitments but have yet to adopt new approaches. Here we provide the generic definitions associated with each of the five stages.

[2] See: https://www.enterprise-development.org/wp-content/uploads/Case_8SystemicChangeMDF.pdf

Figure 1. Systemic Change Pathway



2.2.2 Data Collection Strategy

Our data collection strategy had three components:

1. **Document review** of MOCCA documents to understand how the project had realized its ToC for each activity and sector. Then, we updated the initial ToC through validations with MOCCA teams at global and national levels.
2. **ToC elicitation** sessions with MOCCA staff including all implementing partners, all countries, and sectors to understand how the ToC was realized across different contexts.
3. **Interviews with MOCCA partners and non-partners** across all countries and sectors to understand behavior change and MOCCA contributions to those changes were carried out between December 2024 and April, 2025.

The **sampling** of actors to be interviewed to collect primary data followed this process: The sampling used MOCCA partner lists in each country and value chain, selecting 8–20 actors per sector, covering diverse actor types and activities. Interviews also included national commodity institutes or key public entities, focus groups with MOCCA technicians, and 4–7 non-partner actors (some from baseline). In coffee, 139 individuals were consulted and in cacao, 136 individuals (**Table 1** and **Table 2**). This ensured representation across actor types, activities, and partner status.

Table 1. Key informants for Coffee

	El Salvador	Guatemala	Honduras	Peru	Total
Partners	10	12	9	15	46
Non partners	7	6	5	4	22
Individuals	32	37	34	36	139

Table 2.Key informants for Cacao

	Ecuador	El Salvador	Guatemala	Honduras	Peru	Total
Partners	12	7	9	10	18	56
Non partners	4	5	6	4	6	25
Individuals	29	22	25	24	36	136

Once the sample was identified, we **collected data** as follows:

- *In-country semi-structured interviews* were used to collect information from MOCCA partners and non -partners. We modeled the instruments after the Market Development Facility (MDF)[3] pathway for systemic change. Instruments integrated questions to assess the strength of MOCCA's contribution vs that of other actors and factors to the changes.
- *Small group interviews with field technicians* employed by MOCCA partners were similar to interviews with MOCCA partners, but focused more on training activities, and provided a perspective from the field as well as exploring contextual changes within or impacting the sector locally and changes observed among small farmers.

2.2.3 Data Analysis

To analyze the data, we followed this process:

- *ToC data* was used to create a visual map of MOCCA implementation in different countries and sectors to map expected causal pathways and prioritize key outcomes to assess and serve as evidence for the contribution analysis.
- The information from all informants in each sector was used to generate quantitative *descriptions of the type and level of changes* among MOCCA partners for a given country/sector that can be associated with the project. We also scored each country/sector vis a vis the Systemic Change Pathway to assess the depth of change observed among MOCCA partners within each country for each commodity.
- Using the evidence gathered, a *contribution analysis* was conducted by mapping evidence from the ToC elicitations and interviews to assess the plausibility and strength of MOCCA's contribution to changes observed, considering alternative explanations and other contributors.

To do that, we organized the data into a contribution analysis framework, including 5 components (1) impact trajectory, (2) explanatory mechanism, (3) body of evidence (testimonies that support the explanatory mechanism) and (4) strength of evidence. For the outcomes of each activity, we also identify facilitating and limiting factors through inductive categorization. Statements identified through interviews were first characterized by type of explanatory mechanism. The body of evidence was then assessed to determine the mechanism with the strongest evidence and contribution.

Impact trajectory categories are (1) confirmed (Clear evidence that several immediate and intermediate outcomes have been achieved), (2) initiated (Evidence that some immediate outcomes have been

[3] Strategic Guidance Note No. 3, "Achieving Change in Markets: MDF Framework for Defining and Populating Pathways to Systemic Change" (MDF, 2015)

achieved), (3) not yet initiated (Little/no evidence that progress has been made toward the first outcomes), (4) indetermined (Lack of clarity regarding changes and their impacts).

Explanatory mechanism categories are (1) primary explanatory mechanism (Target mechanism (MOCCA) accounts for the observed outcomes), (2) combined explanatory mechanism (MOCCA together with other actors or mechanisms account for the observed outcomes), (3) no evidence of the contribution of MOCCA (Non-target mechanism accounts for observed outcomes), (4) undetermined (no clear evidence on contributor).

Strength of evidence categories are (1) strong (Large and diverse converging evidence based on different sources; many key actors agree), (2) moderately strong (Some evidence from different sources; some key actors agree), (3) moderately weak (Small evidence base; some conflicting interpretations from different key actors), (4) weak (Little evidence and/or low consensus among key actors).

Strength of evidence for sustainability categories are (1) strong (partners express intention to continue, more than half are already implementing autonomously, non-partners are interested and at least one is already replicating; (2) moderately strong (partners express intention to continue and at least half are already implementing changes autonomously, non-partners are aware and view favorably; (3) moderately weak (partners express intention to continue, but there is little evidence of anyone doing so; (4) weak (partners do not express plans to continue or very few do, just one of many is implementing changes autonomously, some concerns are expressed regarding sustainability).

2.3 Farmer-level Evaluation

2.3.1 Evaluation Design

The original evaluation design contemplated an impact assessment with comparison groups; however, due to restrictions and delays caused by the COVID-19 pandemic, the methodology was adjusted to a before-and-after design. At the farmer level, we compared key indicators for beneficiary farmers prior and post project implementation (i.e., a before and after evaluation).[4] Under this design, we measured the contributions of the MOCCA project to the observed changes. The main limitation of this is that changes we observed could not be entirely attributed to MOCCA as they could have been caused by other factors. To address this issue, we documented potential external (to MOCCA) factors using farmer-level, monitoring and qualitative data, to control for these during the analysis (when needed), and used this information to demonstrate a plausible association between the project implementation and the observed outcomes.

For yields, we were able to obtain secondary data from farmers in the MOCCA regions, but that were not MOCCA beneficiaries, for the same period when MOCCA was implemented. Thus, only for this impact variable, we compared the changes in yields over time (i.e., baseline and endline) between beneficiary farmers and these non-beneficiary farmers, to determine whether the project had any impact on yields. Though this is not an ideal comparison, it is a second-best alternative in the absence of a control group. Unfortunately, we did not have similar information for other outcome and impact

[4] Using difference-in-difference (DiD) with propensity score matching was not possible because the pandemic caused by COVID-19 made it difficult to obtain information from potential counterfactual ('control') farmers in time for baseline data collection.

variables that MOCCA intended to influence, mainly because the secondary data was obtained by TNS from ENVERITAS, and yields is one of the indicators they collect. This dataset covers the 2020–21 through 2023–24 harvests; data for the 2024–25 harvest was not yet available at the time of analysis, as ENVERITAS collects information one year after the harvest. Accordingly, data for the 2024–25 harvest will be collected between October 2025 and early 2026.

Finally, while the evaluation design at the farmer level included collecting baseline, midline, and endline data, the results presented in this study only analyze the changes between baseline and endline years, because the midline survey was implemented only with one-half of project beneficiaries.[5]

2.3.2 Sampling Strategy and Sample

We estimated the appropriate sample size using a simple random sampling formula (commonly used to estimate sample size):

$$n = \frac{N * Z_{\alpha}^{2} * p * (1-p)}{d^{2} * (N-1) + Z_{\alpha}^{2} * p * (1-p)} \quad (1)$$

where n is the sample size, N the population of farmers that will be reached under MOCCA, Z_{α} is the z value at a 95% confidence level for a two-tail normal curve (1.96), p is the proportion of farmers that will benefit from MOCCA (assumed at 0.5),[6] and d is the absolute precision level (assumed at 5%). Since we did not anticipate using simple random sampling due to cost considerations, we adjusted these estimations to account for a design effect (factor of 1.15)[7] and expected attrition (5%). Within each country, we distributed the sample size proportional to the square root of the (beneficiary) population of each anchor firm, to better balance the representation of anchor firms with smaller beneficiary populations in the sample.[8] We also distributed the sample proportional to the municipality's population,[9] after excluding municipalities with less than 10 farmers. We also identified replacement farmers at the same geographic level.

The actual attrition rate was much higher than expected due to several factors (not participating in MOCCA after baseline, migration, not growing the crops anymore, etc.; see ***Table A 2***). The main implication of this was that, instead of conducting the analysis using a balanced panel of observations (i.e., data for the same households at baseline and endline), we assumed an unbalanced panel of data because at endline we surveyed new farmers to replace the farmers who discontinued their participation in the project (to maintain the sample size). These new farmers were randomly sampled

[5] This was determined since the initial project proposal was developed.

[6] We estimated the sample size using this formula prior to knowing that a counterfactual would not be possible to include.

[7] We assumed a primary sampling unit size of six (households) and intra-class correlation of 3%.

[8] In practice, this increases the proportion of smaller populations in the sample and decreases it for larger populations, thus balancing the representativeness of anchor firms with smaller target beneficiary populations.

[9] Except for cacao-Peru, where we identified the sample at the province level.

from a list of beneficiary farmers (who had received at least two MOCCA trainings[10]) from the same municipalities (or nearby municipalities when no additional beneficiaries were available for sampling) to maintain the sample representativeness. For robustness, in addition to estimating our regressions for an unbalanced panel (using the full sample), we also estimated the regressions using only the balanced panel (using the subset of the sample that was surveyed both at baseline and endline).

Table 3 shows the population of expected MOCCA beneficiaries at the time we determined the sample sizes for the evaluation, at baseline. The table also includes the initial and updated expected sample size for the baseline[11] and the actual number of surveys done at baseline and endline, for coffee and cacao, in each country. While we expected to survey 2,114 coffee and 1,128 cacao producers at baseline (all countries), we surpassed this goal in coffee and did not reach it in cacao. However, in both value chains we faced challenges to complete the planned number of surveys in at least one country. For coffee, we were able to survey only 92% of the expected sample in El Salvador, while for cacao we surveyed only 80% of the expected sample in Ecuador.[12] In all other countries, we reached above 94% of the expected sample. In the case of coffee, the lower number of surveys was offset by the additional surveys done in Peru (55% over the goal), though this did not solve the potential negative impact in the representativeness of the sample for El Salvador. At endline, we were able to survey 95% of the baseline sample because of difficulties in reaching the farmers, refusal by some farmers to be interviewed, and the limited time we had to finish data collection in El Salvador and Nicaragua.[13]

The baseline sample at the project level included farmers from 145 municipalities in coffee and 115 in cacao,[14] located at an average altitude of 1350 m.a.s.l. and 411 m.a.s.l., respectively (**Table 4**). The countries that included the most municipalities in the sample were Honduras and Peru for coffee, and El Salvador and Ecuador for cacao. At endline, we surveyed slightly fewer municipalities for both coffee and cacao. Further, post baseline, we identified errors in the location of the farmers and corrected this prior to endline implementation, which is why the number of municipalities at baseline differs with the number reported in the baseline report.

[10] Given that the project only counts beneficiary farmers if farmers participate in at least two trainings, we used this criterion to exclude farmers who had not actively participated in the project, to be consistent with monitoring data reported to USDA.

[11] In coffee in El Salvador, the sample size was adjusted down because the expected population of beneficiaries decreased. In cacao Ecuador and Guatemala, one anchor firm in each country did not participate in MOCCA so the expected population of beneficiaries also decreased.

[12] This was due to criminal activity in some intervention areas and in order to protect data collectors' safety, it was not possible to reach the full sample in Ecuador; instead, 80% of the targeted farmers were surveyed.

[13] The deadline to finish data collection was compressed due to USDA decisions, which did not allow us to extend field work to attempt to survey all farmers we planned to survey.

[14] Its equivalent for Ecuador is 'canton' and for Peru is 'district'.

Table 3. Sampling frame, expected baseline sample, and realized baseline and endline samples

Sampling details	Ecuador	El Salvador	Guatemala	Honduras	Nicaragua	Peru	All countries
Coffee							
Population		5,000	9,000	7,600	11,033	6,800	**39,433**
Initial expected sample at baseline		430	445	441	447	437	**2,200**
Updated expected sample at baseline	n.a.	344	445	441	447	437	**2,114**
Realized sample at baseline		316	451	422	422	677	**2,288**
Realized sample at endline		297	426	525	413	519	**2,180**
Cacao							
Population	4,062	1,800	986	1,200	3,500	5,373	**16,921**
Initial expected sample at baseline	385	106	101	86	148	432	**1,258**
Updated expected sample at baseline	283	106	73	86	148	432	**1,128**
Realized sample at baseline	227	103	73	87	142	429	**1,061**
Realized sample at endline	234	91	73	86	138	387	**1,009**

Table 4. Baseline and endline sample information

Sample information	Ecuador	El Salvador	Guatemala	Honduras	Nicaragua	Peru	All countries
Coffee producers at baseline							
# municipalities		23	32	36	18	35	144
Altitude (m.a.s.l.)⊗	n.a.	994	1,524	1,158	805	1,553	1,350
Number of households		**316**	**451**	**422**	**422**	**677**	**2288**
Coffee producers at endline							
# municipalities		25	28	35	19	28	135
Altitude (m.a.s.l.)*	n.a.	916	1,453	1,230	808	1,561	1,235
Number of households		**297**	**426**	**525**	**413**	**519**	**2180**
Cacao producers at baseline							
# municipalities	33	36	3	7	11	25	115
Altitude (m.a.s.l.)⊗⊗	168	512	155	284	408	591	411
Number of households	**227**	**103**	**73**	**87**	**142**	**429**	**1061**
Cacao producers at endline							
# municipalities	23	31	3	6	10	21	94
Altitude (m.a.s.l.)**	129	608	330	269	369	611	411
Number of households	**231**	**93**	**70**	**86**	**138**	**384**	**1002**

⊗527 observations with no GPS data

*288 observations with no GPS data

⊗⊗ 65 observations with no GPS data

** 132 observations with no GPS data

2.3.3 Sample Attrition and its Implications

Attrition, when the same household cannot be surveyed repeatedly, is a well-documented challenge in longitudinal studies and can pose serious threats to the internal validity of impact evaluations when not appropriately addressed (Little & Rubin, 2019). In the MOCCA project, attrition rates varied substantially across countries and crops. As shown in **Table *5***, attrition in the coffee sample reached 72.5% in El Salvador, exceeded 50% in Guatemala, and was just below 50% in Honduras and Peru. The situation was even more pronounced in cacao, with rates as high as 88.6% in Ecuador and over 60% in El Salvador. Only Guatemala maintained a relatively low attrition rate of 28.8%. Although these levels are considered high in most longitudinal studies, it is important to note that MOCCA spans a longer timeframe than average projects (usually 3-5 years), which naturally increases exposure to attrition risks but also provides valuable learning on how attrition evolves over extended implementation horizons.

These heterogeneous attrition levels raise concerns about the representativeness of the panel and the potential for selection bias, particularly if attrition is systematically associated with observable or unobservable characteristics. To examine this possibility, we compared baseline characteristics between farmers who remained in the panel (i.e., were interviewed in both baseline and endline) and those who dropped out (attriters; only interviewed at baseline). The results (**¡Error! No se encuentra el origen de la referencia.¡Error! No se encuentra el origen de la referencia.¡Error! No se encuentra el origen de la referencia.¡Error! No se encuentra el origen de la referencia.***¡Error! No se encuentra el origen de la referencia.*) reveal statistically significant differences across several dimensions. From an economic standpoint, attriters in Ecuador and Peru (cacao) and Guatemala (coffee) had higher yields and larger volumes of product sold, while in El Salvador (both coffee and cacao), attriters reported significantly higher baseline sales. These suggest that in Ecuador and Peru (cacao) and Guatemala (coffee), farmers who exited MOCCA were more productive (obtained higher yields), while in these countries plus El Salvador, there is a pattern of exit among more commercially engaged producers. The reasons for this attrition are listed in ***Table A2***, and although it varied by country, one of the main reasons was that farmers or partners did not want to continue receiving training or continue participating in long surveys.

Demographic differences were also evident. In countries such Guatemala, attriters tended to be younger and, in some cases, less likely to belong to female-headed households. These differences may reflect greater mobility or differing opportunity costs of participation across demographic groups. Furthermore, variation in farm structure and management practices also emerged. For instance, in Ecuador, attriters were more likely to hold farm certifications and to manage larger cultivated areas. Additionally, in countries such as Honduras and El Salvador, differences were found in the adoption of improved agricultural practices, particularly the use of fertilization techniques and pest and disease monitoring systems. Attriters were found to be more likely to adopt improved agricultural practices.

To formally assess whether these observed differences translate into systematic attrition, we estimated probit models to identify the marginal effects of baseline characteristics on the probability of remaining in the panel (**Table 6**). The results indicate several consistent patterns across countries. In Guatemala (coffee), farmers with higher yields were significantly less likely to remain in the project, suggesting that more productive farmers may have exited the panel, potentially due to the opportunity costs associated with time-intensive participation or greater market orientation. In contrast, in Honduras (coffee), the use of fertilizers informed by visual assessments or soil analysis, as well as the implementation of pest and disease monitoring systems, were positively associated with panel retention. These findings suggest that more engaged or better-supported farmers were more likely to remain in the project. Similarly, in

Peru (cacao), older farmers had a higher probability of staying in the project, a pattern that aligns with broader findings in longitudinal agricultural surveys showing that younger or more mobile populations are harder to retain (Beegle, De Weerdt, & Dercon, 2011).

Table 5. Sample attrition by country and crop

Crop/Country	# farmers only at baseline (attriters)	# farmers both at baseline & endline (panel)	Attrition rate (%)
Coffee			
El Salvador	229	87	72.47%
Guatemala	265	186	58.76%
Honduras	208	214	49.29%
Peru	335	342	49.48%
Cacao			
Ecuador	201	26	88.55%
El Salvador	65	38	63.11%
Guatemala	21	52	28.77%
Honduras	46	41	52.87%
Peru	206	223	48.02%

Notes: Attriter farmers are farmers who were surveyed at baseline but did not continue in MOCCA. Panel farmers are farmers who were surveyed both at baseline and endline. Attrition rate estimated by dividing the number of farmers that were only surveyed at baseline by the sample size (attriters + panel)

Given that attrition is only partially explained by observable characteristics (pseudo R^2 in the estimated models ranged from 0.03 to 0.25), we can control for part of the attrition using baseline data, as unobserved factors, such as health shocks or opportunity costs of other activities, likely also influence continuity in the project. This underscores the importance of employing robust evaluation methods that account for selection on observables and are designed to mitigate bias from unobserved heterogeneity (Wooldridge, 2010).

Non-random attrition is a well-recognized threat to the internal validity of impact evaluations, especially when dropout is correlated with potential outcomes (Fitzgerald, Gottschalk, & Moffitt, 1998). In the case of MOCCA, attrition rates were substantial across several countries and crops. It is also important to note that MOCCA's relatively long duration compared to similar projects made panel maintenance more complex, which partly explains the observed attrition rates. However, a key and reassuring finding from the analysis is that core impact variables, such as yields, renovation practices, and pest and disease management (to name a few), were not consistent predictors of attrition across countries, meaning they did not significantly influence the likelihood of dropping out of the project. This pattern significantly reduces concerns that attrition may systematically bias impact estimates. While certain country-specific associations did emerge, for example, higher yields were negatively associated with panel retention in Guatemala (coffee), such relationships were not observed consistently across countries. This suggests that the attrition process, though non-random, was not driven by the outcome variables of primary interest, thereby mitigating the risk of endogenous attrition bias in the estimation of program effects.

Nonetheless, to safeguard the validity of the evaluation, the analysis employed a set of mitigation strategies grounded in best practices from the impact evaluation literature. First, we utilized an unbalanced panel approach, retaining all available observations (excluding outliers) regardless of whether a farmer was surveyed at both baseline and endline. This strategy allowed for the full use of the data and helped preserve statistical power (Deaton, 1997). Second, all econometric models incorporated a comprehensive set of baseline covariates, enabling control for selection on observables, an essential technique when dealing with potential attrition bias (Heckman, Ichimura, & Todd, 1998). Third, we conducted robust checks by re-estimating key models on a balanced panel subsample; that is, only using the subset of farmers who were surveyed both at baseline and endline. Because our main findings did not change when estimating regressions using the balanced panel, we do not include these regression results in this document. The stability of results when estimating the models using unbalanced and balanced panels lend further credibility to the findings.

Even with these precautions, we acknowledge the possibility that unobserved factors may have influenced attrition in ways that cannot be fully captured by baseline data. In conclusion, while the extent and nature of attrition in MOCCA posed real methodological challenges, the empirical evidence suggests that it was not systematically linked to key outcome variables. We used robust evaluation techniques to provide a foundation for credible inference. These findings also support the internal validity of the reported impacts.

Table 6. Marginal effects of baseline characteristics on the probability of panel retention (participating in MOCCA at baseline and endline)

	Marginal effects in Coffee				Marginal effects in Cacao				
Characteristics of producers at baseline\a	**El Salvador**	**Guatemala**	**Honduras**	**Peru**	**Ecuador**	**El Salvador**	**Guatemala**	**Honduras**	**Peru**
Impact variables									
Yields (kg/ha)	-0.000	-0.000***	0.000	0.000	-0.000	0.002	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
Quantity of coffee/cacao sold (kg)	-0.000	0.000	-0.000	-0.000	-0.000	-0.002	0.001*	0.001	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)	(0.000)	(0.000)
Income from coffee/cacao sales (US$)	0.000	0.000	-0.000	-0.000	0.000	-0.001	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
Sociodemographic variables									
Age of respondent (years)	-0.002	-0.000	0.002	-0.000	0.001	-0.003	-0.006	-0.004	0.005**
	(0.003)	(0.000)	(0.002)	(0.000)	(0.001)	(0.004)	(0.004)	(0.004)	(0.002)
Female-headed household (% yes)	0.091	0.048	0.102	0.095	-0.045	-0.046	0.100	0.179	-0.048
	(0.081)	(0.059)	(0.062)	(0.058)	(0.053)	(0.119)	(0.119)	(0.111)	(0.051)
Farm characteristics									
Coffee/cacao area (ha)	-0.044	-0.027	-0.006	0.043	-0.011	0.067	-0.065	0.024	-0,000
	(0.054)	(0.029)	(0.016)	(0.036)	(0.016)	(0.058)	(0.070)	(0.052)	(0.000)
Farm has certifications (% yes)		-0.025	-0.028	-0.008	0.056		0.152	0.178	0.029
	.	(0.119)	(0.057)	(0.066)	(0.078)	.	(0.134)	(0.127)	(0.056)
Average tree age (years)	-0.017	0.005	0.011	-0.009	-0.001	0.045	0.016	0.027*	0.011*
	(0.011)	(0.006)	(0.008)	(0.010)	(0.003)	(0.065)	(0.028)	(0.013)	(0.005)
Adoption of practices (% yes)									
Did renovation	-0.121	-0.025	-0.041	0.014	-0.081	0.182	0.434	0.264*	0.105
	(0.174)	(0.066)	(0.074)	(0.056)	(0.085)	(0.134)	(0.225)	(0.131)	(0.061)
Did pruning	-0.018	-0.043	-0.063	-0.031	-0.060	0.186	0.212		0.007
	(0.099)	(0.058)	(0.060)	(0.057)	(0.049)	(0.130)	(0.221)	.	(0.074)
Applied fertilizer to coffee based on visual characteristics of the plant or using soil analysis	0.055	-0.059	0.113*	0.091					
	(0.123)	(0.073)	(0.055)	(0.058)	n.a.	n.a.	n.a.	n.a.	n.a.
Applied fertilizer to cacao using soil analysis or based on nutrient balance of expected harvest	n.a.	n.a.	n.a.	n.a.	.	.	.	.	.
Implemented any pest and disease monitoring system	.	0.053	0.285***	0.088	0.106	0.198*	-0.330	0.276	0.167
		(0.054)	(0.046)	(0.049)	(0.063)	(0.100)	(0.176)	(0.143)	(0.165)
Mean of the dependent (binary) variable	**0.333**	**0.379**	**0.493**	**0.518**	**0.121**	**0.37**	**0.722**	**0.464**	**0.521**
Pseudo R2	**0.124**	**0.0833**	**0.12**	**0.0337**	**0.143**	**0.251**	**0.154**	**0.222**	**0.111**
Number of households	**147**	**356**	**345**	**438**	**215**	**81**	**72**	**84**	**426**

Standard errors in parenthesis

a\ Additional control variables included in the regressions (but not shown) are whether anyone in the household received remittances, if anyone received agricultural information, and altitude.

2.3.4 Data Collection

We prepared structured instruments for coffee and cacao. The year of reference for the baseline was the 2019-2020 agricultural year (cohort 1) and the 2020-2021 agricultural year (cohort 2), and for endline was the 2024 (Peru) and the 2024-2025 agricultural year (all other countries). TNS and LWR staff validated these questionnaires so they would provide the needed information to respond to the MOCCA indicators, and to adapt it to the local culture and context of each country.

At baseline, crop technicians who eventually became project trainers conducted the surveys. This was possible because the interaction between these technicians and farmers at the time of data collection was minimal to non-existent; so we assumed there would be no enumerator bias in the data. At endline, survey firms conducted the surveys, while Alliance staff handled enumerator training, on-site and remote data quality control, and data cleaning.

Enumerator training was key to ensuring high-quality data collection. For the baseline during the pandemic, the Alliance, together with TNS, LWR, and MOCCA, held 19 virtual sessions and one in-person session, each lasting three days with theory, software practice, and pilot interviews. These took place from September–December 2020 (cohort 1) and April–July 2021 (cohort 2). For the endline, trainings lasted five days, mostly in person except in Honduras and Guatemala. Interviews took place in Peru in October 2024, and in Ecuador, Honduras, Guatemala and El Salvador in April 2025. Data collection started immediately after each training.

Finally, to comply with best practices regarding the protection of human subjects in research and data management, we obtained approval from the International Center for Tropical Agriculture's (CIAT) Institutional Review Board prior to the start of field activities (Appendix 9.2).

2.3.5 Data Analysis

We analyzed farmer data using descriptive statistics at the country level and the project level (all countries combined) and using multivariate regression (econometric) analysis at the same two levels. For descriptive statistics we present mean values and the results of a statistical test between baseline and endline means. Descriptive statistics allowed us to characterize the coffee and cacao-producing populations in the project's target intervention areas and compare differences in means between baseline and endline results. For key MOCCA indicators, we present results disaggregated by sex of beneficiary farmer and age group (15-29 years of age vs. $\geq$30 years).

Our econometric analysis allowed us to estimate the effect of the MOCCA project on key outcome and impact variables (yields, income from crop sales, and adoption of key improved agronomic practices), while controlling confounding factors that may have influenced the variables that interested us. To identify a suitable estimation approach and assess robustness, we first tested three model specifications[15], then selected the most appropriate one. Then, for the selected model specification, we

[15] The model specifications tested were: (i) fixed effects logistic regression, which controls for unobserved time-invariant farmer characteristics but excludes time-invariant covariates and farmers without outcome variation (Greene, 2012); (ii) random effects logistic regression, which allows broader covariate inclusion but assumes no correlation between unobserved effects and regressors (Baltagi, 2008); and (iii) the linear probability model (LPM) with two-way fixed effects, which offers straightforward interpretation of coefficients as marginal effects and fewer assumptions, though it may predict probabilities outside [0,1] and is sensitive to heteroskedasticity (Angrist & Pischke, 2009; Wooldridge, 2010).

conducted the analysis using unbalanced data (full baseline and endline samples), the results of which are presented in this report, as well as using only the balanced panel data (households surveyed at both baseline and endline), whose results are not included because the significance of the main variables of interest do not change, which gives us confidence in our results.

After weighing the trade-offs between the three models, we selected the linear probability model (LPM) with two-way fixed effects because it balances robustness, flexibility, and interpretability, while allowing control for both observed and unobserved confounding factors at the individual and spatial levels. We used this specification for all our dependent variables, and controlled for key covariates such as age, sex, education, tree age, etc., with municipality fixed effects capturing spatial heterogeneity. In all models, the standard errors were clustered at the municipality level, following best practices for grouped data (Cameron & Miller, 2015). Combined with the descriptive statistics analysis, we consider that our estimations enhance the internal validity and credibility of findings on MOCCA's contribution to farmer-level outcomes. For the estimations (regressions) done only with the balanced panel, we controlled for baseline values (when available), in addition to other control variables.

Our dependent variables included both impact and outcome measures. Impact variables were **income** (gross coffee/cacao sales in US$, deflated) and **yields** (kg sold per hectare[16], using sales instead of harvests), and in both variables we excluded outliers[17]. Outcome variables captured adoption of MOCCA-promoted practices: **renovation** and **rehabilitation** of trees, **use of fertilizers**, **shade tree pruning**, **selective harvesting**, and **use of farm waste**. These outcome variables are binary, taking the value 1 if the farmer performed the practice and 0 otherwise.

The full list of the MOCCA-promoted practices and the definition of an adopter farmer is provided in *¡Error! No se encuentra el origen de la referencia.* for coffee and *¡Error! No se encuentra el origen de la referencia.* for cacao. In our econometric analysis, we are interested in the changes over time (which we assume MOCCA contributed to), and of key activity-level variables and sex-disaggregated dependent variables, in the above (dependent) variables. We measure the contributions of MOCCA to the changes in the dependent variables by including a time variable in our regression models (i.e., variable named "survey wave"), which allows us to measure the changes between baseline and endline values. To measure the contributions of activity-level variables, we included one variable for each of five main MOCCA activities (farmer training, market linkages, improved research, strengthening suppliers of planting materials, and facilitating access to finance) in our regression models. We also included two variables related to sex and household decision-making(i.e., variable named income use decided jointly by couple, and sex of the farmer) to determine whether there is any heterogeneity in results associated with these factors.

[16] We planned to estimate this variable using the amount harvested, but the data contained inconsistencies that we could not clean. Since both coffee and cacao are cash crops, we decided to use the amount sold (in green coffee or dry cacao) and divided it by the area planted with each crop.

[17] For our analysis, we excluded outlier values that were over three standard deviations above the mean (identified by dividing income per area, not total income) However, we show the results with outliers included, in the annex, for reference.

3 Achievements against Performance Indicators

We discuss the achievements of the project against its performance indicators, using monitoring data up to the 2023-2024 harvest for eight of the indicators[18] and with full information for the remaining ones. Thus, for these eight indicators, the LOP achievements will be larger. We discuss achievements according to the main MOCCA activities and highlighting which value chain contributed the most (though MOCCA did not have targets per value chain): **activity 1)** farmer training, **activity 2)** market linkages, **activity 3)** improved research, **activity 4)** strengthening suppliers of planting materials, **activity 5)** facilitate access to finance, **activity 6)** supporting trade association service provision, and **activity 7)** bolster platforms.

For **activity 1- farmers training**, **the project reached, on average, 108% of its target. Roughly 73% of farmers trained were coffee farmers and 27% cacao farmers (Table *7*)**. This distribution reflects the project design: the coffee target was approximately three times larger than cacao, and more resources (funding and personnel) were allocated to coffee. However, both value chains were integral to MOCCA's objectives, with coffee and cacao contributing in complementary ways to strengthening market systems in the region.

Table 7. MOCCA Activity 1: Achievements on project-level indicators

MOCCA Activity	Performance indicator	New targets (extension)	Progress (LOP MOCCA)	% reached
1	Number of individuals in the agriculture system who have applied improved management practices or technologies with USDA assistance	102,042	109,372	107%
1	Number of hectares under improved management practices or technologies with USDA assistance	104,895	143,342	137%
1	Number of individuals benefitting indirectly from USDA-funded interventions	520,000	555,754	106.9%
1	Number of individuals who have received short-term agricultural sector productivity or food security training as a result of USDA assistance	120,000	130,243	108.5%
1	Yield (Kg/Ha) of targeted agricultural commodities among program participants with USDA assistance - coffee	839	789	94.0%
1	Yield (Kg/Ha) of targeted agricultural commodities among program participants with USDA assistance - cacao	458	336	73.4%

Source: MOCCA monitoring system

For **activity 2**, the project exceeded its target in the number of farmers accessing improved markets through partnerships supported by MOCCA; 67% of those farmers were cacao farmers. For the volume and sales indicators, the project reached, on average, 93% of its target (including information from the last harvest). For the value of annual sales of farms and firms receiving USDA assistance, MOCCA reached 95% and 115% of its target in coffee and cacao, respectively, including information from the last

[18] Indicators in rows 1, 2, and 5-10, in bold.

harvest. We used survey data to estimate that in the last harvest, the total value of sales was $363.89 million from coffee and $148.15 million from cacao, suggesting that the project surpassed its target in cacao (by 15%) and reached 95% of its target in coffee. Similar achievements were made in the volume (MT) of commodities sold by farms and firms receiving USDA assistance, reaching 80% and 83% of the target in coffee and cacao, respectively, including information from the last harvest. Similar to the value of sales, we used survey data to estimate that farmers sold 65,622 MT of coffee and 20,503 MT of cacao in the last harvest, suggesting that the project reached 80% and 83% of its target for coffee and cacao, respectively.

MOCCA fell short of these life-of-project (LOP) targets for two main reasons. First, when setting coffee volume and value of sales targets, the Project assumed an extrapolation base of 60,000 households for 2023–2025. In practice, trained farmers represented 47,943 households in 2023 (after training 68,490 farmers) and 57,973 households in 2024 (after training 82,819 farmers). The Project only surpassed the 60,000-household base in 2025, reaching 64,428 households (after training 92,040 farmers). Second, the Project did not reach its targets for improved productivity, which drove volume and value of sales targets. The Project had projected increased coffee and cacao productivity of 15% in 2023, 25% in 2024, and 30% in 2025. After exceeding its productivity targets in coffee, achieving 35% in 2023 (results from the 2022-23 harvest), coffee farmers supported by the Project had year to year productivity declines of 11% in 2024 (corresponding to the 2023-24 harvest) and 5% in 2025 (from the 2024-25 harvest). In cacao, farmers supported by the Project saw their productivity increase by 24% in 2022, and then drop by 10% in 2024 before increasing by 11% in 2025 (in comparison to the baseline). According to Project implementers, productivity declines were a result of different factors including the El Niño (which had significant effects across the region from June 2023 to July 2024) and the subsequent La Niña weather phenomena (which began in late 2024 and ended in April 2025). Another reason for decreased productivity in coffee could be an increase in farmers rehabilitating their coffee plants, as a result of MOCCA's training. Survey results show that 56% farmers reported stumping their coffee plants at the endline, compared to 34% at the baseline, which would result in farmers losing production in the short term, in order to achieve higher productivity in the future.

For the last indicator, the value of new USG commitments and new public and private sector investment leveraged by USDA to support food security and nutrition, MOCCA only reached 46% of its target, with 80% of investment leveraged in coffee and 20% in cacao. The relatively low share in cacao reflects broader market dynamics rather than project execution alone: in Latin America, cacao companies tend to make limited direct investments, typically through importers such as ECOM and OFI. However, if we consider two private sector commitments to be leveraged for coffee by MOCCA after the end of the project, including $12.5 million from JDE Peet's and $1.5 million from Smuckers, MOCCA's target would be exceeded. **For this activity, the project reached, on average, 69% of its target (84% when including sales information from survey data) (Table *8*)**.

Table 8. MOCCA Activity 2: Achievements on project-level indicators

MOCCA Activity	Performance indicator	New targets (extension)	Progress (LOP MOCCA)	% reached
2	Value of annual sales of farms and firms receiving USDA assistance - Cacao	319,127,887	367,781,171	115%
2	Value of annual sales of farms and firms receiving USDA assistance - Coffee	2,067,019,522	1,956,416,001	95%
2	Volume (MT) of commodities sold by farms and firms receiving USDA assistance - coffee	667,156	535,413	80%
2	Volume (MT) of commodities sold by farms and firms receiving USDA assistance - cacao	130,791	108,350	83%
2	Number of farmers accessing improved markets through partnerships supported by the project	36,000	40,757	113.2%
2	Value of new USG commitments and new public and private sector investment leveraged by USDA to support food security and nutrition	21,000,000	11,869,780	56.5%

Source: MOCCA monitoring system

For **activity 3**, MOCCA surpassed its target by 60% in the number of technologies, practices, and approaches under various phases of research, development, and uptake as a result of USDA assistance, 65% of technologies in coffee and 35% in cacao; and only achieved 64% of its target in the number of market system actors disseminating research findings as a result of USDA support, 74% of actors in cacao and 26% in coffee. MOCCA funded the creation of a research geoportal with Promecafe, aimed at disseminating a wide range of research study results, including those funded via MOCCA's matching grant research fund managed by Promecafe, which Promecafe launched at a research symposium they organized in El Salvador in July. The Project aimed to promote its use with market system actors, following the symposium, and to develop easy-to-understand infographics actors could download and share with farmers via WhatsApp; however, the Project did not invest in the infographics, or promote the geoportal's use with market system actors due to the Project's earlier-than-anticipated conclusion. **For this activity, MOCCA exceeded its target, on average, by 12% (Table 9**

For **activity 4**, MOCCA achieved 82% of its target in the number of plants and budwood acquired from strengthened seedlots, nurseries, and clonal gardens, 99% of which were coffee plants and seeds; and exceeded its target by 44% in the number of seed-producing farms, nursery and clonal gardens supported to produce quality genetic material for planting, 73% of which were coffee and 27% cacao genetic material providers. **For this activity, MOCCA exceeded its target, on average, by 13% (Table 9)**.

Table 9. MOCCA Activities 3 and 4: Achievements on project-level indicators

MOCCA Activity	Performance indicator	New targets (extension)	Progress (LOP MOCCA)	% reached
3	Number of technologies, practices, and approaches under various phases of research, development, and uptake as a result of USDA assistance	205	328	160.0%
3	Number of market system actors disseminating research findings as a result of USDA support	90	58	64.4%
4	# of plants and budwood acquired from strengthened seedlots, nurseries, and clonal gardens (wording changed)	110,347,479	90,252,819	81.8%
4	Number of seed-producing farms, nursery and clonal gardens supported to produce quality genetic material for planting	1,055	1,519	144.0%
3, 4	Number of organizations with increased performance with USDA assistance	1,002	1,120	111.8%
3, 4	Number of organizations that received assistance from USDA-funded interventions.	1,305	1,669	127.9%

Source: MOCCA monitoring system

For **activity 5**, the project reached 89% of its target in the number of individuals accessing agriculture-related financing as a result of USDA assistance; and 167% of its target in the value (USD) of agriculture-related financing accessed as a result of USDA assistance. **For this activity, MOCCA exceeded its target, on average, by 28% (Table *10*)**. This component was managed by TNS for both value chains, but market dynamics and demand for credit differed substantially by chain and country. In cacao, several buyers advance funds for aggregation, and both producer organizations and individual farmers often prefer not to take loans, particularly in Central America.

For **activities 6 and 7**, the project achieved 92% of its target in the number of market system actors actively engaged in supporting R&R with regional platform support; and doubled its target in the number of regional platforms strengthened or created to support R&R initiatives. **For this activity, MOCCA exceeded its target, on average, by 46%, and the largest share of this achievement (roughly 61%) happened because of achievements in cacao (Table *10*).**

As is shown in **Table 9** and **Table *10***, three indicators contributed to more than one MOCCA activity. In all three indicators, the project surpassed its target, with higher contributions from achievements in coffee.

Table 10. MOCCA Activities 5; 1, 4, 5; and 7: Achievements on project-level indicators

MOCCA Activity	Performance indicator	New targets (extension)	Progress (LOP MOCCA)	% reached
5	Number of individuals accessing agriculture-related financing as a result of USDA assistance	29,992	26,605	88.7%
5	Value of agriculture-related financing accessed as a result of USDA assistance (USD)	70,000,000	116,726,939	166.8%
1, 4, 5	Number of individuals participating in USDA food security programs	135,646	158,367	116.8%
7	Market system actors actively engaged in supporting R&R with regional platform support	24	22	91.7%
7	Number of regional platforms strengthened or created to support R&R initiatives	2	4	200.0%

Source: MOCCA monitoring system

In summary, although achievements varied by indicator and country,[19] on average, targets were almost met or exceeded. Achievements in activity 2 lagged a little more than for other activities, most likely due to challenges in improving marketing conditions for the farmers and challenges in securing higher yields. These results may also highlight the challenges that anchor firms face to help farmers increase productivity, and attract sellers as farmers have the option of selling their harvest to other potential buyers. Finally, the largest achievements, on average, were accomplished in coffee.

[19] For Activities 1 and 2, the countries that stood out in terms of the number of farmers trained—and therefore reported higher sales volumes and values—were Guatemala, Honduras, and Peru in coffee, and Peru and Ecuador in cacao. For Activity 3, the cacao sector stood out by successfully engaging more actors in disseminating research. In coffee, the process was more complex: the project ended earlier than expected, which prevented the promotion of the Geoportal developed with Promecafé that could have increased the number of market actors disseminating research findings. On access to finance, Peru stood out in both coffee and cacao, Honduras in coffee, and Ecuador in cacao—reaching more farmers and therefore reporting higher amounts of financing accessed.

4 Results for Coffee

4.1 Characteristics of the Key Informants and the Farmers

4.1.1 Key informants

In coffee, MOCCA worked with a diverse range of market system actors including exporters, roasters, producer organizations, research institutions, financial institutions, public and sectoral institutions, as well as other NGOs or development projects working in the sector. Variations between countries in engagement strategy respond to differences in composition of sector and roles played by different actors vis a vis the support services MOCCA aimed to strengthen for small farmers, and the opportunities and openness of partners to collaborate in line with MOCCA's ToC. In all, MOCCA collaborated with 83 partners across five countries, ranging between 10 and 28 partners in each country (**Table *11***). Producer organizations were most numerous, for their role in last-mile service delivery to farmers. Exporters were key partners especially to drive changes in TA and market access as well as access to finance. Financial institutions were also numerous, mostly in Peru. In each country MOCCA engaged importantly with sectoral and public institutions critical to sectoral governance, to strengthen capacity to formulate and implement policies and programs as well as play a coordinating role in favor of improved support services for small farmers.

Table 11. MOCCA partners in Coffee, by actor type

Partners	El Salvador	Guatemala	Honduras	Nicaragua	Peru	Regional	Total
Exporters	1	3	4	3	3		**14**
Roaster/brand/ importer		2	4		1		**7**
Producer organizations	4	3	4	3	9		**23**
Research Institutions		1	1	1		1	**4**
Financial Institutions	1	3	1	1	9	1	**16**
NCIs and public institutions	3	1	3	2	4	1	**14**
NGOs/Projects		1			2		**3**
Others[20]	1		1				**2**
TOTAL	**10**	**14**	**18**	**10**	**28**	**3**	**83**

4.1.2 Farmers

Since we do not have a balanced panel, we reported farmers' characteristics at baseline and endline. In both rounds of data collection, we almost entirely interviewed the person responsible for the coffee plots, which gives us confidence in the accuracy of the data reported by the farmers (**Table *12***). At the project level, the number of male interviewees decreased from 75% at baseline to 68% at endline, and a similar trend was observed in each country. As expected, the average age of farmers increased between baseline and endline; however, part of this change also reflects differences in the composition of the sample over time, given attrition and the inclusion of new interviewees

[20] Nursery association in El Salvador and CAFICO in Honduras.

Table 12. Coffee: demographic characteristics of beneficiary farmers and their households

Characteristics of producers	El Salvador				Guatemala				Honduras				Nicaragua				Peru				All countries			
	BL	EL	p-value		BL	EL	p-value		BL	EL	p-value		BL	EL	p-value		BL	EL	p-value		BL	EL	p-value	
Characteristics of interviewed person (% yes)																								
Is the person in charge of coffee plots	96.0%	93.0%	0.134		95.0%	92.0%	0.110		95.0%	94.0%	0.380		90.0%	98.0%	0	***	97.0%	98.0%	0.3026		95.0%	95.0%	0.558	
Male interviewee	65.0%	60.0%	0.280		74.0%	61.0%	0.000	***	76.0%	73.0%	0.369		82.0%	73.0%	0.0028	***	76.0%	69.0%	0.02	**	75.0%	68.0%	0.000	***
Is married/free union	61.0%	70.0%	0.056	*	83.0%	84.0%	0.684		83.0%	86.0%	0.378		84.0%	81.0%	0.2125		78.0%	86.0%	0.0009	***	79.0%	83.0%	0.004	***
Age (years)	52.25	59.25	0.000	***	48.9	49.8	0.391		46.35	49.41	0.001	***	43.07	47.87	0	***	45.46	47.74	0.0052	***	46.77	49.85	0.000	***
Is the farm owner	100.0%	88.0%	0.000	***	94.0%	81.0%	0.000	***	96.0%	89.0%	0.000	***	95.0%	92.0%	0.0855	*	96.0%	87.0%	0	***	96.0%	88.0%	0.000	***
Household (HH) characteristics																								
% HHs where at least one member migrated within last 12 months:	11.0%	0.0%	0.000	***	8.0%	3.0%	0.004	***	11.0%	8.0%	0.167		9.0%	5.0%	0.031	**	10.0%	5.0%	0.0007	***	10.0%	5.0%	0.000	***
% HHs receiving subsidy from the government or NGOs	12.0%	49.0%	0.000	***	12.0%	5.0%	0.000	***	19.0%	8.0%	0.000	***	6.0%	3.0%	0.036	**	50.0%	16.0%	0.0000	***	24.0%	13.0%	0.000	***
% HHs receiving remittances	11.0%	27.0%	0.000	***	10.0%	13.0%	0.220		12.0%	12.0%	0.936		6.0%	9.0%	0.177		9.0%	1.0%	0.0000	***	10.0%	10.0%	0.323	
Household decisions																								
Households (%) where decision of how to use the income from coffee sales was **made** by:																								
Male HH head only	53.0%	49.0%	0.409		63.0%	32.0%	0	***	59.0%	32.0%	0.000	***	60.0%	43.0%	0.000	***	28.0%	18.0%	0.000	***	50.0%	33.0%	0.000	***
Female HH head only	25.0%	33.0%	0.044	**	18.0%	12.0%	0.0219	**	15.0%	12.0%	0.170		8.0%	10.0%	0.622		9.0%	5.0%	0.015	**	14.0%	12.0%	0.114	
Both spouses	15.0%	3.0%	0.000	***	8.0%	27.0%	0	***	18.0%	26.0%	0.004	***	18.0%	29.0%	0.000	***	46.0%	57.0%	0.001	***	24.0%	32.0%	0.000	***
Households (%) where decision of how to use the income from coffee sales was **consulted** with:																								
No one	60.0%	0.0%	0.000	***	77.0%	0.0%	0	***	61.0%	0.0%	0.000	***	50.0%	0.0%	0.000	***	24.0%	0.0%	0.000	***	51.0%	0.0%	0.000	***
Spouse	18.0%	79.0%	0.000	***	9.0%	24.0%	0	***	28.0%	31.0%	0.288		28.0%	17.0%	0.000	***	50.0%	11.0%	0.000	***	30.0%	27.0%	0.072	*
Number of households	**256**	**215**			**394**	**377**			**391**	**463**			**342**	**399**			**619**	**479**			**2002**	**1933**		

Migration of household members was more common at baseline, as was receiving external financial support through subsidies. We did not observe differences in the share of farmers reporting receiving remittances over time. Regarding inclusion, the share of households where both spouses decided how to use the income from coffee sales increased at endline, and the same trend happened in all countries except El Salvador, where this share drastically decreased. However, in El Salvador, we observed a significant increase in households reporting that they now consult their spouse on income decisions.

Regarding farm characteristics, although we observed a slight increase in the total farm area at endline, the differences with baseline were not statistically significant. However, when we analyze this information for each country separately, we observed that in Guatemala, farm area statistically decreased at endline, as did the coffee area. The coffee area in all other countries remained statistically the same over time, averaging 2.28 ha planted to coffee. Few households acquired coffee plots post-baseline. Finally, the number of households doing a production diagnosis and using tools to register cost of production and income statistically increased at endline, and this was the same in all countries except for the former variable in Honduras (*¡Error! No se encuentra el origen de la referencia.*).

4.2 Changes in Impact Indicators

4.2.1 Income and Sales

In this section we respond, using farmer level baseline and endline data, to the following three questions[21]. We base our discussion on econometric results for income and descriptive statistics for the amount sold:

> What changes do we observe among MOCCA beneficiary farmers in terms of income and sales of coffee and cacao? What are the contributions of MOCCA to these changes?
>
> Are there differences between female and male farmers?
>
> What other factors contributed to these changes?

Summary of changes and main contributions of MOCCA (Table *13*):

- We observed a statistically significant increase in income from coffee sales at endline in El Salvador and Honduras, and at the project level (all countries). This suggests that the project contributed to this result, but we cannot separate the effect of external market factors because of a lack of a control group. We see a sharp increase in prices between the baseline and endline.[22] Therefore, it is likely that this increase happened because of a combination of an increase in the quantity sold (as shown in the **Table *13***, which positively affected income), and mostly due to increase in prices in the market, given that other variables in the regression did not have a statistically significant effect on this variable, or had a negative effect for these two countries.
- The number of MOCCA trainings had a statistically significant positive effect on income in Peru—farmers who received more trainings obtained higher incomes.

[21] As mentioned in the methods section, we are interested in the effects of the time variable, activity-level variables, and gender-related variables, on income. We are also interested in identifying other factors that have contributed to observed changes, and we only interpret the ones that are statistically significant.

[22] https://www.bbc.com/news/articles/c36pgrrjllyo and farmers' reported price (***Table A 9***).

- Having access to MOCCA anchor firms (improved seller-buyer relationships) did not have a significant effect on income.
- While obtaining information about coffee research products from NGOs or governments had a positive effect in most countries, this effect was not statistically significant. However, when we analyzed the information for all countries together, we observed a statistically significant positive effect on income.[23]
- Selecting coffee seeds for planting from highly-productive plants had no significant effect on income. This may be because one would expect that this variable would directly affect other outcome variables (like adoption of certain practices, or even yields), but not necessarily income.
- Surprisingly, having credit and using it in coffee had a significantly negative impact on income among Guatemalan coffee producers, most likely because payments were directly deducted from coffee revenue. We suspect this result is driven by the small sample size, as few farmers reported obtaining a loan for coffee (in all countries), so we recommend interpreting this with caution.

[23] Although we do not show results for Nicaragua, the result in this country is driving this finding.

Table 13. Coffee regression results for income (US$)

Variables	El Salvador	Guatemala	Honduras	Peru	All Countries
Survey wave (1=endline)	1,116.6**	2,978.1	5,634.7***	476.5	1,715.5***
	(319.8)	(1,556.6)	(1,543.6)	(552.3)	(485.0)
Number of training modules received	-25.0	14.1	-223.3	132.3*	31.9
	(24.6)	(96.7)	(128.5)	(51.4)	(43.9)
Sold through MOCCA anchor firms (1 = yes)	-332.8	-1,333.2	1,987.1	308.5	181.0
	(275.1)	(865.0)	(1,626.9)	(346.9)	(383.4)
Income use decided jointly by couple (1 = yes)	45.1	-158.5	309.5	-468.8	124.5
	(244.4)	(688.2)	(1,031.2)	(375.0)	(378.3)
Age of farmer (years)	-7.7	-45.9	27.8	36.7	-0.0
	(14.2)	(34.3)	(75.7)	(40.0)	(27.0)
Sex of farmer (1 = male)	142.1	961.8	-1,551.4	1,492.8*	579.9
	(729.3)	(908.5)	(2,543.5)	(597.8)	(629.2)
Area planted with coffee (ha)	-454.0*	1,916.1**	2,006.9***	205.3	-566.0***
	(214.9)	(684.2)	(428.9)	(435.7)	(128.0)
Area planted with coffee (ha) squared	13.9	-288.6**	-56.1***	-47.1	45.7***
	(9.2)	(87.1)	(12.4)	(50.6)	(2.3)
Average age of coffee trees (years)	-59.5	-166.2	-129.8	109.2	-65.8
	(46.1)	(117.1)	(265.5)	(130.9)	(88.0)
Average age of coffee trees (years) squared	2.9	3.3	5.4	-11.7	0.7
	(2.2)	(3.4)	(11.2)	(7.8)	(3.2)
Number of coffee trees per hectare	-0.0	-0.4	-0.2	0.0	-0.0
	(0.0)	(0.4)	(0.2)	(0.1)	(0.1)
Productive coffee plant density (plants/ha)	-0.0	0.4	-0.0	0.3	0.1
	(0.1)	(0.4)	(0.3)	(0.2)	(0.1)
Farmer has at least one certification (1 = yes)	-3,236.2**	2,113.0	1,009.9	205.2	-131.7
	(982.3)	(1,262.6)	(1,078.3)	(423.6)	(441.8)
Reported coffee rust (1 = yes)	-579.7**	978.7	341.9	455.0	190.2
	(165.2)	(694.6)	(856.1)	(348.8)	(328.9)
Number of coffee varieties planted	181.8	-785.1***	-1,456.9***	130.9	-415.8**
	(111.2)	(227.8)	(343.9)	(132.4)	(130.5)
Farm altitude (masl)	-1.5	1.8	4.8	3.7	0.9
	(1.5)	(3.2)	(6.6)	(2.6)	(2.0)
Farm altitude squared	0.0	-0.0	-0.0	-0.0	-0.0
	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Had a loan and used in coffee (1 = yes)	n.a.	-4,017.3*	-2,027.1	946.5	259.9
		(1,682.8)	(1,448.3)	(496.9)	(484.3)
Household had a migrant in last 12 months (1 = yes)	-344.7	934.9	42.4	-285.1	-483.5
	(312.0)	(1,401.2)	(1,657.8)	(586.3)	(581.5)
Household received remittances (1 = yes)	-27.5	-82.6	-2,065.2	5,549.7***	1,226.9*
	(178.3)	(1,036.0)	(1,452.2)	(755.8)	(536.2)
Obtained information of coffee research products	144.9	385.6	-38.7	771.7	1,143.9**
from NGOs or government (1 = yes)	(162.6)	(776.9)	(945.7)	(495.4)	(372.5)
Total kilograms of green coffee sold	2.7***	4.8***	3.4***	3.9***	3.6***
	(0.4)	(0.3)	(0.2)	(0.1)	(0.1)
Farmers (%) selecting coffee seeds for planting from	-1,520.5	102.8	-1,559.8	296.7	340.0
highly-productive plants (1 = yes)	(783.0)	(892.4)	(1,820.0)	(371.8)	(421.4)
Constant	2,024.4*	-24.6	-2,196.1	-6,016.4*	437.5
	(936.2)	(2,716.0)	(7,781.8)	(2,883.6)	(2,015.6)
Observations	**471**	**771**	**854**	**1,098**	**3,935**
R-squared	**0.9**	**0.9**	**0.9**	**0.8**	**0.8**
Country controls	**No**	**No**	**No**	**No**	**Yes**
Municipality controls	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Winsorized at 3 sd above mean	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
N baseline	**256**	**394**	**391**	**619**	**2002**
N endline	**215**	**377**	**463**	**479**	**1933**

Standard errors in parentheses and clustered at the municipality level

*** p<0.001, ** p<0.01, * p<0.05

Differences between male and female farmers:

- Male farmers in Peru obtained higher incomes compared to female counterparts.

Other factors contributing to observed changes:

- While the coffee area positively affected income in Guatemala and Peru (that is, farmers with larger areas obtained higher incomes), this variable negatively affected income in El Salvador. The latter could be explained because farmers in this country may have more difficulties in properly managing larger areas of the crop.
- Surprisingly, having a farm certification negatively affected coffee income in El Salvador. This result should be interpreted with caution, as only a small share of farmers in the sample reported holding a certification. The negative association may be partly driven by sample size limitations and could also relate to the additional costs of maintaining certification, but the available evidence does not allow us to establish this with certainty.
- Reporting incidence of coffee rust negatively affected income in El Salvador.
- Having an increasing number of coffee varieties in the farm negatively affected income in Guatemala and Honduras. It is difficult to explain this effect, as it can be due to many factors, including that farmers may have recently planted new varieties (hence harvested and sold less coffee), or trees of some of these varieties may be old, etc., but we do not have the information to confirm this.
- Receiving remittances had a positive effect in Peru—farmers receiving remittances obtained higher incomes, possibly because part of this money allowed farmers to sell their harvest in places other than their farm, where they could get better prices. Remittances may also function as capital to invest in farm improvements, such as renovation and rehabilitation (R&R), which can enhance productivity and income.

The results show that, although effects varied by country, several MOCCA activities contributed to increasing farmers' income from coffee sales, though the increase in prices is what drove most of the effect. For instance, technical assistance had a positive effect in Peru, while access to research outputs and larger farm area were also associated with higher incomes in some countries. In contrast, having a loan for coffee activities was negatively associated with income in Guatemala, and female farmers in Peru reported lower income gains compared to men. These findings suggest that project activities interacted with broader agronomic and socioeconomic factors, which also influenced income positively or negatively.

Regarding sales volumes, we observed a significant increase in El Salvador and a decrease in Guatemala (**Table *14***). Although revenues from coffee sales increased in all countries, the male–female income gap widened in Peru, where male farmers experienced significantly higher income growth than female farmers (*¡Error! No se encuentra el origen de la referencia.*).

Finally, results by age group indicate that in El Salvador and Peru, older farmers achieved larger increases in income compared to younger ones, possibly reflecting greater experience in negotiating prices or accessing better marketing conditions (*¡Error! No se encuentra el origen de la referencia.*).

Table 14. Coffee: changes in key MOCCA indicators, by country

	El Salvador				Guatemala				Honduras				Peru				All countries			
Key MOCCA indicators	**BL**	**EL**	**p-value**		**BL**	**EL**	**p-value**		**BL**	**EL**	**p-value**		**BL**	**EL**	**p-value**		**BL**	**EL**		**p-value**
Yield (sold green kg/ha)	377.0	446.1	0.09	*	936.8	873.0	0.202		815.5	795.1	0.562		691.8	705.4	0.553		754.0	719.4	0.040	**
Coffee area (ha)*	1.4	1.6	0.34		1.1	0.8	0.001	***	2.5	2.2	0.107		2.5	2.5	0.876		2.3	2.3	0.999	
Farmers (%) with access to financing for coffee	0.0%	2.0%	0.12		3.0%	6.0%	0.125		8.0%	8.0%	0.774		7.0%	16.0%	0.000	***	10.0%	17.0%	0.000	***
Value of annual coffee sales (US$)	973.0	3327.8	0.00	***	3423.3	5369.1	0.001	***	7742.9	11947.2	0.000	***	6450.1	7996.1	0.000	***	5887.3	8902.1	0.000	***
Annual amount of coffee sold (kg green coffee)	409.9	641.7	0.01	**	959.6	741.3	0.070	*	1867.6	1786.6	0.685		1648.3	1677.3	0.726		1659.7	1617.1	0.669	
Farmers (%) with access to improved markets thru MOCCA's anchor firms	2.0%	6.0%	0.01	***	13.0%	6.0%	0.001	***	18.0%	11.0%	0.006	***	70.0%	59.0%	0.000	***	37.0%	23.0%	0.000	***
Number of households	**256**	**215**			**394**	**377**			**391**	**463**			**619**	**479**			**2002**	**1933**		

*1 ha (hectare) = 10,000 square meters

Notes

BL=baseline; EL=endline

p-value: differences in means between groups are significant at the 10% level (*), 5% level (**) or 1% level (***)

Yield and coffee area variables have less than 0.6% missing observation in BL. Yield and Value of annual coffee sales have less than 2.7% of missing observation in EL

4.2.2 Productivity and Production Volume

In this section, we address three key questions using farmer-level baseline and endline data.

What changes do we observe among MOCCA beneficiary farmers in terms of income and sales of coffee and cacao? What are the contributions of MOCCA to these changes?

Are there differences between female and male farmers?

What other factors contributed to these changes?

Our discussion is based on econometric results for (quantity sold/ha)[24], measured as quantity sold per hectare. Due to inconsistencies in the reported harvest data in the survey, we draw on monitoring data to discuss progress on this indicator, from Section 3, and recommend that readers refer to that information for additional details.

Main contributions of MOCCA (Table *15*):

- When we analyze results by country, yields (estimated by dividing total coffee sold by hectares) decreased over time in all countries, though the differences between baseline and endline are statistically significant only in Guatemala and for the pooled analysis (all countries). This can be partially explained by the fact that a significantly higher share of farmers reported doing renovation at endline, compared to baseline (**Figure *3***), which may have contributed to lower yields (since renovated trees do not produce for several years); and because the amount sold also decreased at endline (**Table *15***). MOCCA may have contributed to the adoption of renovation practices, which in the short term reduces yields, but the project itself should not be interpreted as causing yield reductions.
- Other market and non-market factors (e.g., weather, increased input costs that limited their use, lower prices in the 2023-2024 season that may have disincentivized proper crop management) also likely played a role. Using data provided by ENVERITAS[25], we observed that yields of farmers not receiving any training or technical assistance in the previous 2 years (and outside of MOCCA-regions) have decreased between the 2019/2020 harvest (MOCCA's baseline year) and 2023/2024 harvest (one year prior to MOCCA's endline year of reference) in all countries, ranging from a 10% decrease in Guatemala and Peru to a 31% decrease in El Salvador. This suggests that this trend happened across the coffee sector, not only MOCCA beneficiaries. Since the decrease observed over time among MOCCA farmers was not statistically significant (except for Guatemala), this could indicate that MOCCA beneficiaries' yields either remained stable or decreased less than those of farmers who did not receive technical assistance. In line with this, 7 out of 10 interviewed farmers reported having reduced fertilizer use due to higher input cost, and 30% indicated experiencing a shortage of labor, particularly for harvesting activities, which affected yields at endline.

[24] See section 2.3.5 for a detailed explanation of this decision.

[25] Enveritas is an organization that collects data and provides insights to help companies benchmark practices and interpret sustainability results within a local context. As part of its collaboration with TechnoServe, Enveritas has shared data from its own projects conducted in the same intervention areas as MOCCA.

- The number of trainings provided by MOCCA had no statistically significant effect on yields in each country individually, but it positively affected yields for all countries combined. This suggests that at the project level, activity 1 had a positive effect on yields.
- Having access to MOCCA anchor firms (improved seller-buyer relationships) had a significantly positive effect on yields among Peruvian farmers—farmers selling to MOCCA anchor firms obtained 12.5% higher yields than farmers selling coffee to other buyers. The results in Peru drive the positive effect also observed at the project level (i.e., all countries).
- Although obtaining information about coffee research products from NGOs or governments had a positive effect in all countries, this effect was statistically significant only in Honduras. This was because of a larger increase in the share of farmers reporting receiving such information in this country compared to all other countries—while 13% of farmers reported receiving such information at baseline, 49% did so at endline.
- Selecting coffee seeds for planting from highly-productive plants had mixed effects between countries, though none were statistically significant. As explained in the previous section, this may be because the effect of this variable on yields would be indirectly through influencing results of good agricultural practices, which would eventually influence yields.
- Having a loan and using it in coffee had no effect on yields.

Differences between male and female farmers:

- Male farmers in El Salvador obtained significantly higher yields compared to female counterparts.

Table 15. Coffee regression results for yields (kg sold/ha)

Variables	El Salvador	Guatemala	Honduras	Peru	All Countries
Survey wave (1=endline)	-64.9	-652.5*	-136.0	-73.6	-216.7***
	(168.3)	(264.2)	(161.8)	(86.8)	(52.9)
Number of training modules received	-6.5	31.6	-5.1	5.1	11.9*
	(14.1)	(17.8)	(13.7)	(7.7)	(4.7)
Sold through MOCCA anchor firms (1 = yes)	-15.7	-127.4	-21.8	148.5**	113.6**
	(162.5)	(167.5)	(157.5)	(50.8)	(40.8)
Income use decided jointly by couple (1 = yes)	-219.5	171.0	87.1	5.2	68.1
	(141.0)	(126.4)	(111.0)	(56.0)	(40.6)
Renovated coffee trees (1 = yes)	-10.3	107.9	-47.0	-11.7	90.7*
	(103.9)	(127.2)	(123.4)	(54.8)	(38.7)
Rehabilitated coffee trees (1 = yes)	103.5	-77.4	-41.2	-7.5	-12.0
	(88.3)	(123.6)	(91.9)	(50.9)	(34.6)
Pruned shade or accompanying trees (1 = yes)	99.7	278.1**	-13.2	26.2	53.1
	(100.1)	(98.0)	(93.0)	(47.1)	(33.2)
Adoption of compost from coffee pulp (1 = yes)	328.8	140.7	-145.5	33.8	17.8
	(264.9)	(137.4)	(93.0)	(63.1)	(41.0)
Applied fertilizers based on visual symptoms or nutrient balance (1 = yes)	57.6	126.5	-202.2	-22.2	-8.6
	(156.8)	(144.2)	(173.2)	(53.4)	(45.1)
Selective harvest: separated high- and low-quality cherries (1 = yes)	34.0	56.8	163.3	59.2	75.0*
	(80.5)	(119.9)	(89.3)	(53.3)	(33.7)
Age of farmer (years)	12.7*	-2.5	-5.3	-5.5	-2.2
	(4.8)	(6.2)	(8.0)	(5.7)	(2.8)
Sex of farmer (1 = male)	565.2*	-86.2	-159.3	70.2	34.5
	(249.6)	(168.3)	(270.3)	(88.3)	(66.8)
Total farm area (ha)	16.2	-256.8*	-23.0	-9.9	-15.4
	(50.3)	(106.9)	(27.7)	(14.5)	(9.1)
Total farm area (ha) squared	-1.0	34.3*	0.3	0.1	0.1
	(1.8)	(14.8)	(0.4)	(0.2)	(0.1)
Average age of coffee trees (years)	-49.2*	9.2	9.4	-3.8	-4.7
	(19.3)	(21.1)	(26.4)	(19.4)	(9.1)
Average age of coffee trees (years) squared	1.5*	0.1	-0.0	-0.3	0.2
	(0.6)	(0.6)	(1.1)	(1.2)	(0.3)
Number of coffee trees per hectare	0.0***	-0.1*	-0.0	0.0	0.0
	(0.0)	(0.1)	(0.0)	(0.0)	(0.0)
Productive coffee plant density (plants/ha)	-0.0	0.2***	0.0	-0.0	0.0*
	(0.0)	(0.1)	(0.0)	(0.0)	(0.0)
Farmer has at least one certification (1 = yes)	873.9*	-138.3	187.5	-61.6	37.6
	(430.4)	(231.4)	(114.7)	(62.2)	(46.9)
Reported coffee rust (1 = yes)	21.4	-136.7	-160.0	24.0	-31.9
	(89.5)	(127.0)	(89.2)	(51.3)	(34.2)
Number of coffee varieties planted	-65.5	1.3	-9.8	12.2	-2.0
	(61.5)	(40.8)	(36.2)	(19.9)	(13.8)
Farm altitude (masl)	-0.3	-0.2	-0.2	-0.4	0.2
	(0.9)	(0.6)	(0.7)	(0.4)	(0.2)
Farm altitude squared	0.0	0.0	-0.0	0.0	-0.0
	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Had a loan and used in coffee (1 = yes)	-543.5	-70.7	-128.9	-73.4	-21.5
	(381.0)	(311.8)	(150.5)	(73.3)	(51.5)
Household had a migrant in last 12 months (1 = yes)	66.2	309.2	84.1	-60.1	-50.1
	(140.5)	(250.0)	(173.1)	(85.0)	(60.1)

Variables	El Salvador	Guatemala	Honduras	Peru	All Countries
Household received remittances (1 = yes)	119.2	-327.5	-162.6	-252.7*	-91.1
	(94.1)	(189.2)	(153.8)	(108.5)	(55.9)
Obtained information of coffee research products from NGOs or government (1 = yes)	79.2	136.8	213.7*	66.4	67.0
	(83.4)	(145.6)	(97.4)	(70.6)	(38.7)
Farmers (%) selecting coffee seeds for planting from highly-productive plants (1=yes)	408.0	-285.3	302.8	-30.7	13.9
	(398.8)	(176.0)	(182.2)	(55.6)	(46.1)
Constant	-864.7	977.8	1,715.4*	1,134.6**	671.1**
	(483.2)	(532.0)	(832.5)	(416.8)	(217.8)
Observations	**539**	**806**	**892**	**1,114**	**4,094**
R-squared	**0.6**	**0.3**	**0.2**	**0.1**	**0.1**
Country controls	**No**	**No**	**No**	**No**	**Yes**
Municipality controls	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Winsorized at 3 sd above mean	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
N baseline	**256**	**394**	**391**	**619**	**2002**
N endline	**283**	**412**	**501**	**495**	**2092**

Standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05

Other factors contributing to observed changes:

- Renovating coffee trees had a positive effect on yields at the project level (all countries), suggesting that when farmers renovate, they are able to increase the amount harvested in a given size of land.
- Similarly, doing selective harvest (i.e., separating high- and low- quality coffee cherries) showed a positive effect on yields, though this effect was statistically significant only at the project level.
- Pruning shade trees had a positive effect on yields in Guatemala.
- As farm area increases, farmers in Guatemala obtained significantly lower yields.
- Salvadorian farmers with older coffee trees obtained lower yields.
- The number of coffee trees per hectare and the number of productive trees per hectare had statistically significant mixed effects on yields, particularly in Guatemala, though the magnitude of this effect is negligible.
- Having a certification in El Salvador positively influenced yields.
- Older farmers in El Salvador obtained significantly higher yields than younger farmers.
- Receiving remittances had a negative effect on yields in Peru. Descriptive evidence suggests that farmers receiving remittances may be implementing more farm practices, which in the short term could temporarily reduce yields. However, the specific use of remittances (e.g., for consumption versus farm investment) is not fully captured in our data, so this association should be interpreted with caution.

We observed a decreasing trend in yields over time (and this was statistically significant in Guatemala and for all countries combined), but this appears to be an effect that was felt across the sector, because secondary data shows that yields have declined in all MOCCA countries. Since the decrease observed among MOCCA farmers was not statistically significant, this could indicate that their yields either remained stable or declined less than those of farmers who did not receive assistance. Despite this, the results show that several of the project activities contributed to increasing farmers' yields, together with

external factors, in a few of the countries where it operated. While the number of MOCCA trainings and selling to MOCCA anchor firms (i.e., firms that participated in the project) positively influenced yields at the project level, only the latter had a statistically significant effect in one of the countries--Peru. Having a loan and using it in coffee or selecting coffee seeds for planting from highly productive plants did not significantly contribute to higher yields. Encouragingly, obtaining information about coffee research positively affected yields, though only in Honduras this effect was statistically significant. We also observed higher incomes when farmers are men, in El Salvador. While the results show that the project had mixed effects on this variable, other factors (mostly agronomic or socioeconomic) also influenced yields both positively and negatively, including several related to MOCCA-promoted practices (renovation, rehabilitation, pruning shade trees). Although the results cannot be generalized across all countries, we observed positive effects in several of them.

4.3 Changes in Outcome Indicators: Adoption of Good Agricultural Practice

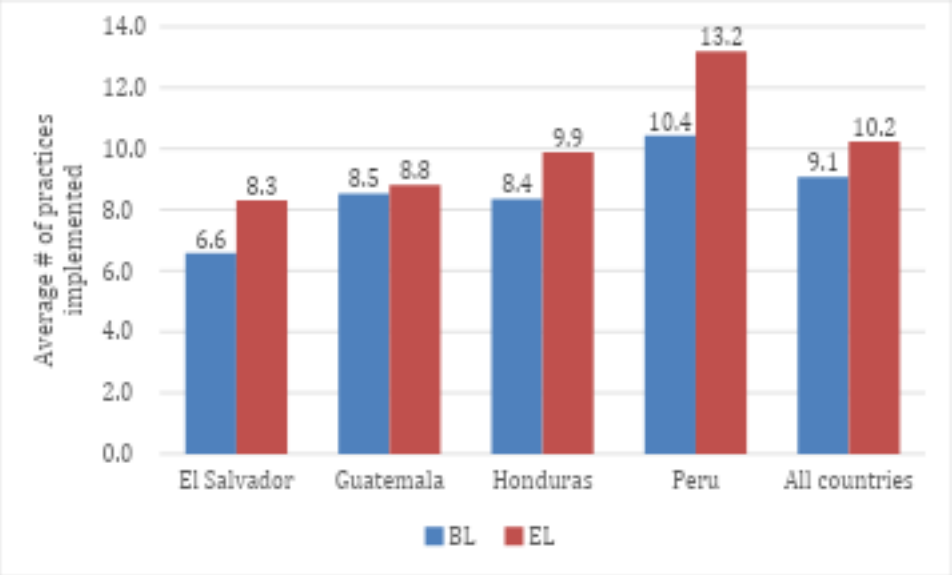
In this section, we analyze changes in the adoption of good agricultural practices using farmer-level baseline and endline data. We focus on six key MOCCA-promoted practices, presenting econometric results complemented by descriptive statistics. In addition, we provide descriptive evidence on other practices encouraged by the project. To guide the analysis, we address three central questions related to income, male–female differences, and other contributing factors.

> What changes do we observe among MOCCA beneficiary farmers in terms of adoption of good agronomic practices in coffee and cacao? What are the contributions of MOCCA to these changes?
>
> Are there differences between female and male farmers?
>
> What other factors contributed to these changes?

MOCCA promoted up to 30 good agronomic practices in the countries where it was implemented. **Figure 2** illustrates the number of MOCCA-promoted practices implemented by farmers at baseline (as some farmers were already doing some of these practices) and endline:

- In all countries we observed an increase in the number of MOCCA practices implemented at endline.
- Except for Guatemala, the differences between baseline and endline were statistically significant.
- The share of farmers who implemented 10 or fewer practices decreased from 64% at baseline to 45% at endline because at endline, a higher share of farmers implemented 11-19 practices (55% vs. 35% who did so at baseline), being this difference statistically significant at the 1% level.
- Practically no farmer reported implementing 20 or more practices.

Figure 2. Coffee: changes in the number of practices implemented between baseline (BL) and endline (EL)



Descriptive data (**Table *16***) shows clear positive changes over time in the adoption of several agronomic practices promoted by MOCCA, though results vary by practice and country.

- The most consistent and significant increases were observed in pruning (from 63% to 78%), fertilization of productive plants (45% to 51%), use of disease control methods (34% to 61%), and record keeping (37% to 60%). These results suggest that MOCCA contributed to consolidating core practices with direct impacts on productivity and farm management.
- Practices such as same-day pulp removal (from 50% to 63%) and drying beans to optimal moisture (35% to 41%) increased significantly. Peru stands out, reaching nearly 100% compliance in same-day pulp removal, while Honduras also showed notable gains.
- At the regional level, adoption of rehabilitation rose from 33% to 44%. The strongest progress was recorded in Peru, reflecting targeted efforts to strengthen pruning and grafting practices.
- Soil and weed management practices were already widely implemented at baseline and remained relatively stable (soil conservation: 78% → 77%; weed control: 76% → 77%). The limited change indicates that farmers were already applying them before MOCCA.
- Adoption of adequate shade cover increased regionally from 53% to 64%, with notable improvements in El Salvador (+29 pp) and Peru (+13 pp). Shade pruning also improved overall (51% → 58%), though with smaller changes in most countries.
- Some progress was observed in practices like pulp treatment (42% → 50%) and wastewater management (30% → 36%), mainly in Peru and Honduras. However, in El Salvador, wastewater management declined (18% → 3%).
- Nursery practices (seed selection, substrate disinfection) remained low and stable, reflecting structural barriers to adoption. Similarly, selective harvest practices remained marginal, with less than 3% adoption in most countries.

MOCCA made progress in adopting agronomic practices, particularly in pruning, disease control, fertilization, post-harvest handling, and record-keeping. While some practices remained unchanged due to already high adoption (soil and weed management) or structural constraints (nurseries, selective harvest), the data highlight clear positive trends across countries, with Peru, El Salvador, and Honduras showing some of the strongest improvements.

We focus our econometric analysis (hence our discussion) on six key practices: renovation of coffee, rehabilitation of coffee, use of fertilizers, pruning shade trees (shade management), doing selective harvest, and using farm waste (waste management). The definition of each of these dependent variables is detailed in section 2.3

Table 16. Coffee: Summary of changes in key MOCCA-promoted practices

Adoption of MOCCA-promoted practices	El Salvador				Guatemala				Honduras				Peru				All countries			
	BL	EL	p-value		BL	EL	p-value		BL	EL	p-value		BL	EL	p-value		BL	EL	p-value	
Selects seed from outstanding, highly productive plants, or purchases genetic material from a certified/verified nursery	1.0%	4.0%	0.039	**	8.0%	9.0%	0.481		7.0%	5.0%	0.178		23.0%	24.0%	0.849		16.0%	16.0%	0.824	
Substrate mix has at least 30% to 50% sand	0.0%	0.0%	0.360		2.0%	2.0%	0.534		1.0%	0.0%	0.303		4.0%	2.0%	0.068	*	2.0%	2.0%	0.094	*
Disinfects substrate mix (with any method, e.g. solarization, boiling water)	0.0%	0.0%	.		1.0%	1.0%	0.232		1.0%	0.0%	0.303		2.0%	1.0%	0.337		1.0%	1.0%	0.563	
Chooses plants for transplant that are free of pests and diseases, and chooses vigorous/robust plants	0.0%	0.0%	.		1.0%	0.0%	0.590		2.0%	0.0%	0.033	**	8.0%	5.0%	0.057	*	6.0%	5.0%	0.017	**
Renovates: planted new trees	12.0%	39.0%	0.000	***	17.0%	28.0%	0.000	***	14.0%	14.0%	0.764		29.0%	22.0%	0.012	**	24.0%	26.0%	0.316	
Rehabilitates: implements recepa, and/or '*poda esqueleto*' (type of pruning)	27.0%	49.0%	0.000	***	34.0%	37.0%	0.292		40.0%	35.0%	0.108		26.0%	43.0%	0.000	***	33.0%	44.0%	0.000	***
Prunning: does at least 1 type of pruning (e.g. *poda esqueletada, sanitaria, recepo, deshije, descope, poda baja*)	42.0%	89.0%	0.000	***	57.0%	62.0%	0.140		60.0%	71.0%	0.000	***	74.0%	86.0%	0.000	***	63.0%	78.0%	0.000	***
Fertilizes using table of visible deficiencies symptoms, or uses soil analysis	7.0%	13.0%	0.030	**	13.0%	6.0%	0.000	***	36.0%	25.0%	0.001	***	17.0%	21.0%	0.083	*	18.0%	18.0%	0.602	
Fertilizes young non-productive plants at least 3 times per year	1.0%	5.0%	0.022	**	8.0%	8.0%	0.955		8.0%	5.0%	0.040	**	3.0%	5.0%	0.184		6.0%	6.0%	0.735	
Fertilizes productive plants at least 2 times per year	47.0%	61.0%	0.002	***	60.0%	55.0%	0.238		66.0%	76.0%	0.001	***	26.0%	31.0%	0.082	*	45.0%	51.0%	0.000	***
Fertilizes young non-productive plants in june, september and november	0.0%	0.0%	.		0.0%	1.0%	0.296		0.0%	0.0%	0.665		0.0%	0.0%	.		0.0%	0.0%	0.335	
Fertilizes productive plants between may-june and july-september	0.0%	0.0%	.		0.0%	0.0%	.		0.0%	0.0%	.		0.0%	0.0%	.		0.0%	0.0%	.	
Randomly spread fertilizer close to roots (al voleo), or applied under the canopy (copa), or applied in fertilization band (zona de abonamiento)	78.0%	95.0%	0.0000	***	89.0%	86.0%	0.184		90.0%	95.0%	0.011	**	36.0%	49.0%	0.000	***	71.0%	78.0%	0.000	***
Applies at least 1 of these MOCCA-recommended formulas: organic fertilizer, compost, diluted fertilization	15.0%	13.0%	0.4748		17.0%	12.0%	0.028	**	38.0%	16.0%	0.000	***	86.0%	54.0%	0.000	***	42.0%	22.0%	0.000	***

Adoption of MOCCA-promoted practices	El Salvador				Guatemala				Honduras				Peru				All countries			
	BL	EL	p-value		BL	EL	p-value		BL	EL	p-value		BL	EL	p-value		BL	EL	p-value	
Uses at least one control method for each pest identified (*control manual, cultural, etológico, biológico y/o químico*)	21.0%	33.0%	0.0048	***	12.0%	9.0%	0.161		16.0%	32.0%	0.000	***	25.0%	57.0%	0.000	***	20.0%	30.0%	0.000	***
Uses at least one control method for each disease identified (*control manual, cultural, etológico, biológico y/o químico*)	46.0%	68.0%	0.0000	***	47.0%	61.0%	0.000	***	28.0%	71.0%	0.000	***	28.0%	60.0%	0.000	***	34.0%	61.0%	0.000	***
Implements repela and pepena (under IPM)	0.0%	2.0%	0.0284	**	0.0%	0.0%	0.328		1.0%	12.0%	0.000	***	0.0%	17.0%	0.000	***	0.0%	8.0%	0.000	***
Does at least one of the following MOCCA-recommended soil conservation practices: established covers - grass, legumes; or covers between furrows with organic matter	85.0%	89.0%	0.1968		82.0%	82.0%	0.928		80.0%	97.0%	0.000	***	75.0%	73.0%	0.355		78.0%	77.0%	0.662	
Does at least one of the following cost-saving weed control practices: use of *guadañas*, or ecoweed and/or covers between furrows with organic matter	83.0%	87.0%	0.2552		81.0%	82.0%	0.864		78.0%	96.0%	0.000	***	74.0%	73.0%	0.662		76.0%	77.0%	0.506	
Coffee has 25% shade, or have planted shade trees recently (2 years ago)	46.0%	75.0%	0.0000	***	55.0%	59.0%	0.252		57.0%	58.0%	0.794		44.0%	57.0%	0.000	***	53.0%	64.0%	0.000	***
Does shade pruning	56.6%	78.3%	0.0000	***	50.9%	56.7%	0.092	*	40.1%	46.1%	0.068	*	53.4%	55.9%	0.392		51.1%	58.2%	0.000	***
Does selective harvest according to field sample indicating 75% of ripped berries	7.0%	10.0%	0.2841		5.0%	1.0%	0.005	***	0.0%	3.0%	0.005	***	0.0%	1.0%	0.005	***	2.0%	2.0%	0.474	
Coffee cherries classified (separated good from low-quality cherries)	71.0%	50.0%	0.0000	***	57.0%	68.0%	0.002	***	60.0%	67.0%	0.033	**	71.0%	77.0%	0.043	**	62.0%	62.0%	0.842	
Removed pulp same day coffee was harvested	1.0%	3.0%	0.1186		39.0%	53.0%	0.000	***	27.0%	42.0%	0.000	***	76.0%	100.0%	0.000	***	50.0%	63.0%	0.000	***
Coffee fermented for <12 hrs	0.0%	1.0%	0.1225		3.0%	2.0%	0.316		8.0%	8.0%	0.736		3.0%	4.0%	0.531		5.0%	5.0%	0.490	
Coffee beans dried up to 12% moisture, measured using touch and visual methods	2.0%	3.0%	0.3581		27.0%	41.0%	0.000	***	8.0%	22.0%	0.000	***	79.0%	97.0%	0.000	***	35.0%	41.0%	0.000	***
Treating waste water (other than from wet milling)	0.0%	1.0%	0.0581	*	18.0%	3.0%	0.000	***	20.0%	12.0%	0.001	***	42.0%	56.0%	0.000	***	25.0%	25.0%	0.934	
Manages (treats) the coffee pulp	1.0%	3.0%	0.0509	*	38.0%	52.0%	0.000	***	25.0%	36.0%	0.000	***	72.0%	94.0%	0.000	***	42.0%	50.0%	0.000	***
Manages (treats) the water from wet milling	0.0%	2.0%	0.0284	**	18.0%	15.0%	0.241		20.0%	22.0%	0.363		50.0%	74.0%	0.000	***	30.0%	36.0%	0.000	***
Uses any tool to register costs (e.g. notebook or folder)	11.0%	27.0%	0.0000	***	26.0%	32.0%	0.058	*	31.0%	73.0%	0.000	***	61.0%	81.0%	0.000	***	37.0%	60.0%	0.000	***
Number of households	**256**	**215**			**394**	**377**			**391**	**463**			**619**	**479**			**2002**	**1933**		

4.3.1 Renovation

Main contributions of MOCCA (Table *17*):

- When we analyze results by country, we found that the share of farmers reporting renovation statistically increased at endline in El Salvador but decreased overall when analyzed for all countries combined. This happened because the share of farmers doing renovation increased much more in this country than in all other countries (**Figure *3***).
- The number of trainings provided by MOCCA had no statistically significant effect on the adoption of coffee renovation in each country individually but positively affected this when analyzed for all countries combined. This suggests that at the project level, activity 1 had a positive effect on doing coffee renovation.
- Selling to a MOCCA anchor firm (improved seller-buyer relationships) had no significant effect on renovating coffee when analyzed for each country individually. However, when we do the analysis at the project level (i.e., all countries combined), we found a negative effect on adoption of this practice—the likelihood of doing renovation when selling to a MOCCA anchor firm is 7.4% lower than when selling coffee to other buyers. One possible explanation for this finding is that farmers who sell to MOCCA have better trees and fewer need for renovation, but further analysis is needed to confirm this hypothesis.
- Although obtaining information of coffee research products from NGOs or government had a positive effect in all countries reported in this study, this effect was statistically significant only in Guatemala.
- Selecting coffee seeds for planting from highly-productive plants had significantly positive effects on the likelihood of doing renovation in Peru and for all countries combined (effect driven by results in Peru). The lack of significant effects in other countries is because less than 10% of farmers in these other countries reported managing a nursery, compared to 26%-29% of farmers in Peru.
- Having a loan and using it in coffee had no effect on the likelihood of doing coffee renovation.

Differences between male and female farmers:

- None of the two sex (female/male) or household decision-making variables showed a statistically significant effect on the adoption of renovation practices.

Other factors contributing to observed changes:

- The number of coffee trees per hectare had mixed effects on renovation. While this variable positively affected renovating coffee in Peru, it negatively affected doing this in Honduras.
- The number of productive trees per hectare had statistically significant negative effect on renovating coffee in El Salvador and Peru, which is expected as one would not expect farmers to renovate productive trees.
- Surprisingly, reporting rust incidence in El Salvador negatively influenced doing renovation, perhaps because infestation levels were not high.
- The number of coffee varieties planted increases the likelihood of doing renovation, perhaps because farmers need to replace older trees with newer ones from newer varieties.

- Other factors that influenced renovation were the altitude (negative effect in El Salvador), having a migrant in the last 12 months (positive in Honduras and negative in Peru), and receiving remittances (negative in Guatemala).

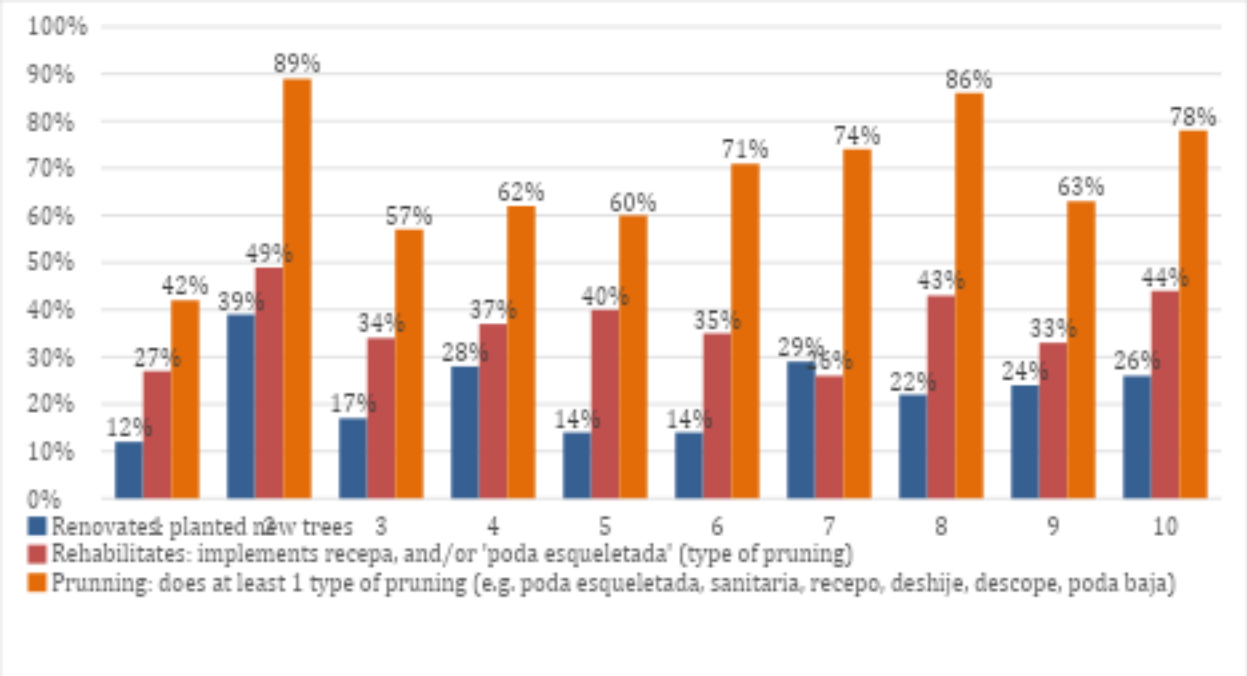
Table 17. Regression results for adoption of coffee renovation

Variables	El Salvador	Guatemala	Honduras	Peru	All Countries
Survey wave (1=endline)	0.508*	-0.115	0.133	0.006	-0.129**
	(0.221)	(0.185)	(0.105)	(0.091)	(0.047)
Number of training modules received	-0.021	0.005	-0.009	-0.005	0.012**
	(0.018)	(0.012)	(0.009)	(0.008)	(0.004)
Sold through MOCCA anchor firms (1 = yes)	-0.245	-0.088	-0.045	-0.083	-0.074*
	(0.218)	(0.111)	(0.103)	(0.057)	(0.037)
Income use decided jointly by couple (1 = yes)	-0.126	0.078	0.021	-0.017	-0.006
	(0.171)	(0.086)	(0.069)	(0.062)	(0.036)
Age of farmer (years)	0.001	0.001	-0.000	0.001	-0.001
	(0.006)	(0.004)	(0.005)	(0.006)	(0.003)
Sex of farmer (1 = male)	0.111	0.121	-0.009	-0.036	-0.004
	(0.351)	(0.117)	(0.173)	(0.099)	(0.061)
Area planted with coffee (ha)	0.163	0.149	-0.033	0.072	-0.009
	(0.135)	(0.080)	(0.027)	(0.072)	(0.011)
Area planted with coffee (ha) squared	-0.006	-0.022*	0.001	-0.008	-0.000
	(0.006)	(0.011)	(0.001)	(0.008)	(0.000)
Average age of coffee trees (years)	-0.005	-0.013	-0.020	0.040	-0.004
	(0.025)	(0.014)	(0.017)	(0.022)	(0.008)
Average age of coffee trees (years) squared	0.000	0.000	0.000	-0.002	0.000
	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)
Number of coffee trees per hectare	0.000	-0.000	-0.000*	0.000**	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Productive coffee plant density (plants/ha)	-0.000*	0.000	-0.000	-0.000**	-0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Farmer has at least one certification (1 = yes)	-0.371	0.111	0.089	-0.037	-0.012
	(0.603)	(0.162)	(0.072)	(0.070)	(0.042)
Reported coffee rust (1 = yes)	-0.262*	-0.004	0.003	-0.089	-0.081**
	(0.113)	(0.086)	(0.057)	(0.057)	(0.031)
Number of coffee varieties planted	-0.034	-0.020	0.013	0.056*	0.032*
	(0.082)	(0.029)	(0.023)	(0.022)	(0.013)
Farm altitude (masl)	-0.003**	-0.000	0.001	0.000	-0.000
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
Farm altitude squared	0.000**	0.000	-0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Had a loan and used in coffee (1 = yes)	-0.978	0.385	-0.187	-0.058	-0.075
	(0.529)	(0.215)	(0.097)	(0.082)	(0.047)
Household had a migrant in last 12 months (1 = yes)	0.214	0.332	0.341**	-0.189*	0.042
	(0.183)	(0.171)	(0.109)	(0.095)	(0.055)
Household received remittances (1 = yes)	0.102	-0.269*	-0.085	0.133	0.055
	(0.115)	(0.129)	(0.097)	(0.122)	(0.051)

Variables	El Salvador	Guatemala	Honduras	Peru	All Countries
Obtained information of coffee research products from NGOs or government (1 = yes)	0.121 (0.107)	0.216* (0.094)	0.075 (0.062)	0.002 (0.081)	0.066 (0.035)
Farmers (%) selecting coffee seeds for planting from highly-productive plants (1=yes)	0.333 (0.535)	0.147 (0.115)	0.149 (0.118)	0.194** (0.062)	0.241*** (0.041)
Constant	0.875 (0.640)	0.088 (0.346)	-0.197 (0.520)	-0.071 (0.469)	0.291 (0.193)
Observations	**540**	**806**	**892**	**1,114**	**4,095**
R-squared	**0.545**	**0.193**	**0.180**	**0.210**	**0.118**
Country controls	**No**	**No**	**No**	**No**	**Yes**
Municipality controls	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Winsorized at 3 sd above mean	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
N baseline	**256**	**394**	**391**	**619**	**2002**
N endline	**284**	**412**	**501**	**495**	**2093**

Standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05

Figure 3. Coffee: changes in adoption of renovation and rehabilitation practices



4.3.2 Rehabilitation

Coffee rehabilitation under MOCCA is when a farmer implements stumping and/or skeleton pruning ” (a type of pruning) in coffee trees.

Main contributions of MOCCA (Table *18*):

- When we analyze results by country, we found that the share of farmers reporting rehabilitation practices statistically increased at endline in Peru and for all countries combined. Further, though there were no statistically significant effects in all other countries, the trend is positive (**Figure *3*)** which is encouraging as this means that the adoption of these practices is increasing.
- The number of trainings provided by MOCCA had no statistically significant effect on the adoption of coffee rehabilitation.
- Selling to a MOCCA anchor firm (improved seller-buyer relationships) had a statistically significantly negative effect among Guatemalan farmers—the likelihood of doing rehabilitation when selling to a MOCCA anchor firm is 26.6% lower than when selling coffee to other buyers. This result may reflect that farmers linked to anchor firms were less inclined to undertake rehabilitation, as the practice temporarily reduces yields, or sample size limitations may influence it. It should therefore be interpreted with caution.
- Obtaining information of coffee research products from NGOs or government had a positive effect in most countries reported in this study, this effect was statistically significant only in Guatemala (like for renovation).
- Similarly, selecting coffee seeds for planting from highly-productive plants had significantly positive effects on the likelihood of doing renovation in Guatemala.
- Having a loan and using it in coffee had no effect on the likelihood of doing coffee rehabilitation.

Differences between male and female farmers:

- The sex of the farmer had no significant effect on the likelihood of rehabilitating coffee.
- In contrast, deciding jointly (male and female heads) about how to use the income from coffee sales had a statistically significantly positive effect on rehabilitation when analyzing data at the project level[26].

Other factors contributing to observed changes:

- Area with coffee positively influences the likelihood of doing rehabilitation in El Salvador for medium-sized farms but decreases for large-sized farms.
- The age of coffee trees also positively influences doing rehabilitation, in Guatemala and overall. As trees become older, they require more pruning.
- The number of productive trees per hectare had a statistically significant negative effect on rehabilitating coffee in Guatemala and overall, suggesting that the productive trees in this country are well managed and require less pruning.
- Surprisingly, reporting rust incidence in Peru negatively influenced doing rehabilitation, perhaps because a large share of farmers at endline reported using at least one control method for every

[26] The effect is primarily driven by positive results in Nicaragua, although the country-level data are not reported in the tables.

disease that affected their crop, thus using other control methods that may reduce the need to rehabilitate.

- Having at least one certification positively affected the likelihood of rehabilitating coffee in Peru, perhaps to maintain a healthy crop to avoid penalizations from the certification body.

We observed positive results in the adoption of rehabilitation practices over time, though only in one country (Peru) and for all countries combined, the effect was statistically significant. Receiving more trainings from MOCCA or having a loan and using it on coffee had no significant effect on renovating coffee. In contrast, selling to a MOCCA anchor firm (i.e., firms that participated in the project) had a negative effect in Guatemala. Further, obtaining information of coffee research products from NGOs or government had a significantly positive effect only in Guatemala, as did selecting coffee seeds for planting from highly productive plants in Peru. While the likelihood of doing rehabilitation was not influenced by the sex of the farmer, deciding jointly about how to use the income from coffee sales had a statistically significantly positive effect at the project level. Other agronomic factors positively and negatively influenced rehabilitating coffee.

Table 18. Coffee regression results for adoption of rehabilitation practices

Variables	El Salvador	Guatemala	Honduras	Peru	All Countries
Survey wave (1=endline)	0.256	0.146	0.038	0.349***	0.256***
	(0.255)	(0.186)	(0.144)	(0.097)	(0.052)
Number of training modules received	-0.009	0.019	-0.002	-0.005	-0.003
	(0.020)	(0.012)	(0.012)	(0.009)	(0.005)
Sold through MOCCA anchor firms (1 = yes)	0.406	-0.266*	-0.032	-0.107	-0.039
	(0.251)	(0.112)	(0.142)	(0.061)	(0.041)
Income use decided jointly by couple (1 = yes)	0.245	0.089	0.118	0.073	0.136***
	(0.197)	(0.086)	(0.096)	(0.066)	(0.041)
Age of farmer (years)	0.010	-0.001	0.007	-0.004	-0.001
	(0.007)	(0.004)	(0.007)	(0.007)	(0.003)
Sex of farmer (1 = male)	-0.010	0.087	-0.371	-0.059	-0.075
	(0.405)	(0.117)	(0.238)	(0.105)	(0.068)
Area planted with coffee (ha)	0.378*	-0.100	0.012	-0.116	0.022
	(0.156)	(0.081)	(0.038)	(0.076)	(0.013)
Area planted with coffee (ha) squared	-0.017*	0.017	-0.000	0.023**	0.000
	(0.006)	(0.011)	(0.001)	(0.009)	(0.000)
Average age of coffee trees (years)	-0.039	0.047**	0.041	0.025	0.026**
	(0.029)	(0.014)	(0.023)	(0.023)	(0.009)
Average age of coffee trees (years) squared	0.001	-0.002***	-0.001	-0.001	-0.001**
	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)
Number of coffee trees per hectare	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Productive coffee plant density (plants/ha)	-0.000	-0.000**	-0.000	-0.000	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Farmer has at least one certification (1 = yes)	0.759	0.243	-0.105	0.195**	0.052
	(0.696)	(0.163)	(0.099)	(0.075)	(0.047)
Reported coffee rust (1 = yes)	0.043	0.068	-0.008	-0.125*	0.023
	(0.130)	(0.087)	(0.078)	(0.061)	(0.035)

Variables	El Salvador	Guatemala	Honduras	Peru	All Countries
Number of coffee varieties planted	0.040	0.005	0.027	0.027	0.014
	(0.094)	(0.029)	(0.032)	(0.023)	(0.014)
Farm altitude (masl)	0.001	-0.001	0.001	-0.000	0.000
	(0.001)	(0.000)	(0.001)	(0.000)	(0.000)
Farm altitude squared	0.000	0.000	-0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Had a loan and used in coffee (1 = yes)	-0.043	0.076	-0.105	-0.021	0.000
	(0.610)	(0.216)	(0.133)	(0.087)	(0.052)
Household had a migrant in last 12 months (1 = yes)	-0.056	-0.253	0.069	0.109	0.019
	(0.211)	(0.172)	(0.150)	(0.102)	(0.061)
Household received remittances (1 = yes)	0.242	0.073	-0.209	-0.034	-0.077
	(0.133)	(0.130)	(0.134)	(0.130)	(0.056)
Obtained information of coffee research products from NGOs or government (1 = yes)	0.180	0.290**	0.015	-0.006	0.040
	(0.124)	(0.094)	(0.085)	(0.086)	(0.039)
Farmers (%) selecting coffee seeds for planting from highly-productive plants (1=yes)	1.040	0.275*	-0.061	0.027	0.067
	(0.617)	(0.116)	(0.163)	(0.066)	(0.046)
Constant	-1.386	0.077	-0.413	0.370	-0.008
	(0.738)	(0.348)	(0.716)	(0.500)	(0.215)
Observations	**540**	**806**	**892**	**1,114**	**4,095**
R-squared	**0.464**	**0.389**	**0.148**	**0.241**	**0.130**
Country controls	**No**	**No**	**No**	**No**	**Yes**
Municipality controls	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Winsorized at 3 sd above mean	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
N baseline	**256**	**394**	**391**	**619**	**2002**
N endline	**284**	**412**	**501**	**495**	**2093**

Standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05

4.3.3 Consolidated Synthesis of Practice Adoption Results (use of fertilizers, shade management, selective harvest, farm waste management)

Effect of time and project implementation

Across the project, no substantial shifts were observed in the adoption of practices such as fertilization, shade management, or selective harvesting when looking at the pooled analysis (**Table 19**, **Table *20***, **Table *21*** and **Table *22***). However, country-level dynamics reveal important heterogeneity. In Peru, adoption of waste management practices increased significantly, suggesting that local institutions and market incentives played a strong role in reinforcing project activities. In contrast, in several Central American countries, adoption remained stagnant, indicating that time alone was insufficient to drive uptake without complementary enabling conditions. These patterns highlight that MOCCA's effects cannot be interpreted as uniform: the outcomes are mediated by local context, institutional support, and the baseline levels of adoption.

Role of training

Participation in MOCCA training emerged as the most consistent driver of practice adoption. Positive and statistically significant effects were found for fertilization (pooled analysis), shade management (pooled analysis), and selective harvesting (pooled and Guatemala). While results were mixed in some

instances, such as selective harvesting in El Salvador or waste management in Peru, the overall evidence indicates that training reinforced adoption across key practices. This suggests that capacity-building activities were critical in enabling farmers to internalize and apply the promoted technologies, even in contexts where external constraints limited broader uptake.

Market linkages (anchor firms)

Selling to anchor firms proved to be an important incentive for specific practices. Farmers connected to these buyers were more likely to adopt waste management practices in El Salvador, Guatemala, and the pooled analysis, as well as selective harvesting in the aggregate results. This points to the role of quality and sustainability requirements in shaping farmer behavior. In contrast, no meaningful effects were detected for fertilization or shade management, indicating that anchor firms exerted selective pressure only on practices most directly related to quality and post-harvest outcomes.

Other relevant factors

- Access to information from NGOs, government, or research institutions played a role in shaping adoption. For example, it was positively associated with fertilization in Guatemala and selective harvesting in Honduras. These findings underscore the complementarity between MOCCA's efforts and existing extension services.
- Joint decision-making within households was associated with higher adoption in some cases, such as shade management in El Salvador, selective harvesting in Guatemala, and waste management in the pooled analysis. This suggests that empowering both men and women in decision processes can facilitate the uptake of labor-intensive or quality-oriented practices.
- Structural features of the farm also influenced adoption patterns. In El Salvador, older coffee trees were negatively associated with fertilization, while in Honduras, higher planting density reduced adoption of certain practices. Variables such as altitude, number of varieties, and plant age displayed diverse effects across countries, indicating that biophysical constraints interacted with project incentives in complex ways.

Table 19. Coffee regression results for fertilizer use

Variables	El Salvador	Guatemala	Honduras	Peru	All Countries
Survey wave (1=endline)	-0.141	-0.155	0.030	-0.021	-0.108**
	(0.147)	(0.160)	(0.076)	(0.094)	(0.040)
Number of training modules received	0.021	0.011	0.001	0.001	0.007*
	(0.012)	(0.010)	(0.006)	(0.009)	(0.004)
Sold through MOCCA anchor firms (1 = yes)	0.150	0.107	0.002	0.039	0.039
	(0.144)	(0.096)	(0.075)	(0.059)	(0.031)
Income use decided jointly by couple (1 = yes)	0.181	0.048	-0.033	0.044	0.030
	(0.113)	(0.074)	(0.050)	(0.064)	(0.031)
Age of farmer (years)	0.004	-0.002	0.003	-0.001	0.002
	(0.004)	(0.004)	(0.004)	(0.007)	(0.002)
Sex of farmer (1 = male)	0.050	0.014	-0.017	0.100	0.031
	(0.233)	(0.101)	(0.126)	(0.102)	(0.052)
Area planted with coffee (ha)	-0.099	-0.001	0.007	-0.094	-0.008
	(0.089)	(0.069)	(0.020)	(0.074)	(0.010)

Variables	El Salvador	Guatemala	Honduras	Peru	All Countries
Area planted with coffee (ha) squared	0.004	-0.010	-0.000	0.007	0.000
	(0.004)	(0.009)	(0.001)	(0.009)	(0.000)
Average age of coffee trees (years)	-0.037*	-0.005	0.018	-0.005	-0.007
	(0.016)	(0.012)	(0.012)	(0.022)	(0.007)
Average age of coffee trees (years) squared	0.001	-0.000	-0.001	-0.000	0.000
	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)
Number of coffee trees per hectare	-0.000	-0.000	-0.000**	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Productive coffee plant density (plants/ha)	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Farmer has at least one certification (1 = yes)	0.266	-0.090	0.009	0.005	0.001
	(0.400)	(0.140)	(0.052)	(0.072)	(0.036)
Reported coffee rust (1 = yes)	0.082	-0.148*	-0.046	0.046	-0.002
	(0.075)	(0.074)	(0.041)	(0.059)	(0.026)
Number of coffee varieties planted	0.070	-0.023	0.000	0.005	-0.002
	(0.054)	(0.025)	(0.017)	(0.023)	(0.011)
Farm altitude (masl)	-0.001	0.000	-0.000	-0.001	-0.000
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
Farm altitude squared	0.000	-0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Had a loan and used in coffee (1 = yes)	0.199	0.118	0.010	0.012	0.020
	(0.350)	(0.186)	(0.070)	(0.084)	(0.040)
Household had a migrant in last 12 months (1 = yes)	0.043	0.233	-0.058	-0.105	-0.029
	(0.121)	(0.148)	(0.079)	(0.098)	(0.047)
Household received remittances (1 = yes)	-0.128	-0.098	-0.014	0.184	0.020
	(0.077)	(0.112)	(0.071)	(0.126)	(0.043)
Obtained information of coffee research products from NGOs or government (1 = yes)	-0.066	0.176*	0.044	0.028	0.054
	(0.071)	(0.081)	(0.045)	(0.083)	(0.030)
Farmers (%) selecting coffee seeds for planting from highly-productive plants (1=yes)	0.024	-0.055	0.091	0.045	0.014
	(0.354)	(0.099)	(0.086)	(0.063)	(0.035)
Constant	0.714	1.031***	0.893*	1.345**	0.878***
	(0.424)	(0.299)	(0.378)	(0.482)	(0.165)
Observations	**540**	**806**	**892**	**1,114**	**4,095**
R-squared	**0.425**	**0.161**	**0.176**	**0.091**	**0.048**
Country controls	**No**	**No**	**No**	**No**	**Yes**
Municipality controls	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Winsorized at 3 sd above mean	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
N baseline	**256**	**394**	**391**	**619**	**2002**
N endline	**284**	**412**	**501**	**495**	**2093**

Standard errors in parentheses and clustered at the municipality level

*** p<0.001, ** p<0.01, * p<0.05

Table 20. Coffee regression results for adoption of shade pruning

Variables	El Salvador	Guatemala	Honduras	Peru	All Countries
Survey wave (1=endline)	0.164	0.034	0.008	0.084	-0.023
	(0.236)	(0.241)	(0.149)	(0.106)	(0.055)
Number of training modules received	0.025	0.019	0.004	-0.000	0.015**
	(0.019)	(0.016)	(0.012)	(0.010)	(0.005)
Sold through MOCCA anchor firms (1 = yes)	-0.225	0.112	-0.121	0.062	0.051
	(0.232)	(0.145)	(0.146)	(0.066)	(0.043)
Income use decided jointly by couple (1 = yes)	0.508**	0.118	-0.261**	-0.195**	-0.069
	(0.182)	(0.111)	(0.098)	(0.072)	(0.043)
Age of farmer (years)	-0.003	0.001	0.002	0.003	-0.003
	(0.007)	(0.006)	(0.007)	(0.007)	(0.003)
Sex of farmer (1 = male)	-0.460	-0.179	0.353	-0.153	-0.096
	(0.375)	(0.152)	(0.246)	(0.115)	(0.071)
Area planted with coffee (ha)	-0.047	0.016	-0.034	0.101	-0.007
	(0.144)	(0.104)	(0.039)	(0.083)	(0.013)
Area planted with coffee (ha) squared	0.005	0.007	0.001	-0.013	0.000
	(0.006)	(0.014)	(0.001)	(0.010)	(0.000)
Average age of coffee trees (years)	0.066*	0.019	0.006	-0.032	0.011
	(0.026)	(0.018)	(0.024)	(0.025)	(0.010)
Average age of coffee trees (years) squared	-0.002*	-0.001	-0.000	0.002	-0.001
	(0.001)	(0.001)	(0.001)	(0.002)	(0.000)
Number of coffee trees per hectare	0.000	0.000	-0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Productive coffee plant density (plants/ha)	-0.000	-0.000	0.000**	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Farmer has at least one certification (1 = yes)	0.201	0.000	-0.172	-0.036	-0.034
	(0.644)	(0.211)	(0.102)	(0.082)	(0.050)
Reported coffee rust (1 = yes)	-0.044	0.081	0.113	0.043	0.030
	(0.120)	(0.112)	(0.080)	(0.067)	(0.036)
Number of coffee varieties planted	0.116	0.035	0.060	0.061*	0.037*
	(0.087)	(0.038)	(0.033)	(0.026)	(0.015)
Farm altitude (masl)	-0.000	-0.000	0.001	-0.001*	-0.000
	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)
Farm altitude squared	0.000	0.000	-0.000	0.000*	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Had a loan and used in coffee (1 = yes)	0.555	-0.137	0.003	0.173	0.080
	(0.564)	(0.280)	(0.137)	(0.096)	(0.055)
Household had a migrant in last 12 months (1 = yes)	-0.227	-0.095	-0.163	0.075	-0.094
	(0.196)	(0.223)	(0.155)	(0.111)	(0.064)
Household received remittances (1 = yes)	0.064	-0.073	0.116	0.059	0.046
	(0.123)	(0.169)	(0.138)	(0.142)	(0.059)
Obtained information of coffee research products from NGOs or government (1 = yes)	0.144	-0.218	0.053	0.083	0.039
	(0.115)	(0.122)	(0.087)	(0.094)	(0.041)
Farmers (%) selecting coffee seeds for planting from highly-productive plants (1=yes)	-1.324*	0.217	0.014	0.133	0.167***
	(0.571)	(0.150)	(0.167)	(0.072)	(0.048)

Variables	El Salvador	Guatemala	Honduras	Peru	All Countries
Constant	0.517	0.666	-0.916	1.165*	0.868***
	(0.683)	(0.451)	(0.738)	(0.546)	(0.226)
Observations	**540**	**806**	**892**	**1,114**	**4,095**
R-squared	**0.523**	**0.213**	**0.185**	**0.181**	**0.090**
Country controls	**No**	**No**	**No**	**No**	**Yes**
Municipality controls	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Winsorized at 3 sd above mean	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
N baseline	**256**	**394**	**391**	**619**	**2002**
N endline	**284**	**412**	**501**	**495**	**2093**

Standard errors in parentheses and clustered at the municipality level

*** p<0.001, ** p<0.01, * p<0.05

Table 21. Coffee regression results for adoption of classifying cherries after harvest

Variables	El Salvador	Guatemala	Honduras	Peru	All Countries
Survey wave (1=endline)	0.203	-0.252	-0.092	-0.061	-0.137*
	(0.291)	(0.197)	(0.152)	(0.097)	(0.054)
Number of training modules received	-0.048*	0.034**	0.019	0.014	0.016***
	(0.023)	(0.013)	(0.013)	(0.009)	(0.005)
Sold through MOCCA anchor firms (1 = yes)	-0.037	0.093	0.282	0.063	0.091*
	(0.286)	(0.118)	(0.150)	(0.060)	(0.042)
Income use decided jointly by couple (1 = yes)	0.040	0.255**	-0.076	0.077	0.118**
	(0.224)	(0.091)	(0.101)	(0.066)	(0.042)
Age of farmer (years)	0.012	0.004	-0.015*	0.000	0.002
	(0.008)	(0.005)	(0.007)	(0.007)	(0.003)
Sex of farmer (1 = male)	0.002	-0.172	-0.167	0.070	-0.042
	(0.461)	(0.124)	(0.251)	(0.105)	(0.070)
Area planted with coffee (ha)	-0.226	-0.069	0.056	0.074	0.027*
	(0.177)	(0.085)	(0.040)	(0.076)	(0.013)
Area planted with coffee (ha) squared	0.006	0.018	-0.002	-0.008	-0.001**
	(0.007)	(0.012)	(0.001)	(0.009)	(0.000)
Average age of coffee trees (years)	0.039	0.026	-0.000	0.055*	0.018
	(0.033)	(0.015)	(0.024)	(0.023)	(0.009)
Average age of coffee trees (years) squared	-0.001	-0.001	0.001	-0.003	-0.000
	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)
Number of coffee trees per hectare	-0.000	-0.000	-0.000	0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Productive coffee plant density (plants/ha)	0.000	0.000	-0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Farmer has at least one certification (1 = yes)	-0.490	-0.119	-0.145	0.011	-0.066
	(0.792)	(0.172)	(0.104)	(0.074)	(0.049)
Reported coffee rust (1 = yes)	-0.288	-0.233*	0.105	0.048	-0.045
	(0.148)	(0.092)	(0.082)	(0.061)	(0.036)
Number of coffee varieties planted	0.176	-0.010	-0.025	-0.046*	-0.026
	(0.108)	(0.031)	(0.034)	(0.023)	(0.015)
Farm altitude (masl)	0.003*	-0.001	0.000	0.000	-0.000
	(0.001)	(0.000)	(0.001)	(0.000)	(0.000)
Farm altitude squared	-0.000	0.000	0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Variables	El Salvador	Guatemala	Honduras	Peru	All Countries
Had a loan and used in coffee (1 = yes)	-0.219	-0.354	-0.164	0.056	-0.066
	(0.694)	(0.229)	(0.141)	(0.087)	(0.054)
Household had a migrant in last 12 months (1 = yes)	-0.202	0.139	-0.045	-0.081	-0.017
	(0.241)	(0.182)	(0.158)	(0.101)	(0.063)
Household received remittances (1 = yes)	0.360*	-0.000	0.069	0.050	0.059
	(0.152)	(0.137)	(0.141)	(0.129)	(0.058)
Obtained information of coffee research products from NGOs or government (1 = yes)	-0.007	-0.156	0.235**	0.052	0.031
	(0.141)	(0.100)	(0.089)	(0.085)	(0.040)
Farmers (%) selecting coffee seeds for planting from highly-productive plants (1=yes)	0.265	0.223	-0.059	-0.018	-0.009
	(0.702)	(0.122)	(0.171)	(0.065)	(0.047)
Constant	-1.060	1.015**	1.238	0.444	0.585**
	(0.840)	(0.368)	(0.755)	(0.496)	(0.223)
Observations	**540**	**806**	**892**	**1,114**	**4,095**
R-squared	**0.453**	**0.384**	**0.197**	**0.168**	**0.086**
Country controls	**No**	**No**	**No**	**No**	**Yes**
Municipality controls	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Winsorized at 3 sd above mean	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
N baseline	**256**	**394**	**391**	**619**	**2002**
N endline	**284**	**412**	**501**	**495**	**2093**

Standard errors in parentheses and clustered at the municipality level

*** p<0.001, ** p<0.01, * p<0.05

Table 22. Coffee regression results for adoption of managing the coffee pulp

Variables	El Salvador	Guatemala	Honduras	Peru	All Countries
Survey wave (1=endline)	0.006	-0.110	0.045	0.429***	0.112*
	(0.078)	(0.169)	(0.139)	(0.080)	(0.044)
Number of training modules received	0.004	0.021	0.026*	-0.023**	0.005
	(0.006)	(0.011)	(0.011)	(0.007)	(0.004)
Sold through MOCCA anchor firms (1 = yes)	0.212**	0.284**	0.054	-0.025	0.086*
	(0.077)	(0.101)	(0.136)	(0.050)	(0.035)
Income use decided jointly by couple (1 = yes)	0.065	0.123	0.108	-0.039	0.069*
	(0.060)	(0.078)	(0.092)	(0.055)	(0.034)
Age of farmer (years)	-0.000	-0.003	-0.014*	-0.013*	-0.004
	(0.002)	(0.004)	(0.007)	(0.006)	(0.002)
Sex of farmer (1 = male)	-0.065	0.070	-0.176	-0.166	-0.079
	(0.124)	(0.106)	(0.229)	(0.087)	(0.057)
Area planted with coffee (ha)	0.149**	-0.090	0.024	0.051	0.012
	(0.048)	(0.073)	(0.036)	(0.063)	(0.011)
Area planted with coffee (ha) squared	-0.006**	0.007	-0.001	-0.003	-0.000
	(0.002)	(0.010)	(0.001)	(0.007)	(0.000)
Average age of coffee trees (years)	0.001	-0.007	-0.027	-0.011	-0.006
	(0.009)	(0.013)	(0.022)	(0.019)	(0.008)
Average age of coffee trees (years) squared	-0.000	0.000	0.000	0.001	0.000
	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)
Number of coffee trees per hectare	0.000	-0.000*	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Variables	El Salvador	Guatemala	Honduras	Peru	All Countries
Productive coffee plant density (plants/ha)	-0.000	0.000**	-0.000	0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Farmer has at least one certification (1 = yes)	0.122	-0.053	0.117	0.101	0.057
	(0.213)	(0.148)	(0.095)	(0.062)	(0.040)
Reported coffee rust (1 = yes)	-0.018	-0.001	0.137	0.020	-0.027
	(0.040)	(0.079)	(0.075)	(0.051)	(0.029)
Number of coffee varieties planted	-0.013	0.008	-0.010	0.013	0.015
	(0.029)	(0.027)	(0.031)	(0.019)	(0.012)
Farm altitude (masl)	-0.000	0.000	-0.001	0.000	0.000
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
Farm altitude squared	0.000	-0.000	0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Had a loan and used in coffee (1 = yes)	-0.273	-0.065	-0.001	0.150*	0.006
	(0.186)	(0.196)	(0.128)	(0.072)	(0.044)
Household had a migrant in last 12 months (1 = yes)	-0.000	0.066	0.113	0.018	0.055
	(0.065)	(0.156)	(0.144)	(0.084)	(0.052)
Household received remittances (1 = yes)	0.030	0.211	-0.276*	0.039	-0.035
	(0.041)	(0.118)	(0.129)	(0.108)	(0.048)
Obtained information of coffee research products from NGOs or government (1 = yes)	0.065	0.038	0.043	0.051	0.093**
	(0.038)	(0.085)	(0.081)	(0.071)	(0.033)
Farmers (%) selecting coffee seeds for planting from highly-productive plants (1=yes)	-0.012	0.397***	0.091	0.015	0.081*
	(0.189)	(0.105)	(0.156)	(0.054)	(0.039)
Constant	0.015	0.197	1.507*	1.232**	0.455*
	(0.226)	(0.316)	(0.688)	(0.413)	(0.182)
Observations	**540**	**806**	**892**	**1,114**	**4,095**
R-squared	**0.348**	**0.279**	**0.264**	**0.252**	**0.119**
Country controls	**No**	**No**	**No**	**No**	**Yes**
Municipality controls	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Winsorized at 3 sd above mean	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
N baseline	**256**	**394**	**391**	**619**	**2002**
N endline	**284**	**412**	**501**	**495**	**2093**

Standard errors in parentheses and clustered at the municipality level

*** p<0.001, ** p<0.01, * p<0.05

4.3.4 Determinants of the total number of Coffee practices adopted

This section examines the determinants of the total number of coffee practices adopted by farmers across project countries (**Table *23***). By combining pooled and country-level analyses, the results provide insights into how project implementation, training activities, household decision-making, financial resources, certification, and access to improved planting material influenced adoption**.**

Overall, training is positively associated with adopting a larger set of practices. Increases in the total count are primarily driven by practices with lower implementation barriers (such as prunning, stumping, integrated pest management), whereas practices that typically require greater capital or labor (like soil management practices that may involve hiring labor or applying fertilizer regularly) show smaller contributions within the evaluation window. Country-specific estimates are provided in *Table 23.*

Effect of time and project implementation

Across the pooled sample, farmers reported a significant overall increase in the number of coffee practices adopted. At the country level, adoption expanded in Peru and Honduras, while Guatemala experienced a significant decline. El Salvador showed no meaningful changes. These results confirm that the project contributed to broad increases in adoption, but with strong heterogeneity across countries.

Role of training

The inclusion of a quadratic term for training reveals a non-linear relationship between the number of training modules received and adoption of practices. In the pooled analysis, the linear term is negative while the squared term is positive, suggesting that farmers with only a few training sessions adopted fewer practices, but adoption increased once participation surpassed a certain threshold. This pattern is also visible in Honduras, where the quadratic term is positive and significant, indicating increasing returns to training intensity. By contrast, in Guatemala, no significant effects were observed, and in some cases the relationship remained flat. These findings suggest that sporadic exposure to training was insufficient, but sustained engagement through multiple modules could reinforce broader adoption of practices.

Market linkages (anchor firms and certification)

Selling to MOCCA anchor firms increased practice adoption in Peru, while results were not significant in other countries or the pooled sample. Certification effects were more limited: positive in Honduras, negative (though not significant) in El Salvador, and null elsewhere. This indicates that market incentives influenced adoption selectively, depending on the strength of institutional and commercial environments.

Information access

Access to information from NGOs, government, or research institutions was among the most consistent drivers of adoption. Positive and significant effects were observed in Honduras, and the pooled analysis, underscoring the complementarity between MOCCA and existing extension channels. Unlike training, which requires intensity to matter, information access alone showed a strong and direct link to practice adoption.

Other relevant factors

- Credit use in coffee was positively associated with adoption in the pooled sample. Migration also increased adoption in Peru and the pooled analysis, while remittances showed mixed effects, positive in El Salvador and Guatemala but negative in the pooled sample.
- Coffee rust had divergent effects: negative in El Salvador and Peru, positive in Guatemala, reflecting different farmer responses to shocks.
- Larger coffee areas were positively associated with adoption in the pooled results, while more varieties planted reduced adoption, suggesting that diversification may dilute management intensity. Tree age effects were mixed, with older plantations generally associated with lower adoption.

Table 23. Determinants of the Total Number of Coffee Practices Adopted

Variables	El Salvador	Guatemala	Honduras	Peru	All Countries
Survey wave (1=endline)	-4.092	-7.631*	2.884*	4.617***	3.814***
	(2.877)	(3.761)	(1.450)	(0.970)	(0.621)
Number of training modules received	0.185	0.395	-0.693*	-0.069	-0.417**
	(0.586)	(0.638)	(0.323)	(0.256)	(0.147)
Number of training modules received squared	-0.014	0.003	0.044*	0.011	0.019*
	(0.029)	(0.027)	(0.018)	(0.015)	(0.008)
Sold through MOCCA anchor firms (1 = yes)	2.062	-0.442	0.439	1.834***	0.028
	(1.668)	(1.180)	(1.056)	(0.471)	(0.370)
Income use decided jointly by couple (1 = yes)	-2.088	0.730	0.382	-0.517	0.073
	(1.381)	(0.905)	(0.714)	(0.517)	(0.366)
Age of farmer (years)	-0.031	0.043	-0.023	0.032	0.001
	(0.048)	(0.048)	(0.053)	(0.053)	(0.025)
Sex of farmer (1 = male)	-0.149	-0.368	2.526	-0.001	0.045
	(2.691)	(1.247)	(1.790)	(0.812)	(0.609)
Area planted with coffee (ha)	1.571	0.136	0.271	-0.230	0.246*
	(1.038)	(0.844)	(0.281)	(0.590)	(0.114)
Area planted with coffee (ha) squared	-0.061	-0.055	-0.005	0.020	-0.000
	(0.043)	(0.115)	(0.009)	(0.069)	(0.002)
Average age of coffee trees (years)	0.342	-0.357*	-0.083	-0.133	-0.122
	(0.192)	(0.149)	(0.174)	(0.179)	(0.082)
Average age of coffee trees (years) squared	-0.016*	0.009*	0.010	0.004	0.001
	(0.006)	(0.004)	(0.007)	(0.011)	(0.003)
Number of coffee trees per hectare	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Productive coffee plant density (plants/ha)	-0.000	0.001	-0.001**	0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Farmer has at least one certification (1 = yes)	-5.915	1.808	1.355	0.145	0.538
	(4.620)	(1.732)	(0.785)	(0.581)	(0.428)
Reported coffee rust (1 = yes)	-2.403**	3.588***	-1.340*	-0.937*	0.574
	(0.880)	(0.909)	(0.581)	(0.472)	(0.311)
Number of coffee varieties planted	-0.445	0.168	-0.229	-0.123	-0.490***
	(0.635)	(0.308)	(0.242)	(0.181)	(0.126)
Farm altitude (masl)	0.006	0.001	0.003	-0.003	0.000
	(0.009)	(0.004)	(0.005)	(0.004)	(0.002)
Farm altitude squared	-0.000	0.000	-0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Had a loan and used in coffee (1 = yes)	-5.888	2.906	1.661	0.742	1.285**
	(4.081)	(2.272)	(0.991)	(0.679)	(0.470)
Household had a migrant in last 12 months (1 = yes)	1.867	-3.188	0.242	2.491**	1.677**
	(1.404)	(1.806)	(1.115)	(0.788)	(0.549)
Household received remittances (1 = yes)	2.293*	2.796*	0.547	-1.411	-1.019*
	(0.885)	(1.364)	(0.996)	(1.009)	(0.509)
Obtained information of coffee research products from NGOs or government (1 = yes)	1.380	1.037	1.606*	0.198	1.207***
	(0.867)	(0.990)	(0.630)	(0.664)	(0.350)

Variables	El Salvador	Guatemala	Honduras	Peru	All Countries
Farmers (%) selecting coffee seeds for planting from highly-productive plants (1=yes)	0.650	-0.467	1.124	-0.509	-0.516
	(4.100)	(1.227)	(1.208)	(0.507)	(0.410)
Constant	10.703*	1.822	6.258	8.625*	7.671***
	(4.955)	(3.648)	(5.349)	(3.861)	(1.937)
Observations	**540**	**806**	**892**	**1,114**	**4,095**
R-squared	**0.728**	**0.405**	**0.298**	**0.642**	**0.285**
Country controls	**No**	**No**	**No**	**No**	**Yes**
Municipality controls	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Winsorized at 3 sd above mean	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
N baseline	**256**	**394**	**391**	**619**	**2002**
N endline	**284**	**412**	**501**	**495**	**2093**

Standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05

4.4 Results by Key Activities

In this section we report on the results for each of MOCCA's main activity areas - Training, Market Access, Research and Dissemination, Genetic Material, Access to Finance and Strengthening National and Regional Platforms – to assess to what degree MOCCA contributed to market system level changes in the provision of key support services for farmers. For each, we first provide the updated Theory of Change for each activity, developed together with MOCCA to reflect the actual causal pathways that guided implementation. We then respond to the following evaluation questions, using information from interviews with market system actors and information from the farmer surveys:

- What changes do we observe among MOCCA partners and non-partners?
- What are the contributions of MOCCA to the changes in partners and non-partners? What other elements contributed?
- How likely are the changes to be sustained over time by MOCCA partners? What challenges might they face?
- What changes do we observe among MOCCA beneficiary farmers in terms of improved services?

We respond to a fifth question using these findings to position each country along a Systemic Change Pathway. This same process was followed for all activities detailed in this section.

4.4.1 Access to Training

MOCCA's updated ToC:

By establishing alliances with anchor firms and market system actors, along with the development and implementation of training curriculums and cost-effective training approaches, market system actors in the coffee sector strengthen their capacities in GAP and R&R techniques, training approaches, and content. Through MOCCA, training methodologies and content are strengthened, enabling partners and other development project implementers to replicate and improve their training models. As a result,

market system actors, both allies and non-allies, adopt improved methodologies, encouraging knowledge transfer to coffee farmers. Farmers gain the knowledge, skills, and understanding needed to apply GAP and R&R techniques, leading to the adoption of low-cost R&R practices. This, in turn, improves farmers' yield, profitability, and sustainability, catalyzing a cycle of R&R investments and ensuring more resilient coffee production systems.

What changes do we observe among MOCCA partners and non-partners in terms of TA and training?

MOCCA planned to increase farmers' knowledge and skills through technical assistance (TA) provision or trainings. **MOCCA worked with 42 partners** across five countries to provide technical assistance and **training to over 114,000 coffee farmers**. The number of farmers reached **was significant at sectoral level in all countries**, ranging from approximately 10% in Peru to 28% in El Salvador of all coffee farmers[27] and representing 20% of coffee farmers across all countries. This means that almost one in five coffee farmers across the region benefited from MOCCA's training activities, exposing them to novel, low-cost practices through participatory and practical training methods. We describe below the changes observed in TA and training among MOCCA's partners, MOCCA's contribution to those changes, and highlight where partners are already investing to maintain those changes post project. Results by country are summarized in **Table *25***.

We were able to confirm changes in how partners deliver TA in coffee in all four countries assessed. The key changes across all four contexts included:

- Uptake of **TA content based on MOCCA curriculum** including standardization across different MOCCA partners.
- Greater use of **participatory methods and inclusive approaches** including demonstration plots, local languages, sex sensitive methods.
- **Expanded coverage of TA** for farmers.
- **Increased number of trained technicians** hired by exporters, cooperatives and farmer organizations

Partners in El Salvador and Guatemala highlighted increased use of inclusive approaches to TA. Partners in El Salvador highlighted an increase in use of demonstration plots and in Guatemala the increased use of radio (Cafetal Radio) and digital tools.

As a result of these changes, partners reported:

- Greater **adoption of practices** (pruning, organic inputs, fertilization, shade management, post-harvest practices) by farmers
- **Stronger relationships**/reputation/trust between farmers, their organizations, and exporters
- Improved **productivity** and **quality** of coffee among trained farmers
- Increased participation of women and families in training activities

MOCCA was the PRIMARY contributor to changes observed in Honduras and Peru, while **in El Salvador and Guatemala, MOCCA's contribution COMBINED with that of other actors to bring about changes**.

[27] As proportion of total coffee farmers in country at baseline, based on figures in baseline report.

The evidence for the changes and MOCCA's contribution to those changes is strong in all four countries. Large development projects in El Salvador and exporters and farmer organizations in Guatemala contributed alongside MOCCA to support changes.

Key **MOCCA contributions to these changes** include:

- **Introduction of a standardized training curriculum** (technical content)
- **Training of technicians** in participatory methods for TA, sexinclusive approaches, production practices and quality management
- **Hiring of** (or resources to hire) **technicians** to provide TA
- **Promotion of low-cost production practices**
- **Provision of tools and inputs** to farmer organizations
- Introduction of **digital tools** for TA

Contextual factors also facilitated or limited the achievement of MOCCA's objectives and are outlined in **Table *24***.

Table 24. Contextual factors that affected implementation

Facilitated	Limited
• For El Salvador, the decrease of gangs in coffee growing areas as a result of the government crackdown. • For Honduras, the pandemic supported the adoption of virtual TA tools. • For Peru, multistakeholder coordination mechanisms favored implementation of TA and increased fertilizer prices supported the adoption of low-cost practices. • No supporting contextual factors were identified for Guatemala.	• Labor scarcity/costs • Financial limitations of farmers and farmer organizations • Climate • Coffee price fluctuations • Trust issues • Pandemic

Finally, we explored with partners what changes they were most likely to continue, and whether and how they were already investing in maintaining or expanding the changes post MOCCA.

The following are the **changes most likely to be sustained by partners**:

- **Expanded provision of TA**.
- **Use of elements of MOCCA curriculum and methods** in TA moving forward
- **Promotion of sustainable practices** promoted by MOCCA
- In Guatemala and Honduras use of digital tools for TA
- In Honduras soil analysis and training on quality.

In Honduras, Guatemala and Peru we find the greatest number of anchor firm partners (private exporters and producer organizations) already investing to sustain or expand the changes introduced

by MOCCA. In Honduras we even find non-partners interested in implementing the changes. In Guatemala a couple exporters have retained MOCCA staff to continue TA, but farmer organizations cite financial limitations to maintaining TA staff. In El Salvador there are few to no partners already implementing changes without MOCCA support and they identify important challenges in doing so.

Major **challenges** partners face in maintaining or expanding the changes introduced by MOCCA in TA for farmers include:

- **Lack of financial resources to continue provision of TA** at scale supported under MOCCA
- **Farmers are unlikely to continue implementing practices without ongoing support** in the form of TA, follow up, inputs or other.
- In Guatemala labor scarcity, competing economic priorities, shifting household roles in coffee and limited availability of inputs for some practices are additional challenges.
- In Honduras, the lack of price incentives for investment in coffee, low capacity for sexsensitive TA, and low capacity of farmer organizations will challenge sustainability of practice adoption.

Table 25. Changes in technical assistance

El Salvador	Guatemala	Honduras	Peru
# MOCCA partners participating in Activity			
6	6	8	15
# farmers reached; farmers in sector; coverage.[28]			
6,76523,751 28%	32,146 122,000 26%	16,554 100,000 17%	23,335 223,482 10%
Impact trajectory confirmed?			
CONFIRMED	CONFIRMED	CONFIRMED	CONFIRMED

[28] Coverage=# farmers reached/total farmers in sector at baseline according to baseline reports. Use to give a sense of the reach MOCCA had in each country vis a vis the total size of the sector.

El Salvador	Guatemala	Honduras	Peru
Changes observed			
Use of **MOCCA curriculum** More use of **participatory methods** in TA and training Use of **demonstration plots** **Introduction of sexissues into training**	**MOCCA technical assistance curriculum (CREAR) implemented and/or integrated with existing curriculum** . **Increase in numbers of technicians and expanded coverage of farmers** receiving TA and training. **Greater use of radio and web-based communication** for the provision of technical assistance **Inclusive approaches** to technical assistance (local languages, sex, demonstration plots)	New **curriculum content** for training and TA with small Coffee farmers More **participatory methods** used for TA and training. **Increased size of technical assistance staff** along with **increased coverage of farmers** More **training of technicians** hired by exporters, farmer organizations, rural financial institutions	Some partners replicated the MOCCA curriculum in full, while others incorporated it partially into their own TA and training programs.; **adoption in Cajamarca as starting point for common curriculum** for sector **More efficient and participatory group training methods** helped grow attendance from 5 to 40 in some farmer groups. Significantly **expanded TA coverage** by cooperatives and exporters to, in some cases, 70 to 100% of their suppliers. **Technicians more skilled** in specialized technical topics, participatory methods, and certification
Level of MOCCA contribution			
COMBINED	COMBINED	PRIMARY	PRIMARY
Strength of evidence for the contribution of MOCCA			
STRONG	STRONG	STRONG	STRONG
What changes are most likely to be sustained?			
Promotion of Good Agricultural Practices in coffee TA **Training and TA for affiliated small farmers**	Use of **digital tools** for TA including PIER, WhatsApp, and mobile phone, especially for individual follow-up. **Promotion of sustainable practices** including top working and pruning techniques. **Provision of TA** to greater numbers of farmers by exporters and farmer organizations	Ongoing **provision of TA** by MOCCA partners including use of PIER or adaptations of MOCCA curriculum content. **Soil analysis** **Training on quality**	**Use of MOCCA training curriculum** **Promotion of** biofertilizers, use of vetiver and R&R **practices**
What is the evidence for sustainability?			
WEAK	MODERATELY STRONG	STRONG	MODERATELY STRONG

What changes do we observe among MOCCA beneficiary farmers in terms of training received?

We used monitoring data to learn about the number of trainings provided by the project. As shown in **Figure 4**, the project provided an average of 9 training modules to farmers, and the number of training modules was highest in Guatemala, and lowest in Peru. The trainings were equally provided to male and female beneficiary farmers. When we asked farmers how useful they considered the trainings received, most of them considered they were very useful or useful (**Figure *5***). Despite this, some farmers considered the trainings were of little use, particularly in Peru.

Figure 4. Coffee: Number of trainings attended by farmers, by sex

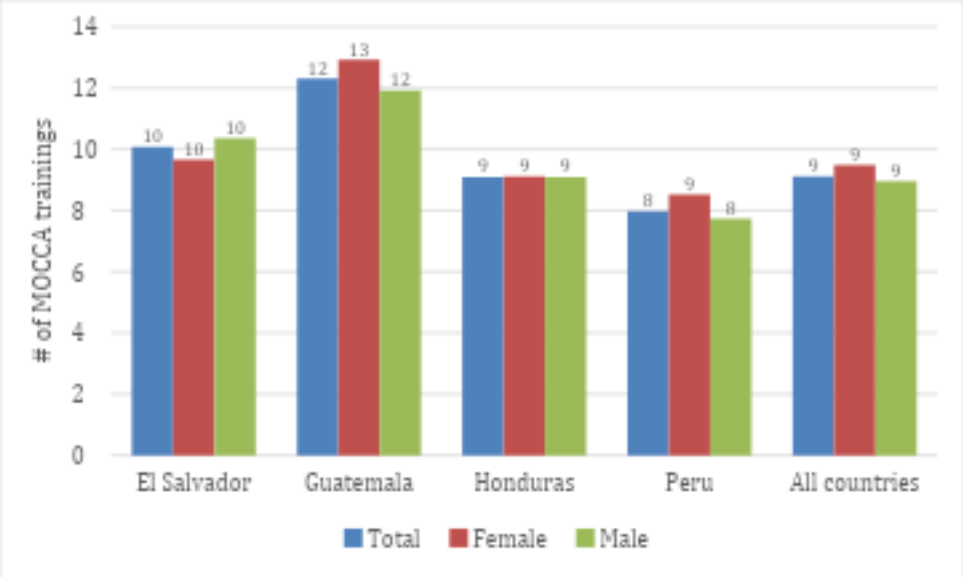
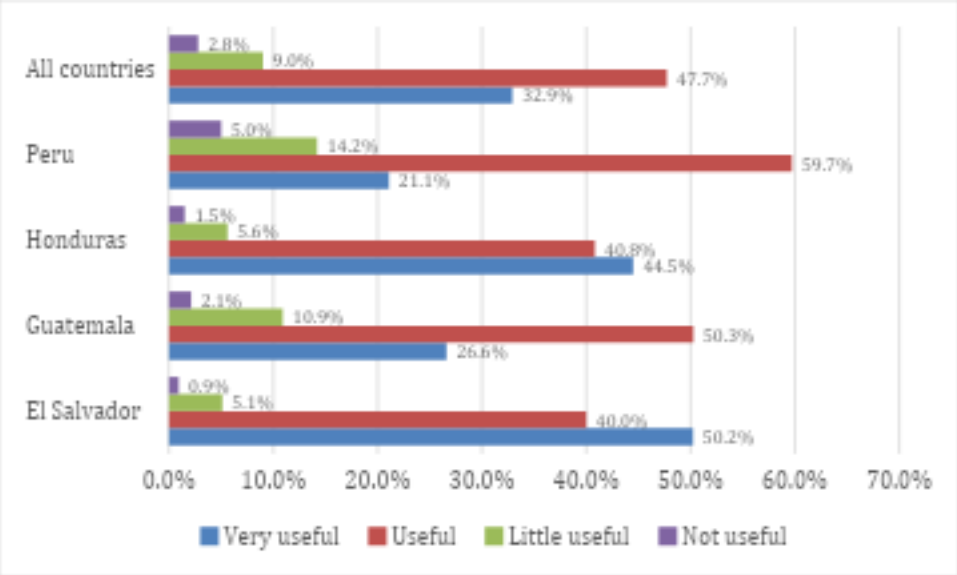


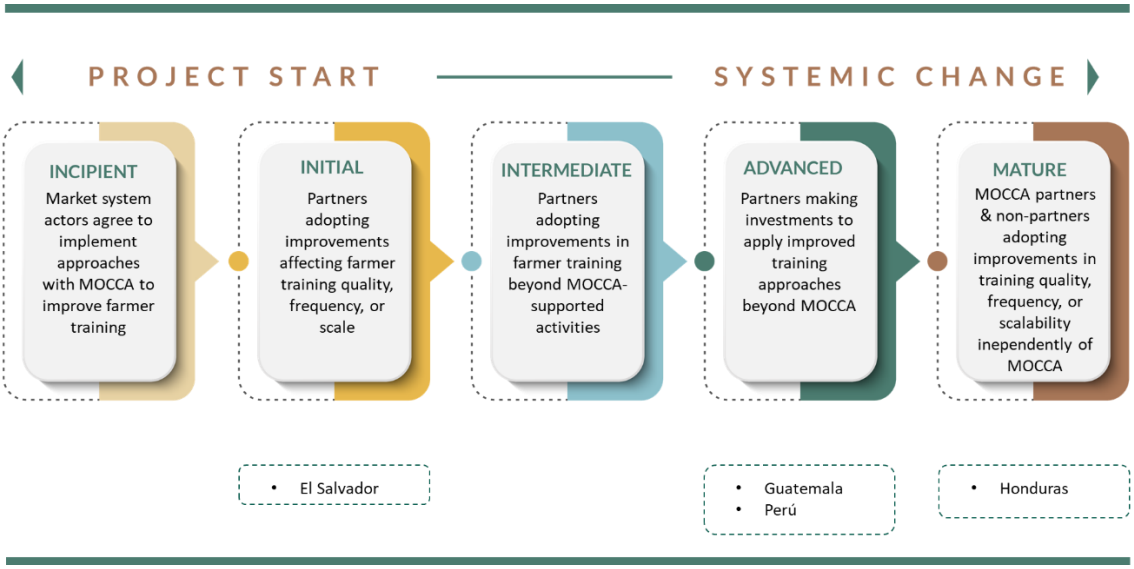
Figure 5. Coffee: perception of farmers about how useful they considered the trainings received



The number of training modules received had a positive and statistically significant effect on the adoption of all but one (doing coffee rehabilitation) of the six MOCCA-promoted practices evaluated econometrically (see section 4.3) , though this was heterogeneous across countries. For example, the number of trainings positively influenced adoption of renovation, use of fertilizer, and shade management only when doing the pooled analysis, suggesting that country-level effects were not large enough to be detected statistically. Doing selective harvesting was positively influenced by the number of trainings in Guatemala and in the pooled analysis; and negatively influenced in El Salvador. Similarly, managing (treating) the coffee pulp was positively influenced by the number of trainings in Honduras and negatively in Peru. However, the magnitude of the (negative) effects in the latter two practices was small (<5%). These results highlight that more training sessions alone may not secure adoption without complementary incentives or activities.

MOCCA provided trainings focusing on 31 practices, and though we did not evaluate all of them econometrically, descriptive statistics show that the trainings (along with possibly other activities) positively influenced many of them. For example, doing soil conservation and cost-saving weed control practices in Honduras increased at endline; the share of farmers using at least one control method for each disease affecting coffee, increased in all countries over time; complementary pest management practices such as doing *repela* and *pepena* also increased in Honduras and Peru, at endline; as did the use of tools to register cost of production and income from sales in all countries. These results suggest that, in countries where changes observed at the market system can be attributed to the project (Honduras and Peru), several outcomes were better than in other countries where investments from other sources were also relevant.

Where does the available evidence suggest countries sit along the Systemic Change Pathway?



4.4.2 Market Access and Buyer Relationships

MOCCA's updated ToC:

Through strategic alliances, coffee anchor firms actively integrate farmers into high-value business models by incorporating them into formal business plans. This collaborative effort fosters stable, long-term relationships between farmers and anchor firms, ensuring fair prices and transparent market opportunities. As farmers participate in these value-oriented models, they gain the knowledge and support needed to adopt low-cost rehabilitation and renovation (R&R) practices, which in turn improve productivity and profitability.

What changes do we observe among MOCCA partners and non-partners in terms of market access and buyer relationships?

MOCCA strengthened farmer access to higher value markets and prices by strengthening buyer seller relationships including strengthening capacity for producing better quality coffee, assessing coffee quality, establishing models for more direct purchasing from farmers based on quality and certifications. **MOCCA worked with 26 partners** across five countries to support **access to improved markets for over 13,000 coffee farmers** including better prices, price incentives for quality coffee, and expanded support services (TA, quality assessment, certification, access to finance, provision of seedlings). The number of farmers benefitted with improved buyer-seller relationships is relatively small, ranging from approximately 1% in El Salvador and Peru to 5% in Honduras of all coffee farmers. We describe below the changes observed in buyer-seller relationships among MOCCA's partners, MOCCA's contribution to

those changes, and highlight where partners are already investing to maintain those changes post project. Results by country are summarized in **Table *27.***

We were able to CONFIRM changes in how partners manage buyer seller relationships in all four countries assessed. The **key changes** across all four contexts included:

- **More direct buyer-seller relationships,**
- **More purchasing of coffee based on quality and certification**
- **Increase in number of small farmer suppliers** selling to exporters and/or farmer organizations including expansion into new areas.
- **Farmers and cooperatives play a stronger role in negotiation of buyer-seller relationships**, particularly use of quality as part of price negotiation.
- **Increase provision of support services to farmers**
- **Higher prices** for better quality, negotiations based on quality.
- **New/better systems for assessing quality** Partners in Peru highlighted diversifying market relationships into specialty coffee niches and roasted coffee for the domestic market.

As a result of these changes, partners reported:

- Exporters **integrate more small farmers into their supply chain**
- **Access to new markets/buyers**
- Improved **quality** of coffee
- **Better negotiation skills,** based on quality, on the part of lead farmers and farmer organizations Greater **knowledge of coffee marketing/pricing**
- More farmers obtaining **certification** and increased interest in certification
- Increased **productivity**
- Higher prices for higher **quality**
- For Guatemala, greater adoption of practices and quality of life
- For El Salvador, greater awareness of sex equity considerations
- For Honduras, greater volumes of quality coffee and improved reputation and relationship with farmers

MOCCA was the PRIMARY contributor to changes observed in El Salvador, Guatemala, and Honduras. However, the **evidence for the changes and MOCCA's contribution to those changes in El Salvador is moderately weak** as we only obtained evidence from MOCCA and a few partners. This means that although MOCCA appeared, according to testimonies, as main contributor of changes reported, in the case of El Salvador we had few sources of evidence to back this up (only few testimonies were backing up this statement).

According to the evidence, **MOCCA was not a significant contributor to changes in buyer-seller relationships in Peru**, with **moderately strong evidence that other actors drove changes observed in buyer seller relationships. In particular** international NGOs and public institutions working since 2018 to promote a market transition towards quality which has motivated buyers and farmers to adopt commercial strategies based on quality standards, differentiated prices, cupping labs, direct engagement with international buyers and improvements in infrastructure.to conserve quality.

Key **MOCCA contributions to these changes in El Salvador, Guatemala and Honduras** include:

- Establishing **new, more direct commercial relationships** between exporters and farmers or their organizations **including formal contracts**
- In El Salvador, training of farmers on quality-oriented harvest practices and implementation of MOCCA's women's empowerment tool
- In Guatemala, support for certification and engagement with buyers including trade fairs, coffee tasting sessions, agreements with buyers

Contextual factors also facilitated or limited the achievement of MOCCA's objectives and are outlined in **Table *26***.

Table 26. Contextual factors that affected implementation

Facilitated	Limited
● **Increase in demand for specialty coffee** in international and domestic (Peru) markets. ● **Increased interest in quality** on the part of farmers, in response to increased demand. ● In **Peru** the organization of quality competitions generated incentives for farmer investment in quality and differentiated pricing and the existence of a multi-stakeholder platform in the coffee sector in Cajamarca facilitated the implementation of MOCCA activities in buyer seller relationships.	● **Fluctuating coffee prices** create disincentives for farmers and challenges for buyers. ● **Existing commercial practices** (selling to multiple buyers, role of intermediaries, fraudulent scales, information availability) that are difficult to change and work against direct, high value commercial relations with small farmers. ● For El Salvador, fragmentation within the sector. ● For Guatemala disincentives for long term investment in quality or certified coffee ● For Honduras weak sectoral institutions, dependence on international markets, fiscal policies and past negative experiences with development programs. ● For Peru the pandemic and leaf rust outbreak reduced yields, profitability and quality, affecting buyer seller relationships.

Finally, we explored with partners what changes they were most likely to continue, and whether and how they were already investing in maintaining or expanding the changes post MOCCA.

The following are the **changes most likely to be sustained by partners**:

- Better prices for quality coffee
- Continuing supply relationships with small farmers
- For El Salvador and Guatemala, continuation of support services for farmers.
- For Guatemala, continued use of digital database, including phone numbers, to provide information and recruit new suppliers.
- For Honduras, stronger commercial relationships built with support from MOCCA (importer-exporter, farmer organizations-farmers-buyers)

In Guatemala and Honduras, we find the greatest number of partners already investing to sustain the changes introduced by MOCCA. We even find non-partners interested in adopting high-value business models in Guatemala. In El Salvador not all partners express interest in continuing the changes and there

are few to no partners already implementing changes without MOCCA support. In El Salvador one partner shared plans to scale back due to lack of capacity without ongoing support.

Major **challenges partners face in maintaining or expanding the changes introduced by MOCCA in buyer-seller relationships include**:

- **Lack of access to finance** for partners in El Salvador and Honduras**.**
- **Logistical challenges for partners in El Salvador.**
- **Stability of market incentives (price differentials) for certified or quality coffee will directly influence continuity of related buying models and practices.**
- **Lack of resources for TA** - continuation of direct buying relationships has relied heavily on lead farmers and/or technicians to link farmers to exporters which has been financed by MOCCA. Without MOCCA to hire technicians or create incentives for lead farmers, there is concern that these commercial relationships may come to an end.

Table 27. Changes in buyer-seller relationships

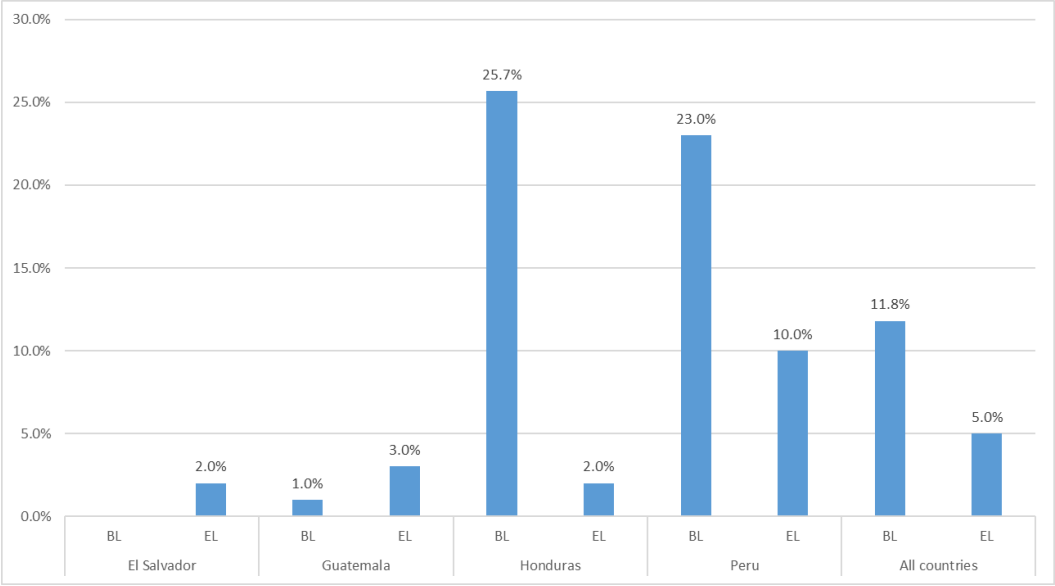
El Salvador	Guatemala	Honduras	Peru
# MOCCA partners participating in Activity			
2	4	7	11
# farmers reached; farmers in sector; coverage.[17]			
134 23,751 1%	2,602 122,000 2%	5,493 100,000 5%	1,651 223,482 1%
Impact trajectory confirmed?			
CONFIRMED	CONFIRMED	CONFIRMED	CONFIRMED
Changes observed			
Exporters increase the number of farmers from whom coffee is purchased at **higher quality and price**. Exporter carries out training for staff on gender (respect for women) based on MOCCA supported women's empowerment tool Creation of a **new system to provide quality evaluation and feedback to farmers**	**Increase in size of technical team** increasing **presence in new parts of the country** and the **number of farmers suppliers**. More **direct purchases** without intermediaries. Local lead farmers in charge of marketing **connect farmers to exporters** for direct purchases. Exporters have **more suppliers selling quality and/or certified coffee** allowing them to open new international markets.	**Exporters provide services to more farmers** (TA, credit, certification, seedlings) as a part of their commercial relationship. Exporters attract **new farmer suppliers** through **payments for quality** and/or **provision of support services**. **Exporters pay higher prices** to farmers **for higher quality** coffee.	**Cooperatives begin buying coffee based on quality and productivity**, creating incentives for farmers to improve practices. **Cooperatives have cupping labs** that they use in **negotiation with buyers based on quality.** Some buyers have **expanded their buying model based on cupping scores** creating incentives for farmers who implement best practices. **Participation in specialty coffee market niches** has grown. Cooperatives have **diversified towards roasted coffee** for growing domestic markets. Government programs have **invested in post-harvest infrastructure** that facilitates better quality management.

El Salvador	Guatemala	Honduras	Peru
Level of MOCCA contribution			
PRIMARY	PRIMARY	PRIMARY	NO CONTRIBUTION IDENTIFIED
Strength of evidence for the contribution of MOCCA			
MODERATELY WEAK	STRONG	MODERATELY STRONG	MODERATELY STRONG
What changes are most likely to be sustained?			
Support for coffee collection **Better prices**	**Use of farmer databases to share technical information** and **engage new suppliers** **Direct buying** from farmers **Provision of support services**, particularly certification	**Better prices** for farmers **Maintain relationships with new partners**	No changes to be sustained
What is the evidence for sustainability?			
MODERATELY WEAK	MODERATELY STRONG	MODERATELY STRONG.	WEAK

What changes do we observe among MOCCA beneficiary farmers in terms of market access and buyer relationships?

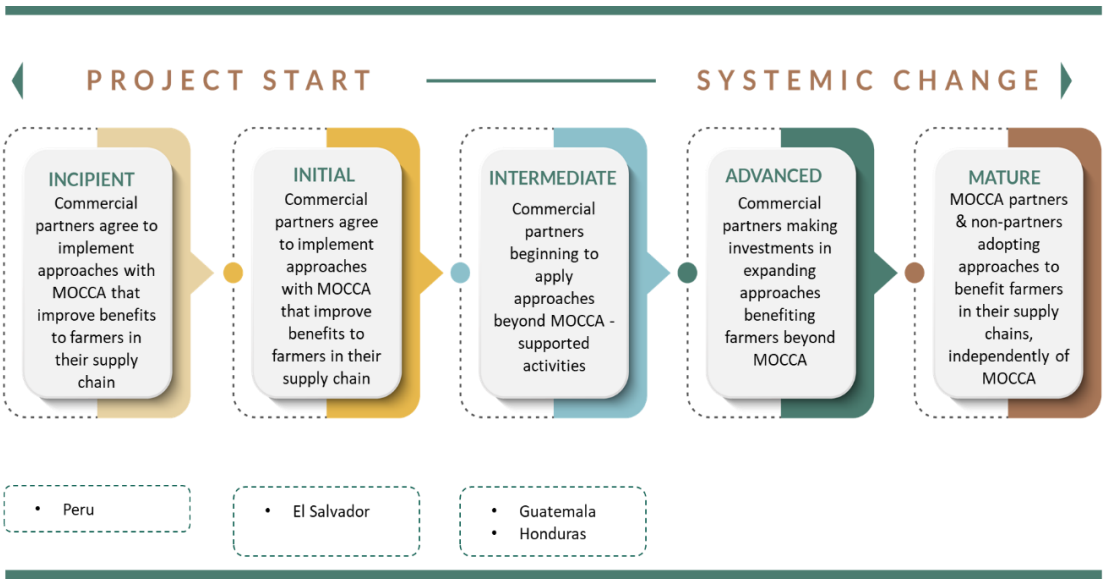
We described the econometric effect of improved buyer-seller relationships, determined by coffee anchor firms actively integrating farmers into high-value business models by incorporating them into formal business plans, on eight impact and outcome indicators, in sections 4.2 and 4.3. We observed heterogeneous effects across countries. For example, improved buyer-seller relationships had no statistical effect on income, use of fertilizers, or managing shade trees. In contrast, this positively influenced yields and doing selective harvest (only in the pooled analysis) and on the adoption of farm waste management in El Salvador, Guatemala, and in the pooled analysis. However, we observed negative effects on renovating coffee trees (pooled analysis only) and on rehabilitating coffee trees in Guatemala. These results suggest that market linkages, when combined with quality requirements, may encourage key harvest and post-harvest waste management activities, and have an impact on yields; but is not enough to encourage renovating or rehabilitating coffee, which is driven by other (agronomic, instead of market) factors. Since the changes observed in market actors can strongly be attributed to MOCCA in Guatemala, and moderately in El Salvador and Honduras, the econometric results suggest that in Guatemala and El Salvador, market system changes to which the project contributed to materialized into changes at the farmer level too.

Figure 6. Coffee: changes in premium received due to cup quality



We asked farmers to report whether they received price premiums due to the cup quality (a partial indicator of better buyer-seller relationships, as other factors may also influence receiving a premium) and overall, few farmers reported this at endline (**Figure *6***). We observed a statistically significant decrease in the share of farmers reporting this at endline in Honduras and Peru. In these countries, the share of farmers that reported selling to a MOCCA anchor firm statistically decreased at endline (**Table 14**), and in the case of Honduras, this may also be related to farm certifications (as fewer farmers reported having a certification at endline compared to baseline). Further, in Peru, MOCCA did not significantly contribute to changes in behavior of market system actors.

Where does the available evidence suggest countries sit along the Systemic Change Pathway?



4.4.3 Access to Research Outputs

MOCCA's updated ToC:

By developing multi-site trials, along with strengthening research capacity through training, mentorship, and sustainable funding pathways, coffee researchers, research institutions, and NCIs enhance their ability to lead impactful research. As NCIs and research institutions take charge of research innovation and dissemination, relevant information is accessed by stakeholders, including technical assistance providers, through regional workshops and conferences. Farmers are expected to access this information and adopt new practices and varieties.

MOCCA partnered with research institutions in each country, and with World Coffee Research (WCR) and PROMECAFE at regional level to expand applied coffee research and improve its relevance for small coffee farmers. MOCCA also worked to improve dissemination of research to diverse stakeholders and support dissemination to farmers through TA providers and sectoral institutions. MOCCA worked with 11 partners across five countries to support the development of 213 technologies, practices or approaches and engaged 15 partners in dissemination of research findings to next-users. MOCCA established a regional research fund with PROMECAFE through which 11 research projects were funded. MOCCA also provided training in proposal development and support for participation in regional research conferences. We describe below the changes observed in TA and training research and research dissemination among MOCCA's partners, MOCCA's contribution to those changes, and highlight where partners are already investing to maintain those changes post project. Results by country are summarized in **Table *29***.

What changes do we observe among MOCCA partners and non-partners in terms of access to research outputs?

We were able to CONFIRM changes in how partners carry out research and research dissemination in Honduras and Peru. Work to introduce changes in research and research dissemination among partners in Guatemala was initiated but outcomes were yet not observed. In El Salvador, MOCCA research activities were minimal and we did not have sufficient evidence to confirm changes. The **key changes** observed in Guatemala, Honduras and Peru included:

- **Strengthened research capabilities**, including proposal development.
- **New researchers and other partners engaged collaboratively** in coffee research.
- **Research results are shared more widely**, more frequently, and with a greater diversity of next users in scientific and technical events, multi-stakeholder platforms, through online media and in training of technicians and farmers.
- **Research topics aligned with sector priorities**, particularly profitability, quality and varietal performance.

As a result of these changes, partners reported:

- **Research topics are increasingly relevant** to the coffee sector, particularly in profitability, fermentation, cup quality, and varietal performance under local conditions.
- **Research results disseminated to diverse next users** —technicians, farmers, organizations, exporters, and institutions— who use them to inform training, technical assistance, and on-farm decisions.
- **Successful fundraising** for research in Guatemala and Peru.

MOCCA was the PRIMARY contributor to changes observed in Guatemala, while in Peru and Honduras, MOCCA's contribution COMBINED with that of other actors to bring about changes. The evidence for the changes and MOCCA's contribution to those changes is strong in Guatemala, Honduras and Peru. In El Salvador changes were NOT OBSERVED and evidence for any MOCCA contribution was WEAK. Instituto Hondureno del Café (IHCAFE), WCR, PROMECAFE and donors contributed alongside MOCCA to support changes in Honduras while in Peru MOCCA's efforts combined with those of farmer organizations, sectoral platforms and WCR to support changes in research and research dissemination.

Key **MOCCA contributions to these changes** include:

- **Training of researchers**
- **Funding for research**, including co-funding varietal trials.
- **Direct support for research, particularly through WCR** (technical, establishment of plots, lead research collaborations, access to genetic materials and analyses)
- **Support for dissemination of results** through webinars, social media, infographics, scientific events, and farmer engagement
- **Direct dissemination of results** (Facebook, infographics)

Contextual factors also facilitated or limited the achievement of MOCCA's objectives and are outlined in **Table 28**.

Table 28. Contextual factors that affected implementation

Facilitated	Limited
● Climate effects on coffee (especially droughts). The Intensification of the effects of **climate change** and the increasing vulnerability of popular varieties have generated pressure for research on new resilient varieties and climate smart production practices. ● New seed regulations. Partners reported that the work to advance regulations created demand for more research on varieties, assessment of varieties, and dissemination of information on varieties because the regulation makes (or will make) it possible to acquire genetic materials that are true/pure, allowing farmers then to choose which materials they want and therefore having information about what is available and how it behaves in different contexts becomes important.	

Finally, we explored with partners what changes they were most likely to continue, and whether and how they were already investing in maintaining or expanding the changes post MOCCA.

The following are the **changes most likely to be sustained by partners**:

- In Guatemala, Honduras, and Peru, continuation of some MOCCA research topics and approaches
- Genetic material evaluation/improvement in Honduras, with access for regional partners.
- In Guatemala greater dissemination of results.
- In Peru, collaborative research arrangements.

In Guatemala we find the greatest number of partners already investing to sustain or expand the changes introduced by MOCCA. Partners continue with MOCCA supported activities with their own resources including replication of research trials and results dissemination to new groups of farmers. Non partners also express intention to support research and dissemination moving forward. In Peru and Honduras while partners express intentions to continue, and in Peru some have signed agreements to do so with WCR, there is little evidence to date that they are investing in doing so, and some report they will not continue without MOCCA resources to do so. We did not have enough evidence to assess changes in research and research dissemination in El Salvador. Despite many partners listed for this activity in El Salvador in the table below, these partners also participated in other MOCCA activities. In our interviews, partners were asked to prioritize the most important changes, and the interview focused on those (related to TA, buyer seller relationships, genetic material, etc.) As a result, in some countries we had very few informants who provided evidence on changes in some areas. It does not mean that changes did not happen, but that our fieldwork did not provide us with enough evidence to assess them in the case of research in El Salvador.

Table 29. Changes in research and research dissemination

El Salvador	Guatemala	Honduras	Peru
# MOCCA partners participating in Activity			
21	2	2	4
# partners disseminating research; # technologies			
3 19	5 35	4 28	2 76
Impact trajectory confirmed?			
INDETERMINATE	INITIATED	CONFIRMED	CONFIRMED
Changes observed			
NA	Researchers and students have **stronger skills for doing research and applying for research funds**. **New researchers engaging** in research through supervised theses or participation in field experiments. **Research results are more relevant** for the coffee sector, especially in fermentation, quality, and profitability. **Research results are shared with field technicians** who work directly with farmers. Researchers **share research results more frequently in multi-stakeholder platforms** (communities of practice, scientific conferences). Research institutions have **strengthened their online presence** and information and improved dissemination channels for research results.	NCI has **strengthened their capacity in research methods and proposal development**. NCI has expanded collection of genetic material and work on characterization, evaluation and breeding **Stronger research dissemination** strategies using participation in seminars, demonstration plots, scientific articles, and virtual platforms to publish pamphlets, infographics, and videos NCI has **more access to scientific information and uses the information** to inform management of nurseries, seed lots, certification, and coffee leaf rust.	**Diverse partners collaborate on multi-sited coffee trials** coordinated by WCR using coffee plots managed by farmers, farmer organizations and exporters. **Research results generated on more than 30 coffee varieties in different sites; genetic evaluation of old planting materials; fertilization; coffee flavor.** **Results shared through multi-stakeholder platforms**. **Farmers and their organizations participate actively with exporters and researchers in research** including identification of older varieties, assessment of adaptation to local conditions, climate change and pests and diseases, the influence of fertilization and post-harvest practices on productivity and quality in young plantations.
Level of MOCCA contribution			
INDETERMINATE	PRIMARY	COMBINED	COMBINED
Strength of evidence for the contribution of MOCCA			
WEAK	STRONG	STRONG	STRONG

El Salvador	Guatemala	Honduras	Peru
What changes are most likely to be sustained?			
NA	**More investment in research** and greater **interest in formalizing the use of research results** including technical certifications that validate correct use of technical inputs. **Greater dissemination of research**	Implementation of **soil and coffee leaf rust studies.** Evaluation and improvement of genetic materials.	**Collaborative research arrangements** Application of **MOCCA promoted approaches to research and evidence generation.**
What is the evidence for sustainability?			
NA	MODERATELY STRONG	MODERATELY WEAK	MODERATELY WEAK

Major **challenges partners face in maintaining or expanding the changes introduced by MOCCA in** research and research dissemination are diverse across countries and include:

- In Guatemala, high staff rotation and rigid institutional structures.
- In Honduras delays in funding, dispersed investments, long time required for research to produce results for farmers.
- In Peru lack of dedicated staff and financial resources and resulting discontinuity of trials.

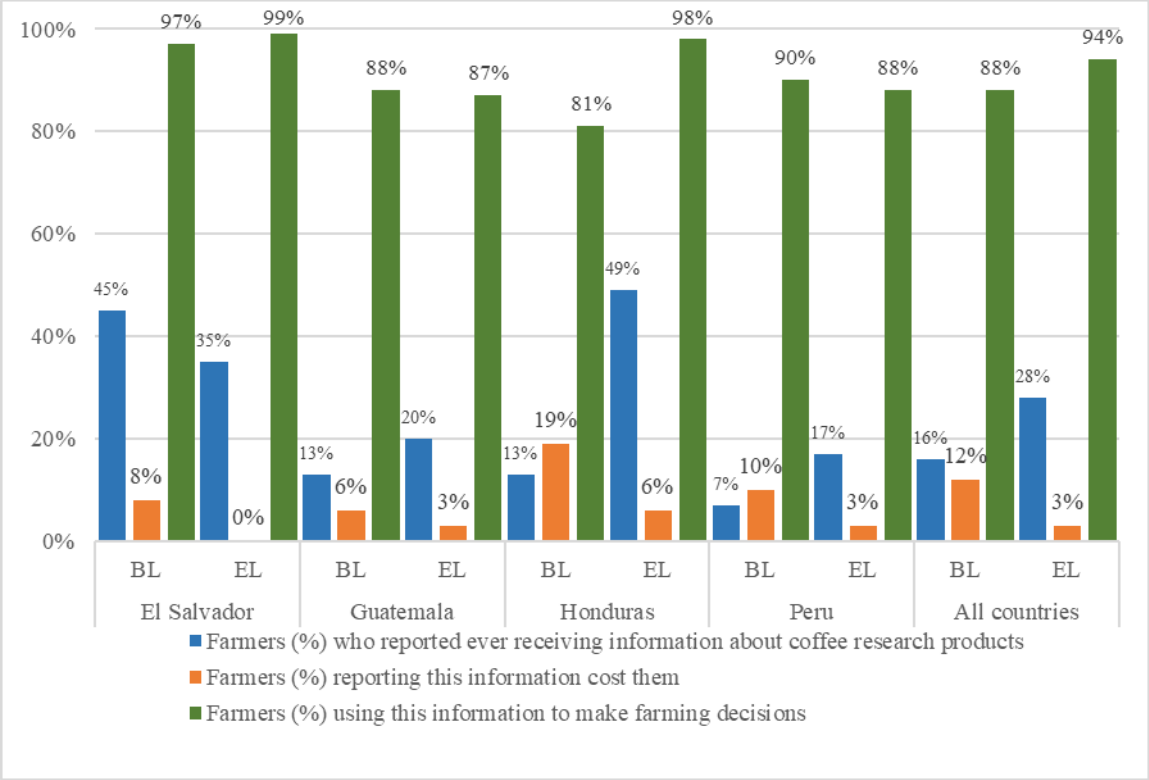
What changes do we observe among MOCCA beneficiary farmers in terms of access to research outputs?

We described the econometric effect of access to research outputs on eight impact and outcome indicators, in sections 4.2 and 4.3. We observed heterogeneous effects across countries. For example, improved access to research outputs had no statistical effect on the likelihood of managing shade trees management. However, this type of information had a statistically significant positive effect on income and treating the coffee pulp only in the pooled analysis, despite showing a positive trend in most (income) or all (treating the coffee pulp) countries. Further, accessing research output information also positively affected results in Guatemala (renovation, rehabilitation, and use of fertilizer) and Honduras (yields and classifying coffee cherries). In these two countries, particularly Guatemala, MOCCA strongly contributed to changing the behavior of market system actors to better promote research dissemination. Overall, there was a positive trend in the effects of this variable on the eight indicators evaluated econometrically.

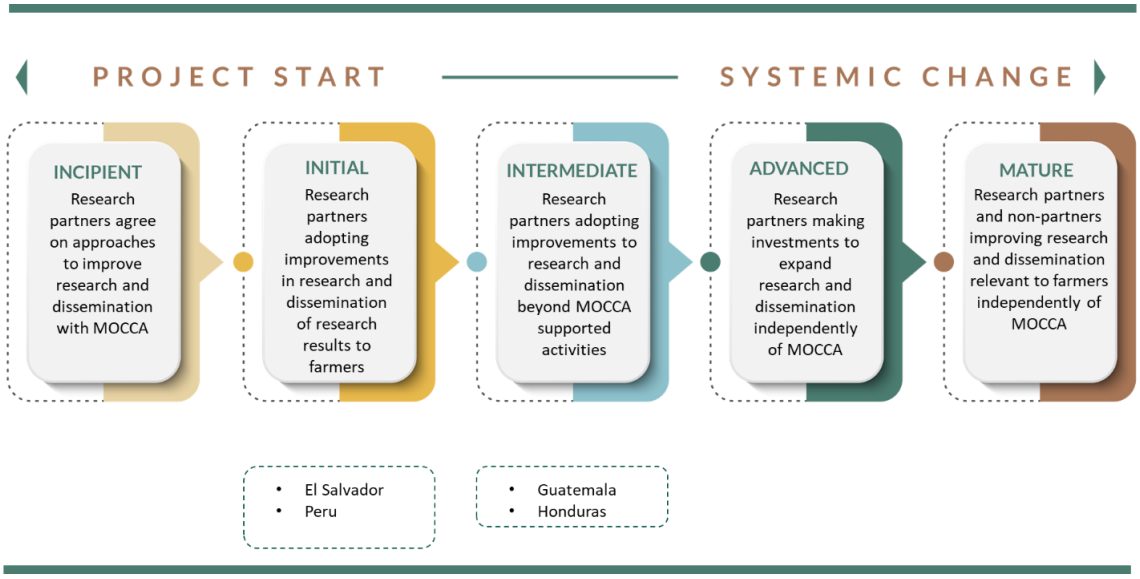
Descriptive statistics show that in most countries (except El Salvador), the share of farmers reporting receiving information about coffee research products statistically increased (or decreased, in El Salvador) over time (***Figure 7***In the case of El Salvador, no changes were observed among market system actors, hence explaining this finding. While at baseline, it was more common for farmers to report that this information cost them, this was rare at endine, a positive result possibly attributed to MOCCA, which made information freely available to farmers. Overall, almost all farmers reported they used the information received to make farming decisions. This highlights the importance of making research

outputs accessible to farmers, as they value learning new information about their crop. In most countries, farmers reported that the main source of this information were NGOs (with the exception of Peru, where other sources were more commonly reported).

Figure 7. Coffee: access and use of research-related information



Where does the available evidence suggest countries sit along the Systemic Change Pathway?



4.4.4 Access to High-Quality Planting Material and Other Inputs

MOCCA's updated ToC:

Through pre-assessments of the availability of genetic material, partnerships with market system actors, and training courses, small and large coffee nurseries improve their practices for the production of seeds and seedlings, and carry out verification. In addition, new large coffee nurseries are created. Thanks to the creation and strengthening of coffee nurseries, coffee farmers have greater access to high-quality inputs that encourage the adoption of R&R practices and, ultimately, improved yields and profitability.

MOCCA strengthened small and large nurseries with training and support to implement best practices including practices to improve quality (health and genetic purity) of coffee seeds and seedlings. This was done through development and roll out of a structured curriculum for nursery managers. MOCCA also promoted, together with WCR, verifications for nurseries including formal verification processes recognized by WCR, and informal recognition processes for smaller nurseries to make it possible to trade in higher quality plants. Across all countries MOCCA also supported genetic material regulations to strengthen the legal framework for coffee seed systems including genetic traceability. MOCCA also worked with seedlots to assess genetic purity and clean seedlots to ensure provision of pure seeds, as the building block for high quality seedlings. **MOCCA worked with 12 partners** across five countries including two regional partnerships with WCR and PROMECAFE to strengthen just **over 1,100 nurseries and seedlots who provided over 89 million seeds or seedlings** to farmers during the project improving access to high quality planting material. The volume of planting material distributed in El Salvador was

important, representing an average of 1,695 plants per farmer.[29] In Guatemala and Honduras the volume of planting material represents 186 and 115 plants per farmer, respectively, also significant at sectoral level. In Peru it was much less significant, amounting to around 25 plants per farmer. We describe below the changes observed in provision of high quality genetic material among MOCCA's partners, MOCCA's contribution to those changes, and highlight where partners are already investing to maintain those changes post project. Results by country are summarized in **Table *31***.

What changes do we observe among MOCCA partners and non-partners in terms of access to high-quality planting material and other inputs?

We were able to confirm changes in provision of quality genetic material for planting in all four countries assessed. The **key changes** across all four contexts included:

- **Adoption of best practices** for nurseries (grafting, bag sizes, alternate substrates, seed and plant selection, genetic analysis, infrastructure)
- **Greater technical capacity** of nursery managers, large and small, public, and private.
- **Greater information on genetic purity** of available seed lots and plants, and **use of this information** for procurement of plants.
- **New regulations** developed or in process for certification of planting material for coffee.
- For El Salvador registration of nurseries under new regulation
- For Guatemala more connections with other countries to exchange technical capacity
- For Honduras expansion of nurseries
- For Peru new varieties made available to farmers.

Partners in El Salvador highlighted registration of nurseries under the new regulation supported by MOCCA, in Guatemala increased technical exchanges with other countries, in Honduras expansion of nurseries in response to increased demand for quality seedlings and in Peru new varieties made available to farmers.

As a result of these changes, partners reported:

- **Improved quality and genetic purity** of seeds and seedlings available to farmers.
- **Increased knowledge of, appreciation and demand** for better quality (including genetic purity) of planting materials for coffee among farmers, nurseries, exporters, cooperatives, public entities.
- Nurseries offering quality planting material have **mechanisms to differentiate** that are trusted by farmers and others.
- In Peru, Honduras and El Salvador partners report increased use of better-quality plants by farmers in new or renovated coffee plantations.
- In El Salvador partners report greater sales from supported nurseries and greater formalization.
- In Honduras partners report lower costs, higher yields, and greater productivity for farmers.

[29] Using data from baseline on number of coffee farmers per country.

- In Peru partners report cost reductions for nursery operators as a result of best practices.

MOCCA was the **PRIMARY contributor to changes observed in all four countries. WCR**, implementing partner of MOCCA, **played a significant role across all four countries**.

The evidence for the changes and for MOCCA's contribution to those changes is strong in all four countries.

Key **MOCCA contributions to these changes** include:

- **Promotion of and training on low-cost best practices** for nurseries and seed lots
- **DNA analyses of 245 coffee seedlots in the region for genetic purity in 15 varieties and dissemination of information on genetically compliant seed sources, and associated seedlot cleaning processes**. **Support for certification or verification** of nurseries
- **Support for development of regulations** for the sector that recognize genetic purity and quality.
- **Strengthening connections between stakeholders** at national, regional and international levels around genetic material for coffee
- **Support for behavior change by farmers** vis a vis use of high quality/genetically pure planting material.
- Development and implementation of diverse **mechanisms to build capacity for and promote visibility and credibility of genetic material providers** based on quality and genetic purity (Viverista de Oro, Digital Registry, Checkcafe, Verification programs, regulations)

Contextual factors also facilitated or limited the achievement of MOCCA's objectives and are outlined in **Table *30***.

Table 30. Contextual factors that affected implementation

Facilitated	Limited
• **Older plantations, and plantations heavily affected by disease and adverse climate conditions** created incentives for farmers to renovate their coffee plantations in Honduras and Peru, creating demand for seeds, seedlings, and new varieties. • Contributing factors were not identified in El Salvador or Guatemala.	• **Lack of regulation/high levels of informality** in the sector meant little trust in purchased seeds/seedlings. • Tradition of producing, not buying, seedlings in El Salvador. • Shortage of seeds in Honduras • Limited technical capacity for seed/seedling production in Peru.

Finally, we explored with partners what changes they were most likely to continue, and whether and how they were already investing in maintaining or expanding the changes post MOCCA.

The following are the **changes most likely to be sustained by partners**:

- **Genetic analysis and traceability** in Guatemala, El Salvador and Honduras
- **Use of registry tools** for managing nurseries (costs, practices) in El Salvador and Peru
- **Certification** of nurseries/planting material in El Salvador, Guatemala, and Honduras
- **Best practices** for nursery management in El Salvador, Guatemala, Honduras, and Peru
- **Further dissemination of regulations and use for market differentiation in Peru**

In El Salvador, followed by Guatemala, Honduras and Peru, we find a number of partners already investing to sustain or expand the changes introduced by MOCCA. In El Salvador a new regulation supported by MOCCA creates enabling conditions and requirements for sustaining the changes. Several non-partners are already using MOCCA introduced nursery standards to procure plants and/or select providers, creating incentives for nurseries to continue best-practices and use registration tools.

Major **challenges** partners face in maintaining or expanding the changes introduced by MOCCA in TA for farmers include:

- **Limited willingness/capacity to pay higher prices on the part of farmers for higher quality planting material.**
- **Lack of institutional support for continuation** of capacity building, regulations, certifications
- **High costs** of MOCCA introduced changes, in particular DNA testing and certifications vis a vis business as usual.
- **Dependence on donor or government funded projects for sale of seedlings**

Table 31. Changes in access to high-quality planting material and other inputs

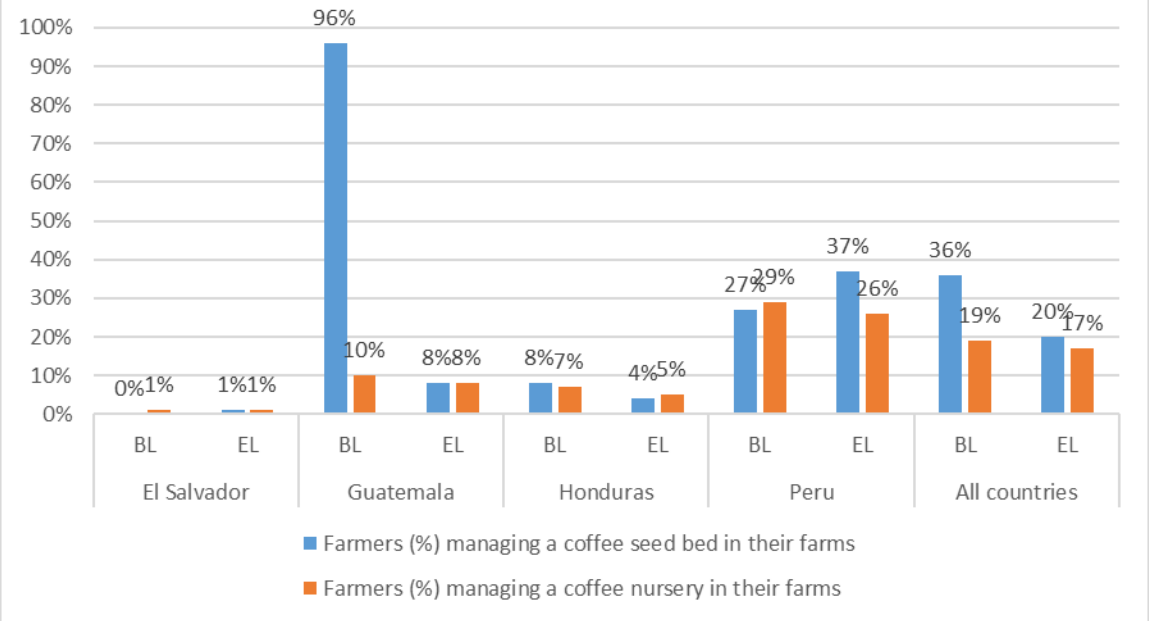
El Salvador	Guatemala	Honduras	Peru
# MOCCA partners participating in Activity; # providers supported			
1 235	2 227	1 245	2 301
# of plants/budwood acquired from strengthened providers			
40,252,468	22,678,65	11,525,186	5,531,096
Impact trajectory confirmed?			
CONFIRMED	CONFIRMED	CONFIRMED	CONFIRMED

El Salvador	Guatemala	Honduras	Peru
Changes observed			
Small and large nurseries **adopt low-cost best practices** for nursery management. **Evaluation of genetic purity** of materials Implementation of **new regulation** related to genetic purity of planting materials. Greater **recognition of the importance of quality of planting material** and **preference for certified nurseries**. Increase in **entities registered formally as providers** of planting material for coffee, under new regulation. **Registry of costs**	Producers of genetic materials (nurseries, exporters) **adopt good practices** (grafting, bags, organic fertilizer, seed, and plant selection) that improve the quality of coffee seedlings. Large nurseries **verify genetic purity** of planting materials. Establishment of **first 100% pure lot** of ANACAFE 14 coffee variety seed **The Certification process** for pure seeds initiated with the Ministry of Agriculture. More **interaction with other countries** about nursery certification	Improvement in **production practices** of large and small nurseries, including exporters and IHCAFE (seed production, genetic analysis, infrastructure) **The genetic quality of seed lots has been verified.** Development of **regulations** for the certification of nurseries has initiated. Nursery owners better understand **the value of selling genetically pure seed.** **New nurseries were established; existing nurseries expanded** in response to increased demand from farmers.	**Adoption of best practices** (seed selection, alternative planting substrates, larger bags) Improvements in nursery **infrastructure** **Seed lots have been genetically evaluated** to assess purity. Seed lots have been cleaned (**increased purity**) Development of **regulation** for coffee seeds has been initiated with broad stakeholder participation. Small nursery managers and farmer organizations **have greater technical capacity** for producing quality seedlings. **New/better varieties made available** (Parainema, Marsellesa, Pacamara)
Level of MOCCA contribution			
PRIMARY	PRIMARY	PRIMARY	PRIMARY
Strength of evidence for the contribution of MOCCA			
STRONG	STRONG	STRONG	STRONG
What changes are most likely to be sustained?			
Best practices for genetic purity of planting material Use of **registry tools for nursery management** (costs) **Use of genetic purity certification** to sell plants and promote trust	**DNA analysis and genetic traceability processes** **Implementation of best practices** by small and large seed/seedling producers **Certification** of seeds/seedlings in large nurseries **Use and promotion of certified planting material** by nurseries and cooperatives.	**DNA tests** before establishing seed lots. **Certification** of seed lots/nurseries.	Ongoing **application of best practices** for seed/seedling production and use of new varieties **Further dissemination of regulations and support for wider adoption** **Registry** of nursery practices Use of biofertilizers
What is the evidence for sustainability?			
STRONG	MODERATELY STRONG	MODERATELY STRONG	MODERATELY STRONG

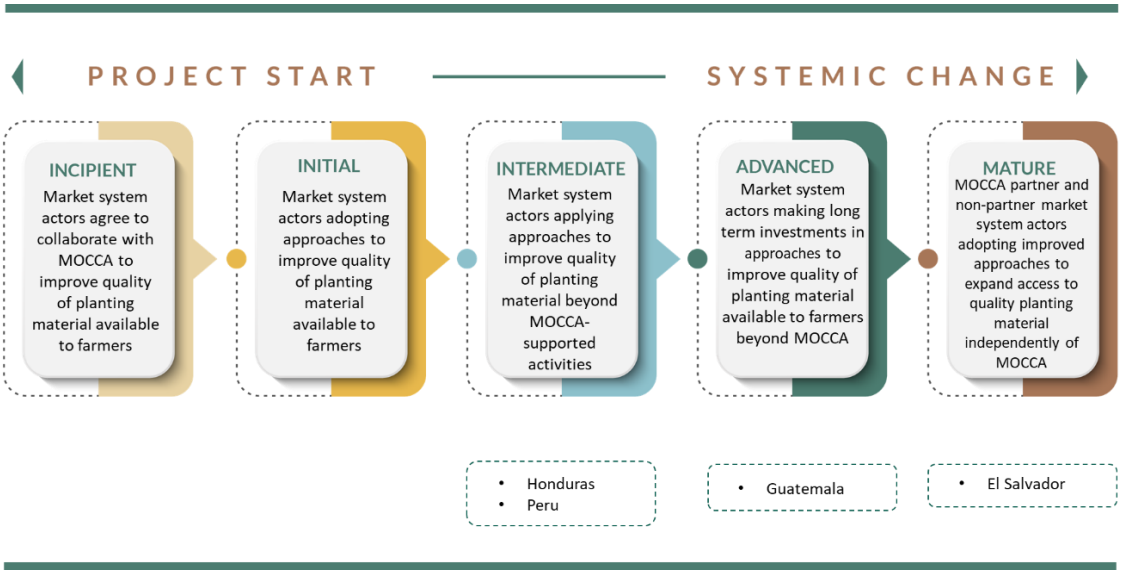
What changes do we observe among MOCCA beneficiary farmers in terms of access to high-quality planting material and other inputs?

We described the econometric effect of access to high-quality planting material on eight impact and outcome indicators, focusing on selecting coffee seeds for planting from highly-productive plants, in sections 4.2 and 4.3. The reason for this was because few farmers reported having a seedbed or a nursery (***Figure 8***). As we can see, there is a decreasing trend in the share of farmers reporting these activities in their farm (and econometric results showed heterogeneous impacts in few countries). Despite this, before the project was implemented, actors were not talking about genetic compliance or talking about developing regulations or were training seed lot and nursery operators to adopt better practices. Since developing a supply of high quality planting material takes time, MOCCA innovated and led change at the market systems level, leaving a lot for national stakeholders to build from based on this work.

Figure 8. Coffee: seedbeds and nurseries in the farm



Where does the available evidence suggest countries sit along the Systemic Change Pathway?



4.4.5 Access to Financial Services

MOCCA's updated ToC:

Through an in-depth analysis of agricultural lending systems for coffee, together with the establishment of partnerships with local lenders, financial institutions, exporters and farmer organizations, financial service providers develop short-, medium- and long-term financial services. These include changes in their products aimed at smallholder coffee farmers. In this way, coffee farmers access and use financial products that support their adoption of R&R practices.

MOCCA planned to increase access to finance for small coffee farmers by working with financial institutions, exporters and farmer organizations to improve the design of financial products for small coffee farmers, make it easier and faster to apply for credit, and to connect actors with new partners to facilitate finance for small farmers. MOCCA worked with 26 partners across five countries as well as a regional partnership with ISF to provide over 94 million dollars in financing to 19,547 small farmers including financing for R&R and crop maintenance, and working capital for farmer organizations. The amount provided in El Salvador at sectoral level is sizeable, considering the total number of coffee farmers. In Honduras partners were largely exporters, while in El Salvador and Peru MOCCA worked largely with financial institutions. We describe below the changes observed in provision of financial services among MOCCA's partners, MOCCA's contribution to those changes, and highlight where partners are already investing to maintain those changes post project. Results by country are summarized in ***Table 33***.

What changes do we observe among MOCCA partners and non-partners in terms of access to financial services?

We were able to confirm changes in provision of financial services for small coffee farmers in all four countries. The key changes across all four contexts included:

- **Financial products were designed or redesigned** to better meet the diverse needs of different small coffee farmers in different contexts.
- **Increased knowledge of coffee on part of credit officials** supported
- MOCCA partners provided **more credits** to small coffee farmers and intermediaries, expanded into **new areas** in Guatemala and Peru.
- MOCCA built **new relationships** between actors to facilitate credits for small coffee farmers in Guatemala and Peru.

Partners in Peru highlighted streamlining of paperwork for loan applications.

As a result of these changes, partners reported:

- More farmers **receive credits for more coffee related activities/expenses**; more **farmers engaging with the financial system**.
- Financial institutions and exporters **increase and improve their credit portfolios** in coffee in Honduras and Peru.
- Increase in **areas of coffee renovated, yields and income** in Honduras and Peru.
- Cooperatives access credit with better terms in Peru.
- Farmers are better able to assess different credit options in Honduras.
- Credit officers improved their knowledge of coffee agronomy in El Salvador

MOCCA was the PRIMARY contributor to changes observed in El Salvador, Guatemala, and Peru, while in Honduras MOCCAs contribution combined with those of other financial institutions and exporters who also supported expansion of inclusive financial services for small coffee farmers**.** The e**vidence** for the changes and MOCCA's contribution to those changes is **STRONG** in Guatemala, Honduras and Peru, and **MODERATELY STRONG**. in El Salvador.

Key **MOCCA contributions to these changes** include:

- **Training for credit officials** in coffee agronomy
- **Specialized technical support for financial institutions** to design/improve financial products for small coffee farmers/better understand their client base.
- **Building partnerships between actors** to facilitate credit for small farmers.
- **Hiring of credit promotors** to support farmers with loan applications and financial training for farmers.

Contextual factors also facilitated or limited the achievement of MOCCA's objectives and are outlined in **Table *32***.

Table 32. Contextual factors that affected implementation

Facilitated	Limited
● **Restructuring of public financial institutions** in favor of inclusion of small coffee farmers and funding for R&R and **increases in international coffee prices** in Peru.	● **Fluctuations in coffee prices** in El Salvador and Peru. ● **Limited interest of small farmers in credit** in Guatemala and Honduras ● **Low profitability/high perceived risk of coffee** in El Salvador and Guatemala. ● **Limited financial capacity of farmer organizations** to manage credit in Peru.

Finally, we explored with partners what changes they were most likely to continue, and whether and how they were already investing in maintaining or expanding the changes post MOCCA.

The following are the **changes most likely to be sustained by partners**:

- **Offer of financial products designed for small coffee farmers** by public and private and rural financial institutions and exporters. **Ongoing improvements** in some cases.
- Inclusion of agronomic information in training of credit officers in El Salvador.
- Use of digital tools in Guatemala.

In El Salvador, Honduras and Peru, we find a number of partners already investing to sustain or expand the changes introduced by MOCCA. In El Salvador the main provider of credit for coffee farmers has expanded financing from farmer organizations to individual farmers and is recognized by other actors for providing TA to their clients, using MOCCA's curriculum. In Peru partners continue to improve on MOCCA supported financial products and a non-partner reports using financial products designed with support from MOCCA. In Guatemala, a few partners express intention to continue with MOCCA-supported changes including financial products for small coffee farmers and digital tools for improving efficiency, and non-partners recognize the value of the work but we found little evidence of autonomous investment in maintaining the changes and partners cited multiple challenges to doing so.

Major **challenges** partners face in maintaining or expanding the changes introduced by MOCCA in financial services for farmers include:

- **Lack of capacity, training materials and responsible actors to continue with financial and agronomic training** post MOCCA (El Salvador, Guatemala, Peru)

- **Ongoing need for improvement of financial products, processes, capacity building** for farmer organizations, and stakeholder coordination in support of financial services for small coffee farmers in Guatemala, Honduras, Peru.
- **Farmers still not motivated to access formal financial credit to invest in coffee** in Guatemala, Peru.
- **Lack of public support/capacity for financial services** for small farmers in Honduras and Peru.
- **Public financial institutions remain weak**, with slow procedures, incomplete reforms, and heavy reliance on state funds; **private sector support for small farmer finance is still insufficient/inadequate.**

Table 33. Changes in provision of financial services

El Salvador	Guatemala	Honduras	Peru
# MOCCA partners participating in Activity;			
2	4	6	10
# farmers reached; Value of financing accessed (USD):			
817 21,522,165	723 2,085,702	4550 14,321,988	8131 28,358,614
Impact trajectory confirmed?			
CONFIRMED	CONFIRMED	CONFIRMED	CONFIRMED
Changes observed			
Credit officials trained in coffee agronomy to improve capacity for analysis of agricultural loans; Bank adopts MOCCA's curriculum for training new credit officials. **Bank expanded financing from farmer organizations to individual farmers.** **Bank updates the cost structure** based on client satisfaction study supported by MOCCA.	**New partnerships** established between financial institutions, farmer organizations, exporters, and others to offer improved financial products and to refer farmers. Financial institutions **redesign and diversify specialized products for coffee farmers** (extend terms, reduce rates, accelerate approval, adapt to diverse kinds of coffee investments, provide inputs on credit, provide agronomic advising). **Credit officials are trained in agronomy** to better adapt services to the agricultural sector. **New digital tools implemented** (faster processing, agroclimatic risk)	**Capacity building/training** in financial services **Redesign of financial products** offered by exporters to facilitate access for small farmer, women, and youth to support fertilization and renovation. **Redesign to facilitate loan access** including application and approval.	**Exporters, cooperativas and financial institutions increased the numbers of credits** (overachieved targets) provided to small farmers in Cajamarca and Amazonas. **Cooperatives leverage AgroPeru** to provide credit to more farmers. **Increased diversity of financial products** offered (fertilization for exporters, renovation, rehabilitation and buying for financial institutions) **Financial institutions expand their presence** in new coffee areas. **Streamlined paperwork for loan application**

El Salvador	Guatemala	Honduras	Peru
Level of MOCCA contribution			
PRIMARY	PRIMARY	COMBINED	PRIMARY
Strength of evidence for the contribution of MOCCA			
MODERATELY STRONG	STRONG	STRONG	STRONG
What changes are most likely to be sustained?			
Credit officers continue to apply lessons learned in training. **Use of MOCCA supported training content** for credit officials. **Improvement of financial products for small farmers**.	**Strategies to improve the inclusion** of small farmers in financial services. **Digital tools** **Differentiation of financial services**	**Provision of finance to farmers** through exporters Continue making same volumes of **funds available for small farmers**.	Provision of credit for small farmers at **preferential rates.** Design and use of **financial products and processes adapted to small coffee farmers**.
What is the evidence for sustainability?			
MODERATELY STRONG	**MODERATELY WEAK**	**MODERATELY STRONG**	**MODERATELY STRONG**

What changes do we observe among MOCCA beneficiary farmers in terms of access to financial services?

We described the econometric effect of having loan and using it in coffee, in sections 4.2 and 4.3. We observed no statistically significant effect of using credit on yields, doing renovation, doing rehabilitation, using fertilizers, doing shade management, or doing selective harvest. However, having a loan positively influenced the adoption of farm waste management in Peru and negatively influenced income in Guatemala, suggesting its effect is highly context dependent.

Descriptive statistics show that securing a loan greatly varied by country, being lowest in El Salvador and highest in Peru, though the changes between baseline and endline are small or inexistent **Figure *9***). Not every farmer with a loan wanted to share detailed information about it (like length, interest paid, etc.) However, when they were willing to do this, we observed that farmers' knowledge about interest rates paid statistically increased at endline in every country, a positive result to which MOCCA contributed to. Farmers also reported that the length of the loan decreased in El Salvador and increased elsewhere (**Figure *10***), and that the interest paid slightly increased in El Salvador and decreased elsewhere (**Figure *11***); though only in Peru these differences were statistically significant—farmers could pay the loan from 10.5 months at baseline to 35 months at endline, and annual interest rate decreased from 27.2% to 13.3% at endline. The results for Peru are consistent with findings at the market system level, suggesting that changes in the system were able to trickle down to farmers.

Figure 9. Coffee: access to credit

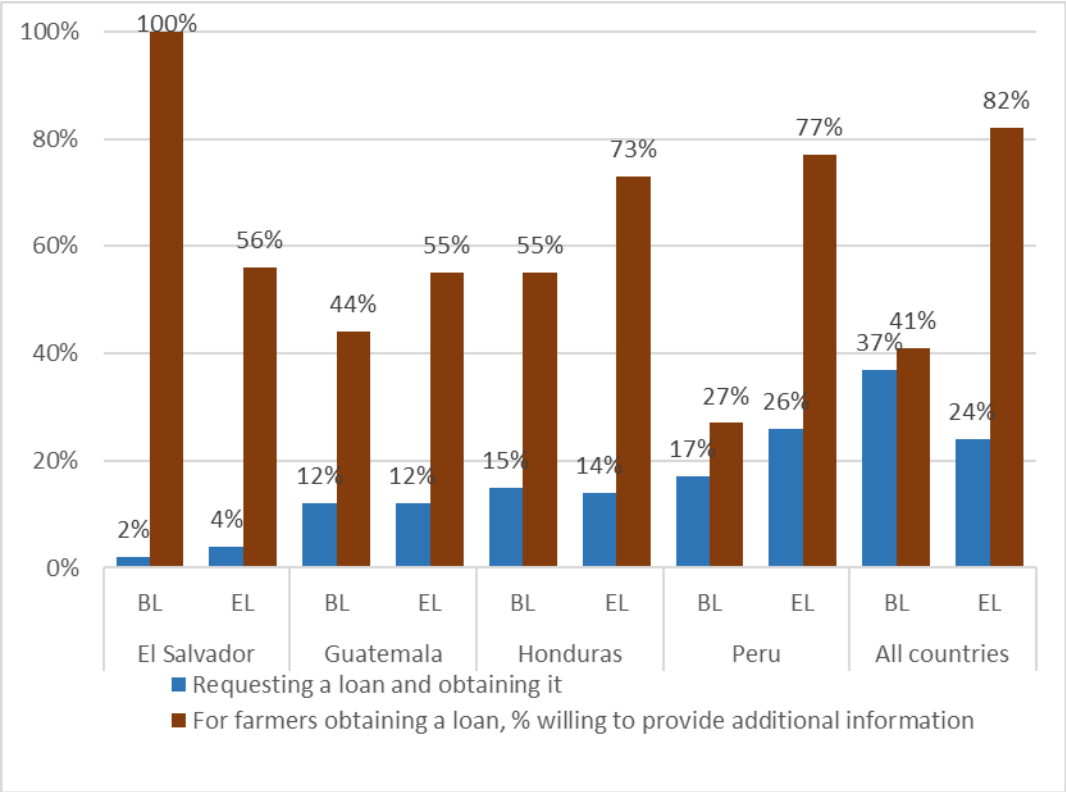


Figure 10. Coffee: length (months) of the loans, and knowledge about interest rate paid

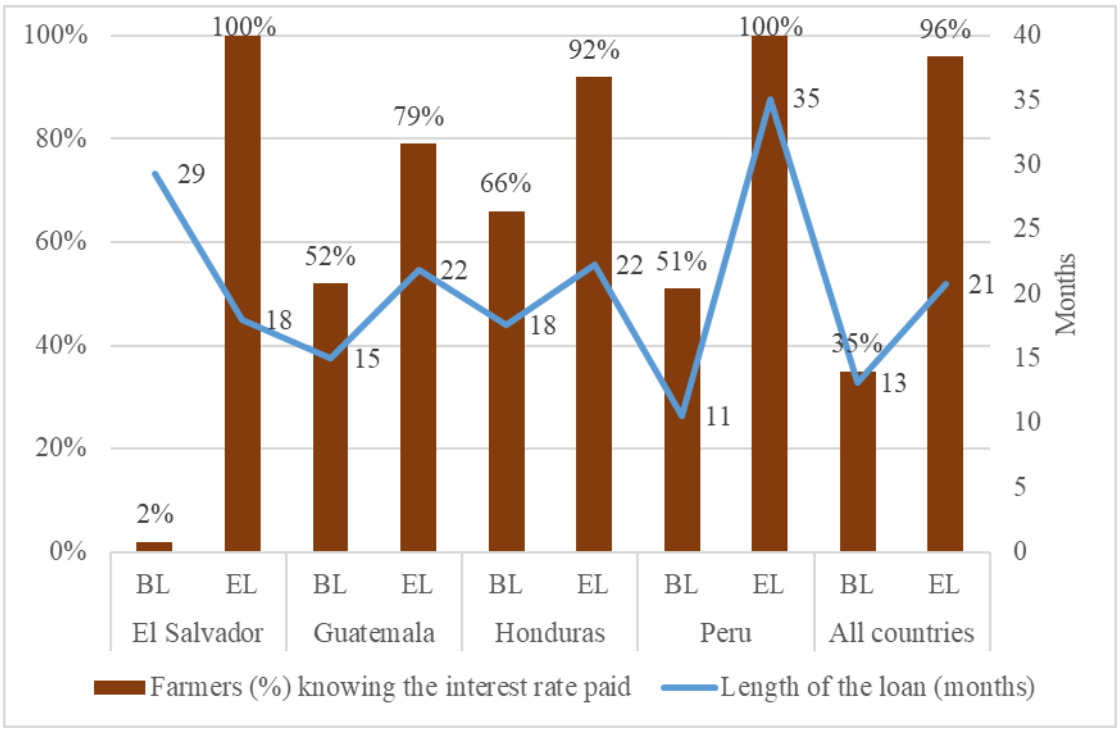
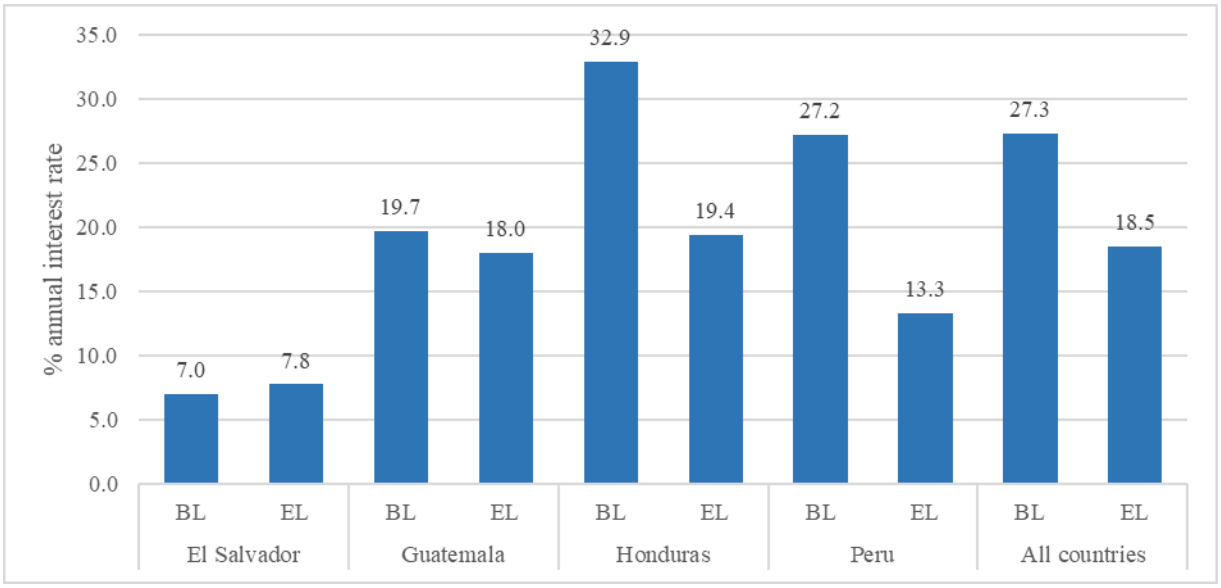
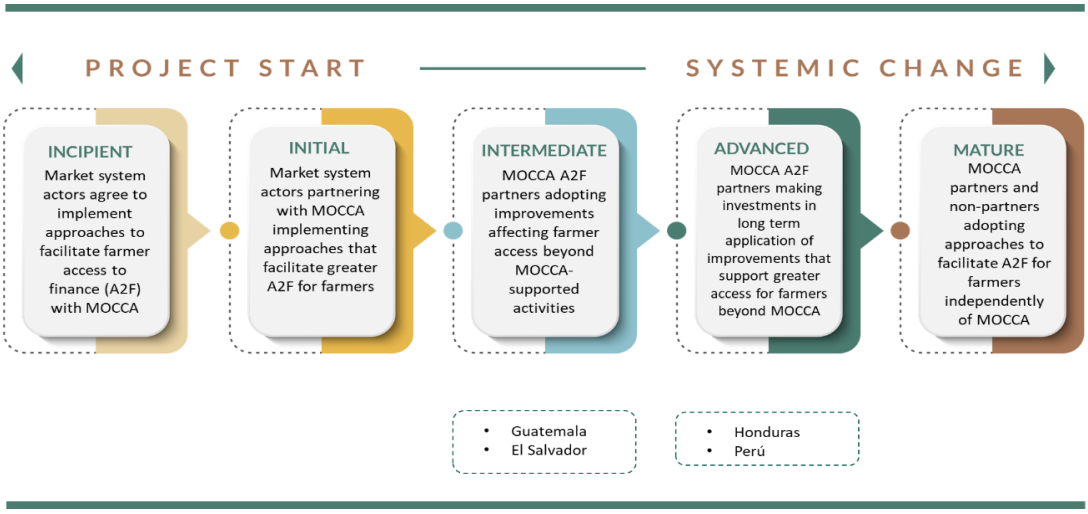


Figure 11. Coffee: annual interest rate (%) paid by farmers



Where does the available evidence suggest countries sit along the Systemic Change Pathway?



4.4.6 Capacity Building of National Coordination Systems (NCS)

MOCCA's updated ToC for NCIs:

Through in-depth assessments, organizational action plans, and targeted training, NCIs strengthen their governance, financial sustainability, and ability to engage with market players. These efforts enable NCIs to improve their service delivery, providing farmers with greater support in training, market promotion, access to genetic resources and research results, and access to finance. As NCIs become more able to deliver or facilitate R&R-related services, farmers receive support services allowing them to gain the knowledge, skills, understanding and resources needed to adopt GAP and R&R techniques. As a result, farmers carry out low-cost R&R practices, which translates into improved yields and profitability.

MOCCA engaged with key sectoral institutions and platforms across all countries to support their capacity to facilitate, provide or create an enabling environment for the provision of support services for small coffee farmers including TA, market access, research, genetic material and financial services. Each country's context is different, some with strong, well organized and recognized sectoral organizations and others with more emergent or informal instances. MOCCA adapted implementation in this component to the different institutional and sectoral contexts and priorities, using different approaches with different entities to facilitate a varied range of services, yet all pointing towards creation of a more inclusive coffee market system for small farmers. MOCCA worked with 13 partners across five countries including public institutions, coffee institutions, coffee associations and multi-stakeholder platforms in the case of Peru. We describe below the changes observed in national coordination systems, MOCCA's contribution to those changes, and highlight where partners are already investing to maintain those changes post project. Results by country are summarized in ***Table 36***.

What changes do we observe among MOCCA partners and non-partners in terms of capacity building of NCS and regional platforms?

We were able to confirm changes in how partners support national coordination systems that are inclusive to small coffee farmers in El Salvador, Guatemala and Honduras. Work to introduce changes in how partners support national coordination systems that are inclusive to small coffee farmers in Peru have initiated but outcomes were yet not observed. The key changes reported by partners are distinct across countries in response to different contexts, demands and priorities:

- In El Salvador, the major change centered around the **creation of the ISC** as an entity to coordinate sectoral efforts.
- In Guatemala, changes centered on working with FUNCAFE on the **expansion of child labor prevention programs** and with ANACAFE on the **expansion of a radio program to disseminate coffee technical assistance**.
- In Honduras, the focus was on strengthening IHCAFE's capacity and role in **provision and regulation of genetic material, research on varieties, and communication** and on strengthening AHPROCAFE's role in **technical assistance and access to finance**.

- In Peru, MOCCA helped strengthen a multi-stakeholder coffee platform in Cajamarca to coordinate **technical assistance** efforts and **engage technicians and farmer organizations in decision making** related to the sector.

Work with NCIs/to strengthen sectoral coordination across all countries focused on facilitating technical assistance services (training, providing curriculum, providing resources) and provision of genetic material (development of regulations, role of NCI in provision). Research was strengthened where existing NCIs formally exist and have a role in research (Honduras and Guatemala). Financial services in Honduras and Peru. Inclusive market access as such was not a part of strengthening of NCIs/sectoral coordination. In ***Table 34***we show the different NCIs and support services that were strengthened in each country.

Table 34. Key functions strengthened with partner NCIs

Functions	El Salvador	Guatemala	Honduras	Peru
Technical Assistance	ISC	ANACAFE	AHPROCAFE	PMCC
Inclusive Market Access				
Research		ANACAFE	IHCAFE	
Genetic Material	MAG/CENTA /DGSVA	ANACAFE	IHCAFE / SAG / SENASA	MIDAGRI/SENASA
Financial Services			AHPROCAFE	MIDAGRI/AgroPeru Junta Nacional de Café
National Platforms	ISC AMCES	ANACAFE FUNCAFE	IHCAFE AHPROCAFE	MIDAGRI Junta Nacional de Café PMCC

As a result of these changes, partners reported:

- **Increased coordination** within the sector at different scales/on different issues.
- **Expanded services** for small farmers especially TA.

MOCCA was the PRIMARY contributor to changes observed in El Salvador, Guatemala and Honduras, while **in Peru MOCCAs contribution COMBINED** with that of other actors to bring about changes. The evidence for the changes and MOCCA's contribution to those changes in Guatemala and Peru is strong, and in El Salvador and Honduras, moderately strong. Sectoral associations, multi-stakeholder platforms, farmer organizations and public institutions in Peru contributed alongside MOCCA to support changes.

Key **MOCCA contributions to these changes** include:

- **Training**
- **Funding**, including direct funding from MOCCA as well as support to leverage funds from private sector for child labor prevention programs in the case of Guatemala
- **Facilitation of multi-stakeholder collaboration (around TA, regulations, methodologies)**
- **Targeted support for capacity or development of tools with relevant NCIs**
- **Cross-country exchanges**

Contextual factors also facilitated or limited the achievement of MOCCA's objectives and are outlined in **Table *35***.

Table 35. Contextual factors that affected implementation

Facilitated	Limited
● **ANACAFE's own efforts to strengthen sectoral coordination** and alignment in Guatemala. ● **Lack of a public extension program** in Peru, creating a gap to be filled. ● For Peru, multistakeholder coordination mechanisms favored implementation of TA and increased fertilizer prices supported the adoption of low-cost practices. ● No supporting contextual factors were identified for El Salvador or Honduras.	● **Absence of a recognized NCI at national level in the coffee sector in Peru.** ● Limiting contextual factors were not identified in other countries.

Finally, we explored with partners what changes they were most likely to continue, and whether and how they were already investing in maintaining or expanding the changes post MOCCA.

The following are the **changes most likely to be sustained by partners and associated challenges**:

In El Salvador, all changes are relatively recent, but evidence suggests that changes associated with the expanded membership and inclusion of women's empowerment training by AMCES will likely continue, along with the use of the new genetic material regulation and the continuation of the ISC's role in technical assistance provision, depending on funding availability. All three partners are already investing to sustain or expand the changes introduced by MOCCA.

In Guatemala MOCCA has contributed to strengthening ongoing efforts and actors within the sector that are important to the achievement of MOCCA objectives. Both programs are already being carried forward by ANACAFE and FUNCAFE with support from other actors.

In Honduras, MOCCA has contributed to improved TA, access to finance (AHPROCAFE) and improved support for genetic material and research (IHCAFE), however, there are important challenges for their continuation independently and without resources from MOCCA by AHPROCAFE or IHCAFE. The changes in genetic material introduced with IHCAFE are likely to continue. Those related to research and institutional strengthening are less clear/too incipient. For AHPROCAFE the changes introduced in financial services have become policy and will continue, while it is less clear how they will sustain TA.

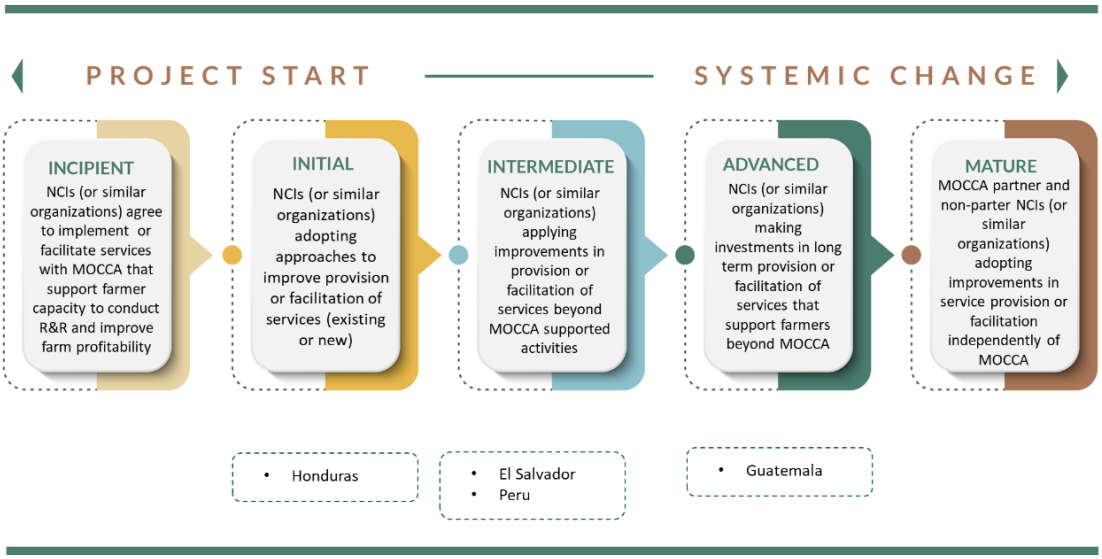
In Peru MOCCA has contributed to important changes, particularly in how actors engage with each other to improve how services for the sector function. While changes in public financial institutions and the regulation for genetic material are incomplete, the changes in multi-stakeholder coordination and action to address issues and design solutions seems to be a change that has been strengthened and will be sustained, both in the context of Cajamarca as well as at national level in interactions between MIDAGRI and the Junta, and other actors.

Table 36. Changes in strengthening national commodity institutes (NCIs)

El Salvador	Guatemala	Honduras	Peru
# MOCCA partners participating in Activity; providers supported			
3 (ISC, MAG, AMCES)	2 (ANACAFE, FUNCAFE)	2 (IHCAFE, AHPROCAFE)	3 (MIDAGRI, Junta Nacional de Café, Plataforma Multiactor de Café de Cajamarca)
Impact trajectory confirmed?			
CONFIRMED	CONFIRMED	CONFIRMED	INITIATED
Changes observed			
ISC: **Creation of the Instituto Salvadoreño del Café** **Capacity of ISC staff strengthened** in research, technical assistance, and genetic material. **MAG:** **Approval of new regulation for coffee seeds and seedling production.** **Creation of digital platform for CENTA to support virtual training, verification, and registration of genetic material, in line with new regulations** **AMCES:** **Expansion of AMCES membership (to 700, including small coffee farmers)** **Expanded relationships with funders for programming with women.** **Use of women's empowermenttool to build leadership for members**	**FUNCAFE:** **Expansion of programs to address child labor through new partnerships with exporters** **Improvements in operational and financial management** of these programs **Sector-wide recognition of these programs** as a sectoral strategy to address child labor. **ANACAFE:** **Creation of new content for and dissemination of Cafetal Radio** as a tool for sharing technical information with farmers **Research collaboration with WCR** and greater **engagement with research networks outside of Guatemala.** **Cleaning of seed lot** for ANACAFE 14 variety to support distribution	**IHCAFE:** **Strengthening of IHCAFE** role/contribution to **provision of genetic material including certification.** **IHCAFE receives 98 new coffee materials, initiates breeding work, and releases three varieties** available to all PROMECAFE member countries. **Better understanding of IHCAFE's institutional image at national level.** **Research on coffee leaf rust, substrates for nurseries and mechanical harvesters carried out and shared with the research community**. **AHPROCAFE**: **Reactivation of technical assistance service** for farmers by AHPROCAFE using curriculum adapted from MOCCA through community promotors who trained 800 farmers. **Capacity building for 70 affiliated rural savings associations** including redesign of credit product.	**MIDAGRI:** **Broad stakeholder engagement and support for SENASA-led development of regulation for coffee genetic material (still underway).** **MIDAGRI/JUNTA:** **Greater participation of technicians and cooperatives in key decision-making spaces/key decisions are discussed with broader stakeholder participation (for example process to improve access to finance under AgroPeru)**. **PMCC:** **Agreement to create unified technical assistance curriculum** across 20 coffee sector organizations in Cajamarca, based on MOCCA curriculum.
Level of MOCCA contribution			
PRIMARY	PRIMARY	PRIMARY	COMBINED

El Salvador	Guatemala	Honduras	Peru
Strength of evidence for the contribution of MOCCA			
MODERATELY STRONG	STRONG	MODERATELY STRONG	STRONG
What changes are most likely to be sustained?			
Use of the digital platform by CENTA for compliance with the genetic material regulation. **New partnerships** established under MOCCA between AMCES and exporters. Ongoing use of the **women's empowerment tool by AMCES and members**	FUNCAFE will **continue with child labor prevention programs. Exporters will continue contributing and expanding child labor prevention programs**, in coordination with FUNCAFE. **ANACAFE will continue with Cafetal Radio**	AHPROCAFE – **inclusion of TA within their mandate/as a service to members.** Adjusted policies to support **redesigned credit product** for members. IHCAFE – **Replication of research on coffee leaf rust** types present in distinct parts of the country, continuation of **best practices for genetic material** production. **Application of some recommendations of the client perception consultancy in future budgeting cycle**. **Development of new coffee genetic material and sharing with other countries**	**MIDAGRI – changes to AgroBanco and AgroPeru and the collaboration with the Junta** **Continued broad participation in development of genetic material regulation.** **Expansion of membership, including public entities and universities, of Plataforma Cajamarca** **Shared Coffee curriculum and collaboration on Ta content in Cajamarca** **Sectoral coordination, particularly among farmer organizations**. **Continuation and expansion of institutional coordination networks**
What is the evidence for sustainability?			
MODERATELY STRONG	**STRONG**	**WEAK**	**MODERATELY STRONG**

Where does the available evidence suggest countries sit along the Systemic Change Pathway?



4.4.7 Regional Platforms

MOCCA's updated ToC for Regional Platforms:

Through the formalization of the PROMECAFE-WCR collaboration, the launch of bi-annual coffee research and sustainable development conferences, and the establishment of the SCC R&R Fund governance structure, PROMECAFE are strengthened to foster collaboration and financial support. These efforts facilitate research exchanges, market development, and the alignment of regional actors to improve R&R practices. As a result, PROMECAFE enables enhanced partnerships that mobilize financial resources and policy reform, promoting sustainable coffee production. With these strengthened platforms and financial support mechanisms, coffee farmers gain access to high-quality inputs, affordable financing, and clear market opportunities. Equipped with enhanced knowledge and skills in Good Agricultural Practices (GAP) and Renovation & Rehabilitation (R&R) techniques, farmers adopt low-cost R&R practices, leading to improved yields, increased profitability, and catalyzing a sustainable cycle of reinvestment.

MOCCA engaged with regional (multi-country) sectoral platforms to strengthen their role in cross country capacity sharing and coordinated action to support inclusive market systems. MOCCA worked with PROMECAFE, a regional platform representing 8 coffee producing countries. We describe below the changes observed in PROMECAFE, MOCCA's contribution to those changes, and highlight where PROMECAFE is already investing to maintain those changes post project.

What changes do we observe among MOCCA partners and non-partners in terms of regional platforms?

At the regional level, MOCCA has worked with PROMECAFE to strengthen its technical capacity and role as a regional platform for the coffee sector. Key advances include:

- **Creation of the Competitive Research Fund** (USD 300,000, 2022) financing 11 applied research projects in five countries, with strong participation from institutions, academia, private exporters, and independent researchers, mostly focused on circular economy and coffee by-products.
- **Tailored communication plans** for each project and **redesign of the Knowledge Center into a geoportal**, ready for launch in July 2025, to host research results, infographics, and geo-referenced data for public use once all projects conclude.
- **Reactivation of thematic technical networks** and hiring of a regional technical advisor, improving credibility and responsiveness to members.
- **Support for progress on coffee genetic material regulations** in El Salvador (approved) and Peru (in process), with exchanges through Mexico's INIFAP; no substantive progress in Guatemala or Honduras.
- **Establishment of the Breeding Hub in Honduras**, active nationally and with potential regional benefits through the launch of three new varieties available to other PROMCAFE member countries. Expansion of impact may be limited without further support due to lack of a roadmap, joint financing, and wider buy-in.

MOCCA acted as funder, technical facilitator, and regional convener, while other initiatives—such as mechanization technology validation with Brazil and Colombia, and a regional varietal trial network—were led by PROMECAFE with its own resources.

Progress was facilitated by strong leadership in El Salvador (Instituto Salvadoreño del Café, Ministry of Agriculture and Livestock, Department of Plant Health, and seedling producers' sector) **and Peru**, which advanced regulations, participated in the Research Fund, and engaged in technical exchanges. **Guatemala**, by contrast, pursued independent approaches in some areas, limiting regional alignment.

Differences in institutional priorities and lack of sustainable funding have constrained broader adoption. **Current challenges include** ensuring continuity of the research fund, maintaining the technical advisor position, finalizing pending regulations, and securing resources to sustain new tools, networks, and capacities.

While MOCCA was able to facilitate a participative process through which its members selected the Honduran Institute of Coffee (IHCAFE) as the operator of the breeding hub and successfully transferred almost 100 accessions to IHCAFE for it to use a genetic basis for crossbreeding, and helped Promecafe members to develop a governance plan, the Project chose not to make additional investments in the breeding hub due to its inability to obtain commitments, from Promecafe's members, to co-invest, along with IHCAFE in its operations. In particular the establishment of the regional breeding hub faced particular challenges, including: 1) during MOCCA's implementation, members expressed more interest in validating varieties developed elsewhere instead of investing in long-term breeding initiatives, 2) most Promecafe institutes are under-resourced and were unable to commit to making larger investments, 3) the lack of coffee variety breeders in MOCCA countries (Honduras only has one), 4) lack of trust among

Promecafe members that varieties developed would actually be available to other country members, and 5) as concluded by WCR, tasked with developing the breeding hub, that regional research efforts may be better suited to other types of research, but not the development of new varieties.

5 Results for Cacao

5.1 Characteristics of the Key Informants and the Farmers

5.1.1 Key informants

In cacao MOCCA worked with a diverse range of market system actors including exporters, chocolate makers/processors, producer organizations, research institutions, financial institutions, public and sectoral institutions, as well as other NGOs or development projects working in the sector. Variations between countries in engagement strategy respond to differences in composition of sector and roles played by different actors vis a vis the support services MOCCA aimed to strengthen for small farmers, and the opportunities/openness of partners to collaborate in line with MOCCA's ToC. In all, MOCCA collaborated with 90 partners across six countries (El Salvador, Honduras, Guatemala, Nicaragua, Ecuador and Peru), collaborating with between 7 and 24 partners in each country (***Table 37***). Producer organizations were most numerous by far, responding to MOCCA's strategy for strengthening their role in last-mile service delivery to farmers. In Central America, in contrast to coffee, cacao sectors are much smaller with sectoral institutions much less developed. Few buyers have on the ground presence and are much less involved than their coffee counterparts in service provision to farmers. Farmer organizations were key partners for TA, market access, and genetic material. In each country MOCCA engaged importantly with sectoral (usually national level second-tier farmer organizations) and public institutions critical to sectoral governance, to strengthen capacity to formulate and implement policies and programs as well as play a coordinating role in favor of improved support services for small farmers. Financial and research institutions in Central America traditionally do not work on cacao so MOCCA's work there was to engage them in a new sector, while for Peru and Ecuador the efforts were more aimed at improving, facilitating, making more relevant and expanding existing efforts.

Table 37. MOCCA partners in Cacao, by actor type

Partners	Ecuador	El Salvador	Guatemala	Honduras	Nicaragua	Peru	Regional	Total
Exporters	2	0	1	0	0	2	0	**5**
Chocolate maker/processor	1	1	1	0	0	2	1	**6**
Producer organizations	5	2	6	10	7	7		**37**
Research Institutions	2	1	1	0	0	3	3	**10**
Financial Institutions	6	1	0	0	0	3	0	**10**
NCIs and public institutions	3	1	0	3	0	3	1	**11**
NGOs/Projects	1	4	1	1	0	0	0	**7**
Others[30]	0	0	0	1	0	0	0	
TOTAL	**20**	**10**	**10**	**15**	**7**	**24**	**4**	**90**

[30] Nursery support organization – ASEPRA in Honduras.

5.1.2 Farmers

Since the survey design does not rely on a strictly balanced panel, we report farmer and household characteristics separately for baseline (BL) and endline (EL) (***Table 38***). In both survey rounds, most respondents were the person responsible for managing the cacao plots, with a significant increase at the project level (from 93.6% to 97.0%, p<0.01), ensuring the reliability of the information collected.

Overall, the sex composition of interviewees remained relatively stable, though some countries experienced notable changes, for example, an increase in the share of male respondents in El Salvador (from 75.9% to 91.8%, p<0.10) and minor variations elsewhere. The average age of farmers increased in several countries, leading to a significant rise at the project level (from 50.8 to 55.2 years, p<0.01), suggesting a gradual aging of the farming population. Marital status and farm ownership remained high across countries, with only moderate shifts, although Honduras recorded an increase in farm ownership (from 83.3% to 95.1%, p<0.05) and Peru a decline (from 88.3% to 81.4%, p<0.01).

Table 38. Cacao: demographic characteristics of beneficiary farmers and their households

	Ecuador			El Salvador			Guatemala		
Characteristics of producers	**BL**	**EL**	**p-value**	**BL**	**EL**	**p-value**	**BL**	**EL**	**p-value**
Characteristics of interviewed person (% yes)									
Is the person in charge of cacao plots	84.8%	97.7%	0.000***	93.1%	98.0%	0.287	97.0%	91.0%	0.153
Male interviewee	75.0%	79.7%	0.248	75.9%	91.8%	0.051*	71.2%	68.7%	0.75
Is married/free union	75.0%	65.9%	0.041**	93.1%	85.7%	0.33	78.8%	83.6%	0.483
Age (years)	57.2%	60.5%	0.019**	56.2%	56.9%	0.79	48.7%	55.3%	0.017**
Is the farm owner	86.1%	88.7%	0.415	96.6%	81.2%	0.054*	86.4%	84.6%	0.778
Household (HH) characteristics									
% HHs where at least one member migrated within last 12 months:	3.9%	6.5%	0.245	0.0%	4.1%	0.276	4.5%	16.4%	0.026**
% HHs receiving subsidy from the government or NGOs	6.9%	5.5%	0.571	10.3%	36.7%	0.011**	13.6%	4.5%	0.066*
% HHs receiving remittances	2.0%	2.3%	0.808	0.0%	20.4%	0.013**	1.5%	10.4%	0.030**
Household decisions									
Households (%) where decision of how to use the income from cacao sales was **made** by:									
Male HH head only	41.7%	32.3%	0.046**	69.0%	67.3%	0.884	47.0%	16.4%	0.000***
Female HH head only	10.8%	8.3%	0.385	24.1%	4.1%	0.007***	16.7%	11.9%	0.44
Both spouses	16.2%	24.0%	0.047**	0.0%	8.2%	0.117	1.5%	10.4%	0.030**
Households (%) where decision of how to use the income from cacao sales was **consulted** with:	0.0%	0.0%		0.0%	0.0%		0.0%	0.0%	
No one	39.2%	35.5%	0.43	93.1%	75.5%	0.051*	62.1%	14.9%	0.000***
Spouse	23.0%	53.9%	0.000***	0.0%	22.4%	0.005***	3.0%	70.1%	0.000***
Number of households	**204**	**217**		**29**	**49**		**66**	**67**	

Table 38 continued

Characteristics of producers	Honduras			Peru			All countries		
	BL	EL	p-value	BL	EL	p-value	BL	EL	p-value
Characteristics of interviewed person (% yes)									
Is the person in charge of cacao plots	96.7%	96.4%	0.914	97.2%	97.0%	0.91	93.6%	97.0%	0.001***
Male interviewee	75.4%	75.9%	0.946	71.6%	68.1%	0.289	74.4%	74.0%	0.842
Is married/free union	72.1%	78.3%	0.396	65.7%	81.4%	0.000***	73.0%	78.5%	0.007***
Age (years)	51.3%	54.4%	0.188	48.2%	53.0%	0.000***	50.8%	55.2%	0.000***
Is the farm owner	83.3%	95.1%	0.020**	88.3%	81.4%	0.009***	87.0%	86.4%	0.722
Household (HH) characteristics									
% HHs where at least one member migrated within last 12 months:	4.9%	6.0%	0.777	12.4%	4.6%	0.000***	7.6%	6.4%	0.316
% HHs receiving subsidy from the government or NGOs	1.6%	10.8%	0.032**	34.0%	10.5%	0.000***	18.5%	9.0%	0.000***
% HHs receiving remittances	31.1%	27.7%	0.657	2.1%	1.9%	0.867	4.7%	6.8%	0.060*
Household decisions									
Households (%) where decision of how to use the income from cacao sales was **made** by:									
Male HH head only	47.5%	51.8%	0.616	51.0%	19.5%	0.000***	49.1%	30.7%	0.000***
Female HH head only	11.5%	13.3%	0.752	20.9%	11.1%	0.000***	15.8%	10.4%	0.001***
Both spouses	16.4%	26.5%	0.151	10.3%	48.6%	0.000***	12.1%	34.0%	0.000***
Households (%) where decision of how to use the income from cacao sales was **consulted** with:	0.0%	0.0%		0.0%	0.0%		0.0%	0.0%	
No one	50.8%	41.0%	0.243	66.8%	17.9%	0.000***	51.9%	27.1%	0.000***
Spouse	0.2%	0.5%	0.000***	21.9%	78.3%	0.000***	29.4%	65.8%	0.000***
Number of households	**61**	**83**		**388**	**370**		**871**	**911**	

Notes

BL=baseline; EL=endline

p-value: differences in means between groups are significant at the 10% level (*), 5% level (**) or 1% level (***)

Variables is the person in charge of cacao plots, is married/free union and is the farmer owner have less than 0.2% of missing observations in BL

Variables of % HHs where at least one member migrated and % HHs receiving remittances have less than 0.19% of missing observations. For EL, variables have less than 0.10% of missing observations

Household mobility and external financial support indicators displayed mixed trends. Migration of household members tended to be low, but increased in Guatemala (from 4.5% to 16.4%, p<0.05) while declining in Peru (from 12.4% to 4.6%, p<0.01). The share of households receiving subsidies from the government or NGOs fell sharply at the project level (from 18.5% to 9.0%, p<0.01), with El Salvador as the main exception, where it rose from 10.3% to 36.7% (p<0.05). Receipt of remittances remained generally low, though it increased in El Salvador (0% to 20.4%, p<0.05) and Guatemala (1.5% to 10.4%, p<0.05).

One of the most significant changes during the project period was in household decision-making over the use of income from cacao sales. Across the project, the proportion of households where both spouses made decisions together increased markedly (from 12.1% to 34.0%, p<0.01), while male-only decision-making declined (from 49.1% to 30.7%, p<0.01). In parallel, consultation between spouses

became more common (from 29.4% to 65.8%, p<0.01), indicating a shift towards more inclusive and participatory decision-making dynamics.

Regarding farm characteristics, total farm area remained generally stable at the project level but declined significantly in Ecuador and Guatemala, with a similar decrease in cacao area in Ecuador and a modest increase in Peru. The distribution of cacao plots shifted slightly towards households holding more than one plot in some countries, though new plot acquisition between 2021 and 2025 was limited. Use of tools to register production costs and income became relatively common by endline (44.5% at the project level), while conducting a production diagnosis of the crop showed mixed results, decreasing in Ecuador but remaining stable elsewhere (*¡Error! No se encuentra el origen de la referencia.*).

5.2 Changes in Impact Indicators

5.2.1 Income and Sales

In this section we respond, using farmer level baseline and endline data, the following three questions. We base our discussion on econometric results for income and descriptive statistics for the amount sold:

> What changes do we observe among MOCCA beneficiary farmers in terms of income and sales of coffee and cacao? What are the contributions of MOCCA to these changes?
>
> Are there differences between female and male farmers?
>
> What other factors contributed to these changes?

As mentioned in the methods section, we are interested in the effects of the time variable, activity-level variables, and sex (female/male) and household decision-making variables, on income. We are also interested in identifying other factors that have contributed to observed changes, and we only interpret the ones that are statistically significant.

Summary of changes and main contributions of MOCCA (*Table 39*):

- The survey wave (endline) variable was not statistically significant in any country or at the project level, indicating that, after controlling for other factors, there was no consistent increase in income solely attributable to the passage of time between baseline and endline. This suggests that observed changes in income are more closely related to other factors, such as production volume, farm characteristics, and most likely, market conditions (price increase[31]), than to time alone.
- Although the number of training modules received was positively associated with income in some countries (e.g., Ecuador, Central America[32]), these effects were not statistically significant, indicating that technical assistance alone may not have translated into immediate income gains for cacao producers.
- Obtaining information about cacao research products from NGOs or government agencies had a positive association with income in most countries, but the effect was not statistically

[31] https://x.com/MaxwellJFoster/status/1951455963376124105

[32] During evaluation design, together with TNS, we decided to identify a cacao sample that is representative of Central America as a region, and not for each country individually, as done for coffee. This was because of the fewer expected cacao beneficiaries in the region. Despite this, in the descriptive analysis we provide details by country, though we do not do this when discussing econometric results.

significant. This suggests that while information sharing is valuable, it may require complementary interventions, such as technical follow-up or access to improved planting material, to influence income.

- Selecting cacao seeds or grafts from elite trees/mothers had a statistically significant negative effect on income in Central America. This likely reflects the short-term costs of renovation and the time lag before new trees reach productive maturity, rather than a negative effect of the practice itself.
- Having credit and using it for cacao activities was not significantly associated with higher income. This may be due to repayment obligations offsetting revenue gains, or to credit being used for purposes that do not directly boost short-term productivity.

Table 39. Cacao regression results for income (US$)

Variables	Central America	Ecuador	Peru	All Countries
Survey wave (1=endline)	1,247.8	-3,421.7	3,903.8	-1,502.9
	(1,325.4)	(0.0)	(5,616.7)	(3,808.0)
Number of training modules received	43.5	457.4	-108.8	-34.8
	(48.3)	(0.0)	(205.1)	(115.1)
Income use decided jointly by couple (1 = yes)	484.0	-639.6	769.6	596.3
	(331.6)	(0.0)	(845.8)	(569.3)
Age of farmer (years)	-8.9	17.9	19.5	15.4
	(14.8)	(0.0)	(47.8)	(27.5)
Sex of farmer (1 = male)	300.7	46.5	6.1	-225.4
	(814.6)	(0.0)	(1,449.5)	(958.6)
Area planted with Cacao (ha)	35.3	1,361.3	2,513.4**	773.9*
	(199.3)	(0.0)	(818.0)	(384.3)
Area planted with cacao (ha) squared	10.2	-223.9	-309.4**	-39.0
	(11.4)	(0.0)	(105.6)	(29.9)
Number of cacao trees per hectare	0.9	-0.8	-2.0	-1.0
	(0.6)	(0.0)	(2.1)	(1.3)
Productive cacao plant density (plants/ha)	-0.5	4.6	4.2*	2.5*
	(0.5)	(0.0)	(1.9)	(1.2)
Farmer has at least one certification (1 = yes)	354.3	1,763.6	-1,730.4*	-790.4
	(252.6)	(0.0)	(853.4)	(532.5)
Number of cacao varieties planted	248.3	1,243.5	1,277.8*	552.2
	(130.3)	(0.0)	(557.6)	(300.8)
Farm altitude (masl)	1.6	-415.6	-2.9	0.9
	(2.5)	(0.0)	(8.6)	(4.0)
Farm altitude squared	-0.0	4.6	0.0	0.0
	(0.0)	(0.0)	(0.0)	(0.0)
Had a loan and used in cacao (1 = yes)	-115.6	1,873.6	n.a.	-102.7
	(500.6)	(0.0)		(1,541.3)
Household had a migrant in last 12 months (1 = yes)	-518.3	-5,210.4	-698.1	-847.4
	(443.9)	(0.0)	(1,172.9)	(800.8)
Household received remittances (1 = yes)	270.9	868.2	-446.3	-186.1
	(369.7)	(0.0)	(2,190.9)	(1,007.6)
Obtained information of cacao research products from NGOs or government (1 = yes)	426.8	-331.7	712.9	726.7
	(246.7)	(0.0)	(889.9)	(529.2)

Variables	Central America	Ecuador	Peru	All Countries
Total kilograms of dry cacao sold	1.8***	8.2	1.2**	1.2***
	(0.3)	(0.0)	(0.4)	(0.3)
Farmers selecting cacao seeds or grafts from elite trees/mothers(1 = yes)	-1,591.4**	-5,483.8	616.8	602.9
	(541.4)	(0.0)	(930.9)	(677.9)
Constant	-1,169.3	-217,871.1	-1,149.0	2,272.7
	(1,767.1)	(0.0)	(5,854.7)	(3,754.1)
Observations	**603**	**421**	**758**	**1,782**
R-squared	**0.9**	**1.0**	**0.6**	**0.6**
Country controls	**No**	**No**	**No**	**Yes**
Municipality controls	**Yes**	**Yes**	**Yes**	**Yes**
Winsorized at 3 sd above mean	**Yes**	**Yes**	**Yes**	**Yes**
N baseline	**279**	**204**	**388**	**871**
N endline	**324**	**217**	**370**	**911**

Standard errors in parentheses and clustered at the municipality level

*** p<0.001, ** p<0.01, * p<0.05

Differences between male and female farmers:

- Across all countries, there were no statistically significant differences in income between male and female cacao farmers. While point estimates varied by country positive in some, negative in others, these differences were not robust.

Other factors contributing to observed changes:

- In Peru, both the area planted with cacao and productive plant density were positively and significantly associated with income, suggesting that expanding cultivated area and increasing planting density, when managed properly, can enhance production and revenues. However, the negative and significant coefficient for the squared term of area indicates diminishing marginal returns at larger farm sizes, pointing to the existence of an optimal scale of production.
- Also in Peru, the number of cacao varieties planted was positively associated with income. This diversification can help mitigate risks related to pests, diseases, and market fluctuations, and may contribute to improved resilience and stability of revenues.
- Certification in Peru showed a statistically significant negative effect on income, possibly due to the additional compliance costs and market conditions during the study period, which may have reduced or eliminated expected price premiums.
- The volume of dry cacao sold was a strong and significant predictor of income in Central America and Peru, reflecting the direct relationship between marketable output and revenues.

The findings indicate that several of MOCCA's interventions supported income growth from cacao sales over time, particularly in Peru, where expanding the area planted with cacao, increasing productive plant density, and diversifying varieties were associated with higher incomes. However, the negative and significant coefficient for the squared term of planted area points to diminishing returns at larger farm sizes, suggesting the existence of an optimal production scale. These effects may reflect the combined influence of MOCCA's activities and favorable market conditions during the evaluation period, factors not explicitly controlled for in our regressions.

Obtaining information from research outputs and participating in training showed positive associations with income in some countries, but these effects were not statistically significant, suggesting that information sharing and technical assistance may require complementary interventions, such as access to improved planting material or market linkages, to yield measurable short-term income gains. In contrast, selecting cacao seeds or grafts from elite trees/mothers had a significant negative effect on income in Central America, likely due to short-term productivity losses during renovation.

Across all countries, there were no statistically significant differences in income between male and female cacao farmers, and joint decision-making between household heads on the use of income from cacao sales was also not significantly associated with higher earnings. Descriptive analysis (*¡Error! No se encuentra el origen de la referencia.*) shows that both male and female farmers increased yields and sales revenues in several countries, but differences between groups were generally not statistically significant at the project level. Exceptions were observed in El Salvador, where male farmers significantly increased annual sales volumes compared to females, and in Ecuador, where female farmers achieved notable yield gains.

We also analyzed (descriptively) changes in income and sales by age group (*¡Error! No se encuentra el origen de la referencia.*). In several countries, including El Salvador, Guatemala, and Peru, older farmers (>30 years of age) experienced significantly larger gains in income and yields than younger farmers (15–29 years of age). These differences may reflect greater experience in farm management, stronger market relationships, or better access to resources among older producers. In Peru, younger farmers expanded their cultivated area more rapidly, yet income gains were more pronounced among older farmers, suggesting that scale alone was not sufficient to close the performance gap.

Regarding total cacao sales, statistically significant increases in the amount sold were observed in El Salvador and Peru, while sales declined in Guatemala (***Table 40***). At the project level, the value of annual cacao sales more than doubled between baseline and endline, with particularly large gains in Peru, Ecuador, and El Salvador. Although sales revenues increased for both male and female farmers, these differences were not statistically significant when compared by sex (male/female). Overall, positive effects were most evident where interventions effectively enhanced production capacity and increased the volume of cacao marketed, even if some benefits, particularly from practices like renovation, may only materialize in the longer term.

Table 40. Cacao: changes in key MOCCA indicators, by country

	Ecuador			El Salvador			Guatemala		
Key MOCCA indicators	**BL**	**EL**	**p-value**	**BL**	**EL**	**p-value**	**BL**	**EL**	**p-value**
Yield (kg dry/ha)	291.8	404.3	0.000***	64.5	184.7	0.001***	296.9	211	0.009***
Cacao area (ha)*	3.7	2.8	0.015**	1.6	2.6	0.275	1.3	1.1	0.215
Farmers (%) with access to financing for agriculture	5.4	1.4	0.168	0	2.0	0.445	3.0	4.5	0.664
Value of annual cacao sales (US$)	3537.5	7900.5	0.000***	293.4	3036.3	0.013**	668.9	1236.3	0.003***
Annual amount of cacao sold (kg dry)	1033.4	968.5	0.628	79.7	330.5	0.016**	338.4	197.1	0.040**
Number of households	**204**	**217**		**29**	**49**		**66**	**67**	

Table 40 continued

Key MOCCA indicators	Honduras			Peru			All countries		
	BL	EL	p-value	BL	EL	p-value	BL	EL	p-value
Yield (kg dry/ha)	208.4	160.6	0.040**	442.4	493.9	0.028**	342.4	380.2	0.007***
Cacao area (ha)*	1.7	1.7	0.803	2.2	2.4	0.083*	2.4	2.3	0.476
Farmers (%) with access to financing for agriculture	4.9	2.4	0.420	9.5	na	.	6.5	1.5	0.905
Value of annual cacao sales (US$)	839.9	1164.2	0.126	2440	8895.5	0.000***	2169.5	6298.8	0.000***
Annual amount of cacao sold (kg dry)	307.7	231.4	0.114	1042.8	1258.2	0.088*	817.4	871.2	0.415
Number of households	**61**	**83**		**388**	**370**		**871**	**911**	

*1 ha (hectare) = 10,000 square meters

Notes

BL=baseline; EL=endline

p-value: differences in means between groups are significant at the 10% level (*), 5% level (**) or 1% level (***)

5.2.2 Productivity and Production Volume

In this section we respond, using farmer level baseline and endline data, the following three questions. We base our discussion on econometric results for yields (quantity sold/ha).[33] Since we faced inconsistencies in the reported harvest data, we cannot provide reliable estimates of the production volume using survey data. However, using monitoring data, we included a discussion of progress in this indicator in section 3, and suggest readers using that information.

What changes do we observe among MOCCA beneficiary farmers in terms of income and sales of coffee and cacao? What are the contributions of MOCCA to these changes?

Are there differences between female and male farmers?

What other factors contributed to these changes?

Main contributions of MOCCA (*Table 41*):

- When we analyze results by country, cacao yields (estimated by dividing total dry cacao sold by hectares) did not show statistically significant differences between baseline and endline in Central America, Ecuador, or Peru. Thus, there is no negative effect to which the project may have contributed in each country individually. When we analyze the effect pooling all countries, the change in yields over time is also not statistically significant. While MOCCA may have contributed to maintaining yields in some contexts, we cannot separate this potential effect from the influence of market and non-market factors (e.g., weather variability, pest and disease incidence, input cost increases that may have limited their use, or price fluctuations affecting incentives for crop management).
- The technical assistance provided by MOCCA, measured as the number of training modules received, had no statistically significant effect on yields in any country.

[33] See section 2.3.5 for an explanation on why we did this.

- Although obtaining information on cacao research products from NGOs or government had a positive effect in some cases, these effects were not statistically significant, suggesting that information alone needs to be complemented with the adoption of improved practices to generate yield gains.
- Selecting cacao seeds or grafts from elite trees/mothers had no statistically significant effect on yields across countries, which is consistent with the fact that benefits from renovation take several years to materialize in productivity data.
- The effect of credit on yields was not statistically significant at the project level or in any country model. Peru has no estimate for this variable in the yield specification, and the Ecuador coefficient is not interpretable due to data limitations[34]; overall, there is no evidence that credit use translated into short-term yield gains during the evaluation period.

Table 41. Cacao regression results for yields (kg sold/ha)

Variables	Central America	Ecuador	Peru	All Countries
Survey wave (1=endline)	-71.3	-18,344.6	38.9	335.9
	(235.8)	(0.0)	(335.0)	(247.2)
Number of training modules received	-5.7	918.0	-6.8	-8.1
	(9.0)	(0.0)	(12.3)	(7.4)
Income use decided jointly by couple (1 = yes)	-15.3	1,479.9	79.5	33.1
	(59.0)	(0.0)	(51.6)	(37.2)
Renovated cacao trees (1 = yes)	-133.6*	24,175.9	60.1	4.1
	(61.6)	(0.0)	(61.1)	(43.9)
Rehabilitated cacao trees (1 = yes)	-23.1	-2,643.3	64.1	6.6
	(49.9)	(0.0)	(51.6)	(34.6)
Performed shade pruning on cacao shade trees (1 = yes)	50.2	-3,415.4	135.9	76.6
	(56.1)	(0.0)	(74.3)	(46.9)
Prepares and applies enmiendas/organic fertilizers (1 = yes)	-3.9	n.a.	-151.0*	-98.3
	(100.5)		(64.8)	(50.0)
Applied fertilizers based on visual symptoms or nutrient balance (1 = yes)	25.3	91.6	32.1	44.5
	(65.5)	(0.0)	(56.6)	(40.3)
Selects cacao beans according to color, shape, and size (1 = yes)	87.3	535.3	65.6	47.8
	(60.9)	(0.0)	(51.1)	(36.2)
Age of farmer (years)	-4.6	-31.7	2.7	-2.2
	(2.8)	(0.0)	(2.7)	(1.7)
Sex of farmer (1 = male)	65.6	5,857.6	-96.4	-10.8
	(146.6)	(0.0)	(86.7)	(61.5)
Total farm area (ha)	4.5	3,991.1	-2.2	-2.0
	(7.2)	(0.0)	(3.6)	(2.6)
Total farm area (ha) squared	-0.1	-315.8	0.0	0.0
	(0.1)	(0.0)	(0.0)	(0.0)
Number of cacao trees per hectare	-0.1	-25.7	-0.4**	-0.3***
	(0.1)	(0.0)	(0.1)	(0.1)

[34] Across the entire sample, only 34 farmers reported having requested and used a loan for cacao, which limited variation within each country and reduced the statistical power to detect effects

Variables	Central America	Ecuador	Peru	All Countries
Productive cacao plant density (plants/ha)	0.2	24.7	0.5***	0.4***
	(0.1)	(0.0)	(0.1)	(0.1)
Farmer has at least one certification (1 = yes)	44.3	-8,093.0	47.3	43.3
	(46.4)	(0.0)	(51.4)	(34.4)
Number of cacao varieties planted	19.7	8,888.4	20.7	12.7
	(23.3)	(0.0)	(33.7)	(19.3)
Farm altitude (masl)	-0.3	-93.0	-0.3	-0.2
	(0.4)	(0.0)	(0.5)	(0.3)
Farm altitude squared	0.0	0.7	0.0	0.0
	(0.0)	(0.0)	(0.0)	(0.0)
Had a loan and used in cacao (1 = yes)	138.1	-16,628.7	n.a	64.2
	(92.5)	(0.0)		(98.8)
Household had a migrant in last 12 months (1 = yes)	141.3	-2,915.8	65.9	76.8
	(77.9)	(0.0)	(68.7)	(50.9)
Household received remittances (1 = yes)	-62.4	2,543.6	46.8	1.2
	(72.1)	(0.0)	(135.0)	(65.3)
Obtained information of cacao research products from NGOs or government (1 = yes)	29.4	573.6	-40.8	-7.0
	(43.8)	(0.0)	(54.9)	(34.8)
Farmers selecting cacao seeds or grafts from elite trees/mothers(1 = yes)	61.8	-14,848.4	-18.5	-5.7
	(106.7)	(0.0)	(57.6)	(44.8)
Constant	405.7	-28,260.2	472.6	248.4
	(328.4)	(0.0)	(353.1)	(247.1)
Observations	**608**	**429**	**758**	**1,795**
R-squared	**0.4**	**1.0**	**0.5**	**0.4**
Country controls	**No**	**No**	**No**	**Yes**
Municipality controls	**Yes**	**Yes**	**Yes**	**Yes**
Winsorized at 3 sd above mean	**Yes**	**Yes**	**Yes**	**Yes**
N baseline	**279**	**205**	**388**	**872**
N endline	**329**	**224**	**370**	**923**

Standard errors in parentheses and clustered at the municipality level
*** p<0.001, ** p<0.01, * p<0.05

Differences between male and female farmers:

- Across all countries, there were no statistically significant differences in yields between male and female cacao farmers. While the estimated coefficients varied in sign by country, positive in some, negative in others, none reached statistical significance.

Other factors contributing to observed changes:

- In Peru, the number of productive cacao plants per hectare was positively and significantly associated with yields, indicating that optimal productive density can enhance output per hectare.
- Conversely, the total number of cacao trees per hectare had a negative and significant effect on yields in Peru and at the project level, suggesting that excessive planting without proper management may lead to competition for resources and reduced productivity.

- Age of the farmer, total farm area, altitude, certification status, number of cacao varieties planted, access to credit, household migration, and remittances were not significantly associated with yields in any country, indicating that these demographic and socioeconomic variables were not primary drivers of productivity outcomes in cacao.
- Renovation of cacao trees had a statistically significant negative effect on yields in Central America, consistent with the expected temporary reduction in production while new trees reach maturity. Rehabilitation of trees did not have a significant effect on yield in any country.
- The preparation and application of organic amendments (*enmiendas*) had a statistically significant negative effect on yields in Peru, which may reflect the longer time horizon required for these practices to improve soil fertility and productivity.

Overall, results show that cacao yields (kilograms of dry cacao sold per hectare) remained stable during the evaluation period, with no statistically significant changes between baseline and endline in Central America, Ecuador, Peru, or at the project level. Any potential MOCCA effect cannot be disentangled from external influences such as climate variability, pest and disease incidence, rising input costs, or price fluctuations. None of the main project activities, including technical assistance (number of MOCCA training modules), obtaining information on cacao research products from NGOs or government agencies, selecting cacao seeds or grafts from elite trees/mothers, or accessing credit, had a statistically significant effect on yields in any country. Positive associations observed in some cases suggest these activities may require complementary interventions, such as improved practice adoption, to deliver measurable short-term gains.

These results should be interpreted in consideration of external shocks. Extreme climate variability, pest and disease incidence, and rising production costs all constrained productivity gains during the project period. Prolonged droughts in 2022–2023 in Guatemala reduced yields and slowed plantation recovery, with effects expected to be seen only after the 2026 harvest. Similarly, the extreme climate events ETA and IOTA caused severe flooding and, in some cases, total crop losses, further limiting short-term gains. In this context, MOCCA's contribution may lie more in helping farmers maintain yields despite adverse conditions and in setting the foundations for longer-term improvements once renovation, soil management, and genetic material interventions begin to deliver results.

Agronomic factors played a more decisive role. In Peru, higher productive plant density was positively and significantly associated with yields, while excessive total tree density was negatively associated with yields in Peru and at the project level, indicating the risks of overplanting without proper management. Renovation in Central America and the application of organic amendments in Peru both had significant short-term negative effects on yields, consistent with the expected lag before benefits materialize. Other variables, including farmer age, total farm area, altitude, certification, number of varieties, migration, and remittances, were not significant drivers of yield outcomes.

Across all countries, there were no statistically significant yield differences between male and female cacao farmers. Descriptive data (*¡Error! No se encuentra el origen de la referencia.*) show gains for both groups in some countries, with exceptions in El Salvador (male farmers increased yields more) and Ecuador (female farmers achieved larger gains). By age group (*¡Error! No se encuentra el origen de la referencia.*), older farmers (>30 years) in El Salvador, Guatemala, and Peru achieved significantly higher yield gains than younger farmers, possibly due to greater experience, stronger market links, or better resource access. In Peru, younger farmers expanded cultivated area faster, but older farmers saw larger

yield improvements, indicating that scale alone did not close performance gaps. Overall, MOCCA's direct short-term impact on cacao yields was limited, with most promoted practices showing no measurable effect during the evaluation period. Yield performance was driven primarily by farm management and agronomic conditions, particularly optimal productive density, rather than by household characteristics.

5.3 Changes in Outcome Indicators: Adoption of Good Agricultural Practices

In this section we respond, using farmer-level baseline and endline data, to the following three questions. We base our discussion on econometric results for selected variables denoting the adoption of key MOCCA-promoted cacao practices, and complement it with descriptive statistics for the same variables. We also provide descriptive information about the full set of practices promoted by MOCCA.

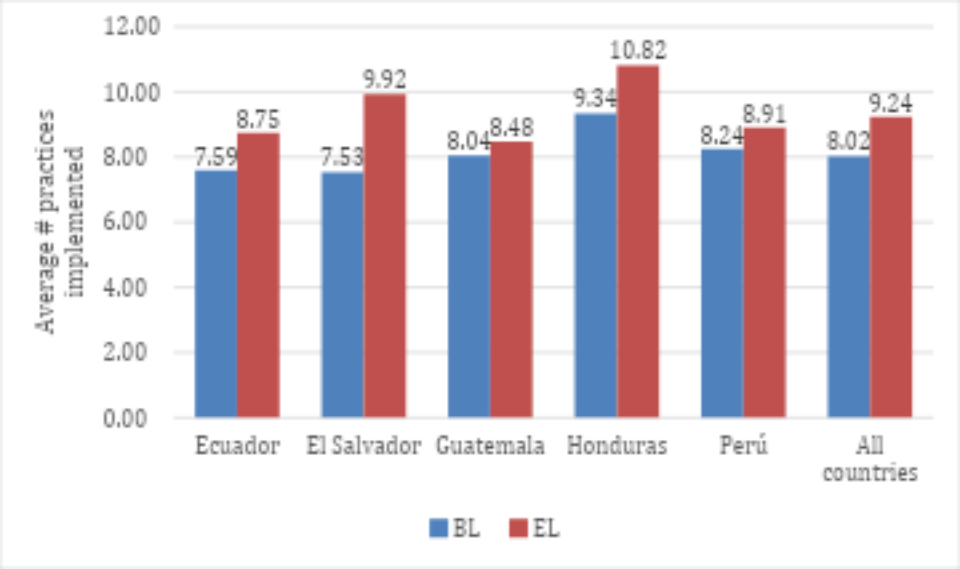
What changes do we observe among MOCCA beneficiary farmers in terms of adoption of cacao practices? What are the contributions of MOCCA to these changes?
Are there differences between female and male farmers?
What other factors contributed to these changes?

MOCCA promoted up to 22 good agronomic practices in the countries where it was implemented. **Figure *12***illustrates the average number of MOCCA-promoted cacao practices implemented by farmers at baseline (BL), as some farmers were already applying these practices, and at endline (EL):

In all countries, the number of practices implemented increased between baseline and endline.

- In all countries, we observed an increase in the number of MOCCA-promoted cacao practices implemented at endline.
- Except for Guatemala, the differences between baseline and endline were statistically significant.
- The share of farmers who implemented 10 or fewer practices decreased from 79% at baseline to 59% at endline, while the share implementing 11–19 practices increased from 21% to 41%, both changes being statistically significant at the 1% level.

Figure 12. Cacao: changes in the number of practices implemented between baseline (BL) and endline (EL)



The descriptive results (***Table 42***) present a mixed picture, with clear increase in adoption over time in some of the MOCCA-promoted practices, stability (no change) in others, and disadoption in certain areas.

- At the regional level, the adoption of improved genetic material rose from 7.8% to 11.6%, with strong gains in Peru and El Salvador.
- The use of recommended weeding practices grew from 68.6% to 88.9%, with notable increases in Ecuador (76% → 96%) and Honduras (71% → 90%).
- The incorporation of organic matter in trees increased from 58.5% to 75.9%, especially in Ecuador (68% → 88%) and El Salvador (47% → 88%).
- Bean selection by color, shape, and size remained consistently high (around 95% regionally), with further improvement in Honduras (92% → 100%).
- Farms with at least 25% shade rose slightly from 15% to 18%, with the strongest increases in El Salvador and Guatemala.
- Shade pruning remained virtually unchanged at the regional level (33.6% → 33.4%).
- Adoption of three or more pruning types declined regionally from 53% to 44% ($p<0.001$), with sharp reductions in Ecuador, El Salvador, and Honduras, although Peru improved significantly (51% → 71%).

Overall, the analysis shows that MOCCA contributed to meaningful progress in soil management (organic amendments, incorporation of organic matter, weed control), improved genetic material, and post-harvest quality practices. However, challenges remain in renovation, pruning, and pest/disease control, where declines were noted. These patterns highlight both the technical complexity of cacao and

the need for a longer time horizon for practices such as renovation or intensive pruning to be sustainably adopted.

We focus our econometric analysis (hence our discussion) on six key MOCCA-promoted cacao practices: renovation of cacao trees, rehabilitation of cacao plantations, use of fertilizers, shade management through pruning of shade trees, selective harvesting of cacao pods, and farm waste management. The definition of each dependent variable is provided in 2.3.5.

Table 42. Cacao: Summary of changes in key MOCCA-promoted practices

Adoption of MOCCA-promoted practices (% farmers)	Ecuador			El Salvador			Guatemala		
	BL	EL	p-value	BL	EL	p-value	BL	EL	p-value
Selects seeds or plants/grafts from elite trees/mothers (highly productive, vigorous, disease and pest tolerant trees)	12.30	7.40	0.092*	0.00	12.00	0.049**	4.50	1.50	0.31
Disinfects substrate mix with ash, boiling water or solarization (but not lime)	0.50	3.20	0.040**	0.00	4.00	0.27	0.00	0.00	.
Does lateral bud grafting in the greenhouse (benefits: produces more plants and is easier to expand within the farm)	n.a.	0.90	.	n.a.	2.00	.	n.a.	0.00	.
Renovates: planted new trees	14.70	26.30	0.003***	16.70	8.00	0.24	13.60	1.50	0.008***
Has 5 or fewer clones per hectare OR renovation done with 80% grafts and 20% from plants coming from seeds	100.00	99.50	0.33	96.70	84.00	0.085*	95.50	89.60	0.20
Does 3 or more of the recommended cacao pruning	38.20	16.60	0.000***	50.00	10.00	0.000***	60.60	19.40	0.000***
Cacao field has at least 25% shade, OR shade trees planted within the last 2 year	9.30	17.50	0.014**	3.30	30.00	0.004***	7.60	22.40	0.017**
Farmers pruning shade	22.10	21.20	0.83	73.30	76.00	0.79	40.90	32.80	0.34
Farmers managing shade based on the farm's location or temperature to guide cacao shade pruning.	5.90	4.60	0.56	46.70	40.00	0.57	27.30	22.40	0.52
Does a nutrients balance based on expected harvest (N, P, K) OR uses soil analysis results to determine fertilization needs	2.90	1.40	0.27	3.30	14.00	0.13	9.10	0.00	0.011**
Does at least 2 fertilizer applications (one every 6 months)	5.40	0.90	0.008***	3.30	0.00	0.20	0.00	0.00	.
Prepares and applies "enmiendas"/organic fertilizers	1.50	2.80	0.36	3.30	20.00	0.036**	0.00	0.00	.
Does at least 1 control method for every pest/disease present	82.40	90.80	0.011**	53.30	34.00	0.091*	92.40	62.70	0.000***
Does at least 1 of the following weeding practices: selective weeding, applying herbicides, applying herbicides with ecoweed, incorporating weed residues in cacao rows	76.50	95.90	0.000***	96.70	88.00	0.19	80.30	98.50	0.001***
Implements at least 1 soil cover crop (legumes, other crops) or dead cover	9.30	7.80	0.59	6.70	20.00	0.11	13.60	4.50	0.066*
Implements at least 1 of these methods to manage the floor: live barriers, cover crops, uses herbicides	26.00	16.60	0.018**	13.30	26.00	0.18	13.60	4.50	0.066*
Incorporates organic matter in the trees	67.60	88.00	0.000***	46.70	88.00	0.000***	74.20	52.20	0.008***
Pods harvested according to ripeness	67.20	26.70	0.000***	43.30	68.00	0.030**	77.30	83.60	0.36
Diseased, damaged, overripe, and unripe pods were removed	n.a.	97.20	.	n.a.	96.00	.	n.a.	92.50	.
Selects cacao beans according to color, shape, and size	98.50	99.10	0.60	100.00	100.00	.	100.00	95.50	0.083*
The beans or seeds from the harvested pods were extracted within 3 days or less	96.10	91.70	0.063*	66.70	92.00	0.003***	71.20	85.10	0.053*
Uses any type of format to register costs and sales	n.a.	43.80	.	n.a.	42.00	.	n.a.	82.10	.
Number of observations	**204**	**217**		**30**	**50**		**66**	**67**	

Table 42 continued

Adoption of MOCCA-promoted practices (% farmers)	Honduras			Peru			All countries		
	BL	EL	p-value	BL	EL	p-value	BL	EL	p-value
Selects seeds or plants/grafts from elite trees/mothers (highly productive, vigorous, disease and pest tolerant trees)	1.60	2.40	0.75	5.40	18.30	0.000***	7.80	11.60	0.007***
Disinfects substrate mix with ash, boiling water or solarization (but not lime)	1.60	0.00	0.25	6.70	5.90	0.66	3.90	3.70	0.85
Does lateral bud grafting in the greenhouse (benefits: produces more plants and is easier to expand within the farm)	n.a.	0.00	.	n.a.	0.50	.	n.a.	0.70	.
Renovates: planted new trees	13.10	10.80	0.68	21.40	9.20	0.000***	17.80	13.30	0.008***
Has 5 or fewer clones per hectare OR renovation done with 80% grafts and 20% from plants coming from seeds	95.10	91.60	0.42	100.00	100.00	.	98.60	96.30	0.002***
Does 3 or more of the recommended cacao pruning	91.80	13.30	0.000***	51.00	71.40	0.000***	53.10	44.40	0.000***
Cacao field has at least 25% shade, OR shade trees planted within the last 2 year\a	16.40	24.10	0.26	16.50	10.80	0.022**	14.60	18.40	0.029**
Farmers pruning shade	67.20	54.20	0.12	26.30	23.00	0.30	33.60	33.40	0.93
Farmers managing shade based on the farm's location or temperature to guide cacao shade pruning.	49.20	44.60	0.59	17.00	10.50	0.010***	19.70	20.20	0.82
Does a nutrients balance based on expected harvest (N, P, K) OR uses soil analysis results to determine fertilization needs	0.00	2.40	0.23	7.00	1.90	0.001***	4.60	3.10	0.094*
Does at least 2 fertilizer applications (one every 6 months)	1.60	1.20	0.83	1.50	4.60	0.015**	2.20	2.30	0.86
Prepares and applies "enmiendas"/organic fertilizers	13.10	22.90	0.14	8.20	20.20	0.000***	5.00	12.80	0.000***
Does at least 1 control method for every pest/disease present	91.80	86.70	0.34	98.50	88.90	0.000***	91.90	83.20	0.000***
Does at least 1 of the following weeding practices: selective weeding, applying herbicides, applying herbicides with ecoweed, incorporating weed residues in cacao rows	70.50	90.40	0.002***	68.30	91.10	0.000***	68.60	88.90	0.000***
Implements at least 1 soil cover crop (legumes, other crops) or dead cover	42.60	81.90	0.000***	28.90	5.10	0.000***	23.40	13.30	0.000***
Implements at least 1 of these methods to manage the floor: live barriers, cover crops, uses herbicides	42.60	81.90	0.000***	36.60	14.80	0.000***	31.80	21.00	0.000***
Incorporates organic matter in the trees	68.90	83.10	0.044**	61.30	79.00	0.000***	58.50	75.90	0.000***
Pods harvested according to ripeness	68.90	68.70	0.98	45.60	45.80	0.96	55.50	53.50	0.38
Diseased, damaged, overripe, and unripe pods were removed	n.a.	100.00	.	n.a.	68.20	.	n.a.	85.70	.
Selects cacao beans according to color, shape, and size	91.80	100.00	0.008***	90.50	89.50	0.66	94.70	95.00	0.82
The beans or seeds from the harvested pods were extracted within 3 days or less	83.60	98.80	0.001***	90.50	86.50	0.089*	89.00	90.70	0.24
Uses any type of format to register costs and sales	n.a.	39.80	.	n.a.	41.80	.	n.a.	46.30	.
Number of observations	**61**	**83**		**388**	**371**		**872**	**913**	

5.3.1 Renovation

Changes and main contributions of MOCCA (*Table 43*):

- Across countries, we did not find statistically significant changes in the share of farmers reporting cacao renovation between baseline and endline in Central America or Peru. When analyzed for all countries combined, there was also no statistically significant change over time.
- The technical assistance provided by MOCCA, measured as the number of training modules received, had no statistically significant effect on the adoption of cacao renovation in any country or in the pooled sample.
- Obtaining information on cacao research products from NGOs or government had a positive and statistically significant effect only in Central America, suggesting that access to actionable information in this subregion may have encouraged renovation decisions.
- Selecting cacao seeds or grafts from elite trees/mothers had a statistically significant positive effect in Peru and in the pooled sample, highlighting the complementarities between seed system improvements and renovation adoption.
- Having a loan and using it in cacao had no statistically significant effect in any country or in the pooled sample.

Table 43. Regression results for adoption of cacao renovation

Variables	Central America	Ecuador	Peru	All Countries
Survey wave (1=endline)	-0.028	1.541	0.543	0.147
	(0.411)	(0.000)	(0.390)	(0.336)
Number of training modules received	-0.007	-0.089	-0.019	-0.011
	(0.013)	(0.000)	(0.016)	(0.010)
Income use decided jointly by couple (1 = yes)	-0.070	-0.212	-0.058	-0.051
	(0.090)	(0.000)	(0.064)	(0.048)
Age of farmer (years)	0.002	0.003	-0.001	0.000
	(0.004)	(0.000)	(0.003)	(0.002)
Sex of farmer (1 = male)	0.032	-0.309	0.165	0.075
	(0.155)	(0.000)	(0.112)	(0.078)
Area planted with cacao (ha)	0.088	-0.176	-0.024	0.037
	(0.052)	(0.000)	(0.063)	(0.032)
Area planted with cacao (ha) squared	-0.009**	0.016	0.001	-0.005*
	(0.003)	(0.000)	(0.008)	(0.003)
Number of cacao trees per hectare	0.000	0.001	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Productive cacao plant density (plants/ha)	-0.000	-0.000	-0.000*	-0.000*
	(0.000)	(0.000)	(0.000)	(0.000)
Farmer has at least one certification (1 = yes)	-0.091	0.662	0.057	0.021
	(0.072)	(0.000)	(0.064)	(0.045)
Number of cacao varieties planted	-0.058	-0.205	-0.060	-0.066**
	(0.032)	(0.000)	(0.042)	(0.024)
Farm altitude (masl)	0.000	-0.017	0.000	0.000
	(0.001)	(0.000)	(0.001)	(0.000)

Variables	Central America	Ecuador	Peru	All Countries
Farm altitude squared	0.000	0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Had a loan and used in cacao (1 = yes)	0.025	1.077	n.a	0.190
	(0.148)	(0.000)		(0.133)
Household had a migrant in last 12 months (1 = yes)	0.014	-0.333	0.041	0.045
	(0.123)	(0.000)	(0.087)	(0.066)
Household received remittances (1 = yes)	0.075	0.689	0.228	0.130
	(0.089)	(0.000)	(0.164)	(0.077)
Obtained information of cacao research products from NGOs or government (1 = yes)	0.157*	0.057	0.054	0.080
	(0.062)	(0.000)	(0.066)	(0.043)
Farmers selecting cacao seeds or grafts from elite trees/mothers(1 = yes)	0.246	-0.007	0.254***	0.280***
	(0.136)	(0.000)	(0.070)	(0.057)
Constant	-0.033	-14.014	-0.224	-0.032
	(0.488)	(0.000)	(0.423)	(0.328)
Observations	**754**	**442**	**791**	**1,987**
R-squared	**0.460**	**1.000**	**0.385**	**0.399**
Country controls	**No**	**No**	**No**	**Yes**
Municipality controls	**Yes**	**Yes**	**Yes**	**Yes**
Winsorized at 3 sd above mean	**Yes**	**Yes**	**Yes**	**Yes**
N baseline	**380**	**218**	**413**	**1011**
N endline	**374**	**224**	**378**	**976**

Standard errors in parentheses and clustered at the municipality level

*** p<0.001, ** p<0.01, * p<0.05

Differences between male and female farmers:

- None of the sex (female/male) or household decision-making variables showed a statistically significant effect on the adoption of cacao renovation practices.

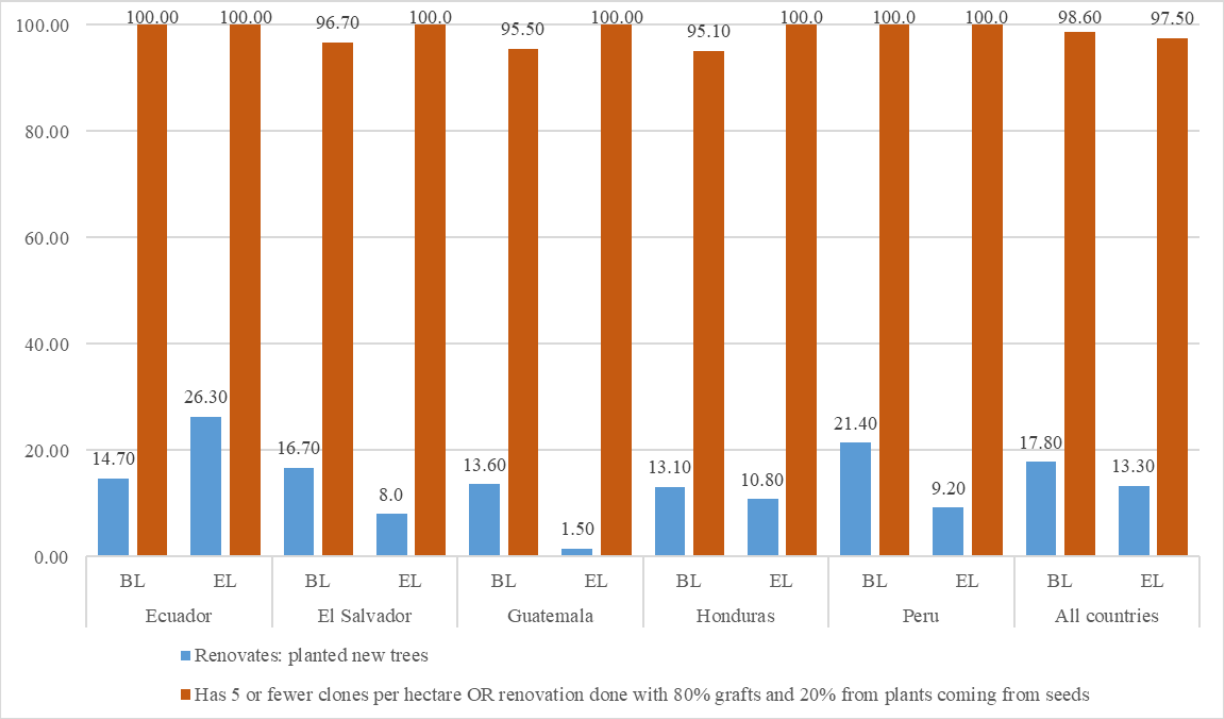
Other factors contributing to observed changes:

- Farm size showed a nonlinear relationship with renovation in Central America and in the pooled sample, with the probability of renovating decreasing beyond a certain area threshold.
- Higher productive plant density was negatively associated with renovation in Peru and in the pooled sample, which is expected since farmers may avoid replacing trees that are already productive.
- A greater number of cacao varieties planted reduced the likelihood of renovation at the project level, suggesting that more diversified farms may focus on maintaining rather than replacing trees.

We observed no statistically significant changes in renovation adoption over time in the cacao value chain, either at the country level or for all countries combined. While technical assistance and credit did not influence adoption, access to information from NGOs/government in Central America and the use of elite planting material in Peru (and in the pooled analysis) emerged as the main positive drivers. The results indicate that renovation uptake is more responsive when seed-system improvements are integrated with information dissemination and less influenced by demographic or socioeconomic factors

such as sex (male/female), migration, or remittances. Descriptive results show decrease in renovation over time (**Figure *13***).

Figure 13. Cacao: changes in adoption of renovation practices



5.3.2 Rehabilitation[35]

Main contributions of MOCCA (*Table 44*):

- When we analyze results by country, we did not find statistically significant changes in the share of farmers reporting adoption of cacao rehabilitation between baseline and endline in Central America or Peru. The Ecuador estimate is not interpretable due to data limitations. At the project level (all countries combined), there was also no statistically significant change over time.
- The technical assistance provided by MOCCA, measured as the number of training modules received, had no statistically significant effect in any country. In the pooled sample, however, we found a small but statistically significant negative association with adoption, suggesting that training may have focused more on other practices or that rehabilitation was not prioritized in the modules.

[35] This variable measures the intensity of pruning practices among cacao farmers. It is defined as a binary indicator, coded as 1 if the farmer reports applying at least three distinct pruning techniques from the following list: removal of buds (chupones), removal of suckers/fake stems, removal of lateral branches, removal of dead branches, removal of misplaced branches, rehabilitation pruning, and height pruning. Farmers adopting fewer than three of these practices are coded as 0.

- Obtaining information on cacao research products from NGOs or government showed no significant effect in any country or in the pooled analysis.
- Selecting cacao seeds or grafts from elite trees/mothers did not significantly influence the adoption of rehabilitation in any country or in the pooled analysis.
- Having a loan and using it in cacao had no statistically significant effect in any country or in the pooled analysis.

Table 44. Cacao regression results for adoption of rehabilitation practices

Variables	Central America	Ecuador	Peru	All Countries
Survey wave (1=endline)	-0.089	7.549	-0.399	-0.570
	(0.547)	(0.000)	(0.452)	(0.418)
Number of training modules received	-0.026	-0.538	-0.031	-0.031**
	(0.017)	(0.000)	(0.019)	(0.012)
Income use decided jointly by couple (1 = yes)	0.236	-1.643	0.069	0.100
	(0.120)	(0.000)	(0.074)	(0.060)
Age of farmer (years)	0.004	-0.001	-0.002	-0.000
	(0.005)	(0.000)	(0.004)	(0.003)
Sex of farmer (1 = male)	0.024	-0.766	0.081	0.043
	(0.207)	(0.000)	(0.130)	(0.097)
Area planted with cacao (ha)	0.027	-0.004	0.114	0.056
	(0.070)	(0.000)	(0.073)	(0.040)
Area planted with cacao (ha) squared	0.001	-0.014	-0.012	-0.002
	(0.004)	(0.000)	(0.009)	(0.003)
Number of cacao trees per hectare	-0.000	-0.003	0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Productive cacao plant density (plants/ha)	0.000	0.004	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Farmer has at least one certification (1 = yes)	0.120	2.770	0.009	0.014
	(0.095)	(0.000)	(0.074)	(0.056)
Number of cacao varieties planted	0.003	0.734	-0.018	-0.002
	(0.042)	(0.000)	(0.049)	(0.030)
Farm altitude (masl)	0.001	-0.078	0.002**	0.001**
	(0.001)	(0.000)	(0.001)	(0.000)
Farm altitude squared	-0.000	0.001	-0.000**	-0.000**
	(0.000)	(0.000)	(0.000)	(0.000)
Had a loan and used in cacao (1 = yes)	0.246	1.337	n.a	-0.028
	(0.197)	(0.000)		(0.166)
Household had a migrant in last 12 months (1 = yes)	-0.096	-2.787	0.068	0.006
	(0.163)	(0.000)	(0.101)	(0.082)
Household received remittances (1 = yes)	-0.171	3.148	0.189	-0.056
	(0.119)	(0.000)	(0.190)	(0.096)
Obtained information of cacao research products from NGOs or government (1 = yes)	-0.102	0.680	0.021	-0.050
	(0.082)	(0.000)	(0.076)	(0.053)
Farmers selecting cacao seeds or grafts from elite trees/mothers(1 = yes)	0.224	-4.721	-0.002	0.016
	(0.181)	(0.000)	(0.081)	(0.071)
Constant	-0.113	-82.518	0.735	0.754
	(0.650)	(0.000)	(0.491)	(0.408)

Variables	Central America	Ecuador	Peru	All Countries
Observations	**754**	**442**	**791**	**1,987**
R-squared	**0.639**	**1.000**	**0.507**	**0.555**
Country controls	**No**	**No**	**No**	**Yes**
Municipality controls	**Yes**	**Yes**	**Yes**	**Yes**
Winsorized at 3 sd above mean	**Yes**	**Yes**	**Yes**	**Yes**
N baseline	**380**	**218**	**413**	**1011**
N endline	**374**	**224**	**378**	**976**

Standard errors in parentheses and clustered at the municipality level

*** p<0.001, ** p<0.01, * p<0.05

Differences between male and female farmers:

- None of the sex (female/male) or household decision-making variables showed a statistically significant effect on the adoption of cacao rehabilitation practices.

Other factors contributing to observed changes:

- Farm altitude was positively associated with adoption in Peru and in the pooled sample, but the squared term was negative, indicating that the effect decreases at higher elevations.
- Migration and remittances had mixed associations: in Central America, receiving remittances was negatively related to adoption, while in Peru it had no effect.

Overall, we found no clear evidence that MOCCA significantly influenced rehabilitation adoption in the cacao value chain. Neither technical assistance, access to research information, use of elite planting material, nor credit were consistently associated with higher adoption. The results suggest that rehabilitation may require more targeted and context-specific interventions to address the agronomic, economic, and opportunity-cost considerations that farmers face when deciding whether to rehabilitate cacao trees.

5.3.3 Consolidated Synthesis of Practice Adoption Results (use of fertilizers, shade management, selective harvest, farm waste management)

Effect of time and project interventions

Across practices, MOCCA's impact on adoption was limited (***Table 45***,***Table 46***,***Table 47*** *and* ***Table 48***). Fertilizer use showed no consistent country-level changes, though fertilizer use[36] increased modestly in the pooled sample. Shade pruning rose significantly in Central America but remained unchanged in Ecuador and Peru. Selective harvest and rehabilitation showed no systematic changes over time. These patterns suggest that broader agronomic conditions, market dynamics, or farmer norms played a stronger role than MOCCA interventions in shaping adoption.

[36] This variable indicates whether the farmer applied fertilizers on cacao plots in the reference agricultural year.

Role of training and technical assistance

The number of training modules received did not consistently increase adoption. In fact, in several Central American countries, training was negatively associated with shade pruning and selective harvest and showed no effect on fertilizer adoption. A notable exception is renovation, where the effect was indirect: training itself did not drive adoption, but farmers who had access to complementary information from NGOs or government were significantly more likely to renovate. This suggests that training efforts may have been concentrated on renovation, limiting broader effects on other practices.

Research information

Research information proved relevant in two cases:

- It was positively associated with renovation in Central America, suggesting that knowledge flows from NGOs/government encouraged replanting decisions.
- It showed a small positive association with selective harvest in the pooled analysis. In other practices (fertilization, shade pruning, rehabilitation), research information had no measurable effect.

Household decision-making and sex (female/male)dynamics

Neither sex (female/male) or household decision-making variables showed consistent effects across practices.

Structural and household factors

- Varietal diversity was positively associated with fertilizer use and organic waste management, suggesting that diverse farms required more intensive soil care.
- Farm size showed weak, non-significant positive associations with shade pruning.
- Remittances were negatively related to fertilizer adoption in Central America, while migration showed mixed and often non-significant associations.

For cacao, MOCCA interventions showed limited direct influence on the adoption of most practices. The clearest contribution was in renovation, where access to external research information amplified adoption, indicating that training alone was insufficient unless reinforced by relevant technical knowledge and complementary support. Adoption patterns in other practices, fertilization, shade management, selective harvest, rehabilitation, were largely shaped by farm structure, household resources, and local dynamics rather than project channels.

Table 45. Cacao regression results for fertilizer use

Variables	Central America	Ecuador	Peru	All Countries
Survey wave (1=endline)	0.024	2.544	0.056	1.091**
	(0.537)	(0.000)	(0.460)	(0.413)
Number of training modules received	-0.025	-0.152	0.000	-0.012
	(0.017)	(0.000)	(0.019)	(0.012)
Income use decided jointly by couple (1 = yes)	0.003	0.255	0.111	0.095
	(0.117)	(0.000)	(0.075)	(0.059)
Age of farmer (years)	0.006	-0.015	0.005	0.005
	(0.005)	(0.000)	(0.004)	(0.003)
Sex of farmer (1 = male)	0.029	-0.437	-0.091	-0.059
	(0.203)	(0.000)	(0.132)	(0.096)
Area planted with cacao (ha)	0.002	-1.036	0.031	0.019
	(0.068)	(0.000)	(0.074)	(0.040)
Area planted with cacao (ha) squared	-0.001	0.076	0.000	-0.001
	(0.004)	(0.000)	(0.009)	(0.003)
Number of cacao trees per hectare	0.000	-0.002	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Productive cacao plant density (plants/ha)	-0.000	-0.001	0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Farmer has at least one certification (1 = yes)	-0.150	-0.299	0.053	-0.013
	(0.093)	(0.000)	(0.075)	(0.055)
Number of cacao varieties planted	0.089*	0.448	0.024	0.055
	(0.041)	(0.000)	(0.050)	(0.030)
Farm altitude (masl)	0.001	0.034	-0.001	-0.000
	(0.001)	(0.000)	(0.001)	(0.000)
Farm altitude squared	-0.000	-0.000	0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Had a loan and used in cacao (1 = yes)	-0.132	1.191	n.a	-0.089
	(0.194)	(0.000)		(0.163)
Household had a migrant in last 12 months (1 = yes)	0.118	-0.775	0.067	0.038
	(0.160)	(0.000)	(0.102)	(0.081)
Household received remittances (1 = yes)	-0.152	0.788	-0.283	-0.152
	(0.117)	(0.000)	(0.193)	(0.095)
Obtained information of cacao research products from NGOs or government (1 = yes)	0.080	0.294	0.012	0.024
	(0.081)	(0.000)	(0.078)	(0.052)
Farmers selecting cacao seeds or grafts from elite trees/mothers(1 = yes)	0.039	1.145	0.078	0.066
	(0.178)	(0.000)	(0.083)	(0.070)
Constant	-0.027	6.914	0.414	-0.822*
	(0.638)	(0.000)	(0.498)	(0.403)
Observations	**754**	**442**	**791**	**1,987**
R-squared	**0.450**	**1.000**	**0.377**	**0.393**
Country controls	**No**	**No**	**No**	**Yes**
Municipality controls	**Yes**	**Yes**	**Yes**	**Yes**
Winsorized at 3 sd above mean	**Yes**	**Yes**	**Yes**	**Yes**
N baseline	**380**	**218**	**413**	**1011**
N endline	**374**	**224**	**378**	**976**

Standard errors in parentheses and clustered at the municipality level

*** p<0.001, ** p<0.01, * p<0.05

Table 46. Cacao regression results for adoption of shade pruning

Variables	Central America	Ecuador	Peru	All Countries
Survey wave (1=endline)	0.968*	0.000	0.405	0.074
	(0.448)	(0.000)	(0.323)	(0.310)
Number of training modules received	-0.028*	-0.000	0.016	-0.006
	(0.014)	(0.000)	(0.013)	(0.009)
Income use decided jointly by couple (1 = yes)	0.154	-0.000	-0.052	0.002
	(0.098)	(0.000)	(0.053)	(0.044)
Age of farmer (years)	-0.003	0.000	-0.001	-0.000
	(0.004)	(0.000)	(0.003)	(0.002)
Sex of farmer (1 = male)	-0.261	-0.000	0.046	-0.052
	(0.169)	(0.000)	(0.093)	(0.072)
Area planted with cacao (ha)	0.043	0.000	0.073	0.052
	(0.057)	(0.000)	(0.052)	(0.030)
Area planted with cacao (ha) squared	-0.004	-0.000	-0.009	-0.004
	(0.004)	(0.000)	(0.007)	(0.002)
Number of cacao trees per hectare	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Productive cacao plant density (plants/ha)	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Farmer has at least one certification (1 = yes)	-0.046	0.000	-0.052	-0.047
	(0.078)	(0.000)	(0.053)	(0.041)
Number of cacao varieties planted	0.008	0.000	0.054	0.017
	(0.034)	(0.000)	(0.035)	(0.022)
Farm altitude (masl)	-0.000	-0.000	-0.000	0.000
	(0.001)	(0.000)	(0.001)	(0.000)
Farm altitude squared	0.000	0.000	0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Had a loan and used in cacao (1 = yes)	-0.217	0.000	n.a	-0.189
	(0.162)	(0.000)		(0.123)
Household had a migrant in last 12 months (1 = yes)	0.074	-0.000	-0.037	0.018
	(0.134)	(0.000)	(0.072)	(0.061)
Household received remittances (1 = yes)	-0.022	0.000	0.004	-0.062
	(0.097)	(0.000)	(0.136)	(0.071)
Obtained information of cacao research products from NGOs or government (1 = yes)	0.008	0.000	0.025	0.021
	(0.067)	(0.000)	(0.055)	(0.039)
Farmers selecting cacao seeds or grafts from elite trees/mothers(1 = yes)	-0.104	-0.000	0.081	0.049
	(0.149)	(0.000)	(0.058)	(0.052)
Constant	0.078	0.118	-0.148	0.394
	(0.533)	(0.000)	(0.350)	(0.302)
Observations	**754**	**442**	**791**	**1,987**
R-squared	**0.720**	**1.000**	**0.516**	**0.612**
Country controls	**No**	**No**	**No**	**Yes**
Municipality controls	**Yes**	**Yes**	**Yes**	**Yes**
Winsorized at 3 sd above mean	**Yes**	**Yes**	**Yes**	**Yes**
N baseline	**380**	**218**	**413**	**1011**
N endline	**374**	**224**	**378**	**976**

Standard errors in parentheses and clustered at the municipality level

*** p<0.001, ** p<0.01, * p<0.05

Table 47. Cacao regression results for adoption of selecting cacao beans according to color, shape, and size

Variables	Central America	Ecuador	Peru	All Countries
Survey wave (1=endline)	-0.035	-5.128	0.343	-0.348
	(0.474)	(0.000)	(0.486)	(0.417)
Number of training modules received	-0.030*	0.354	0.002	-0.014
	(0.015)	(0.000)	(0.020)	(0.012)
Income use decided jointly by couple (1 = yes)	-0.100	0.893	0.134	0.080
	(0.104)	(0.000)	(0.080)	(0.059)
Age of farmer (years)	0.003	-0.013	-0.005	-0.001
	(0.005)	(0.000)	(0.004)	(0.003)
Sex of farmer (1 = male)	-0.112	-0.511	0.049	-0.008
	(0.179)	(0.000)	(0.139)	(0.097)
Area planted with cacao (ha)	-0.001	-0.094	-0.002	-0.013
	(0.060)	(0.000)	(0.078)	(0.040)
Area planted with cacao (ha) squared	-0.001	0.029	-0.003	-0.000
	(0.004)	(0.000)	(0.010)	(0.003)
Number of cacao trees per hectare	-0.000	-0.001	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Productive cacao plant density (plants/ha)	0.000	-0.002	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Farmer has at least one certification (1 = yes)	0.047	-0.487	-0.031	0.039
	(0.083)	(0.000)	(0.080)	(0.056)
Number of cacao varieties planted	-0.006	-0.435	0.003	-0.000
	(0.036)	(0.000)	(0.052)	(0.030)
Farm altitude (masl)	-0.000	0.109	0.000	0.000
	(0.001)	(0.000)	(0.001)	(0.000)
Farm altitude squared	0.000	-0.002	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Had a loan and used in cacao (1 = yes)	-0.063	-1.828		-0.078
	(0.171)	(0.000)		(0.165)
Household had a migrant in last 12 months (1 = yes)	-0.195	2.584	0.013	-0.033
	(0.141)	(0.000)	(0.108)	(0.082)
Household received remittances (1 = yes)	0.032	-2.062	-0.214	-0.040
	(0.103)	(0.000)	(0.204)	(0.096)
Obtained information of cacao research products from NGOs or government (1 = yes)	0.094	-0.671	0.101	0.115*
	(0.071)	(0.000)	(0.082)	(0.053)
Farmers selecting cacao seeds or grafts from elite trees/mothers (1 = yes)	-0.005	1.797	-0.048	-0.033
	(0.157)	(0.000)	(0.087)	(0.070)
Constant	0.805	97.219	0.111	0.915*
	(0.564)	(0.000)	(0.526)	(0.407)
Observations	**754**	**442**	**791**	**1,987**
R-squared	**0.694**	**1.000**	**0.443**	**0.538**
Country controls	**No**	**No**	**No**	**Yes**
Municipality controls	**Yes**	**Yes**	**Yes**	**Yes**
Winsorized at 3 sd above mean	**Yes**	**Yes**	**Yes**	**Yes**
N baseline	**380**	**218**	**413**	**1011**
N endline	**374**	**224**	**378**	**976**

Standard errors in parentheses and clustered at the municipality level

*** p<0.001, ** p<0.01, * p<0.05

Table 48. Cacao regression results for adoption of preparing and applying "enmiendas"/organic fertilizers

Variables	Central America	Ecuador	Peru	All Countries
Survey wave (1=endline)	-0.099	0.000	0.356	0.178
	(0.424)	(0.000)	(0.400)	(0.343)
Number of training modules received	-0.029*	0.000	0.002	-0.017
	(0.013)	(0.000)	(0.016)	(0.010)
Income use decided jointly by couple (1 = yes)	-0.110	0.000	0.124	0.050
	(0.093)	(0.000)	(0.066)	(0.049)
Age of farmer (years)	-0.000	0.000	0.006	0.003
	(0.004)	(0.000)	(0.004)	(0.002)
Sex of farmer (1 = male)	-0.051	0.000	-0.138	-0.070
	(0.160)	(0.000)	(0.115)	(0.080)
Area planted with cacao (ha)	0.092	0.000	-0.034	0.020
	(0.054)	(0.000)	(0.064)	(0.033)
Area planted with cacao (ha) squared	-0.005	0.000	0.006	-0.001
	(0.003)	(0.000)	(0.008)	(0.003)
Number of cacao trees per hectare	-0.000	0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Productive cacao plant density (plants/ha)	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Farmer has at least one certification (1 = yes)	-0.139	0.000	-0.017	-0.035
	(0.074)	(0.000)	(0.066)	(0.046)
Number of cacao varieties planted	0.046	0.000	0.084	0.058*
	(0.033)	(0.000)	(0.043)	(0.025)
Farm altitude (masl)	-0.000	0.000	-0.001	-0.000
	(0.001)	(0.000)	(0.001)	(0.000)
Farm altitude squared	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Had a loan and used in cacao (1 = yes)	-0.302	0.000	n.a	-0.199
	(0.153)	(0.000)		(0.136)
Household had a migrant in last 12 months (1 = yes)	0.156	0.000	0.066	0.081
	(0.126)	(0.000)	(0.089)	(0.068)
Household received remittances (1 = yes)	-0.074	0.000	0.162	-0.014
	(0.092)	(0.000)	(0.168)	(0.079)
Obtained information of cacao research products from NGOs or government (1 = yes)	0.051	0.000	-0.057	-0.014
	(0.064)	(0.000)	(0.068)	(0.044)
Farmers selecting cacao seeds or grafts from elite trees/mothers(1 = yes)	-0.058	0.000	0.043	0.015
	(0.141)	(0.000)	(0.072)	(0.058)
Constant	0.284	0.041	-0.191	-0.041
	(0.504)	(0.000)	(0.434)	(0.335)
Observations	**754**	**442**	**791**	**1,987**
R-squared	**0.301**		**0.269**	**0.235**
Country controls	**No**	**No**	**No**	**Yes**
Municipality controls	**Yes**	**Yes**	**Yes**	**Yes**
Winsorized at 3 sd above mean	**Yes**	**Yes**	**Yes**	**Yes**
N baseline	**380**	**218**	**413**	**1011**
N endline	**374**	**224**	**378**	**976**

Standard errors in parentheses and clustered at the municipality level

*** p<0.001, ** p<0.01, * p<0.05

5.3.4 Determinants of the Total Number of Cacao Practices Adopted

This section examines the determinants of the total number of cacao practices adopted by farmers across project countries (***Table 49***). By combining pooled and country-level analyses, the results provide insights into how project implementation, training activities, household decision-making, financial resources, certification, and access to improved planting material influenced adoption.

Effect of time and project implementation

Across the pooled sample, the number of cacao practices adopted increased significantly. At the subregional level, Central America shows strong and positive effects , while Peru also registered gains, although less pronounced. In Ecuador, the results are highly unstable, likely due to small sample sizes and high variance, producing large coefficients without meaningful interpretation. These findings suggest that MOCCA was effective in expanding practice adoption in Central America and Peru, but results were heterogeneous and less reliable in Ecuador.

Role of training

The inclusion of a quadratic term for training shows no significant effects in the pooled analysis or at the country level. Both the linear and squared terms are small and statistically insignificant, indicating that, increased exposure to training did not translate into broader adoption of cacao practices.

Information access

Obtaining information from NGOs or government institutions had no significant effect on adoption, suggesting weaker complementarities compared to the coffee case.

Credit and financial resources

Loans used in cacao did not have a consistent effect across countries, though in the pooled analysis, the coefficient was close to zero.

Seeds or grafts from elite trees

Farmers selecting grafts or seeds from elite trees reported significantly higher adoption in all contexts, highlighting the importance of access to improved planting material in driving broader technological uptake.

Other relevant factors

- Households with a migrant member in the last 12 months adopted significantly more practices in Peru and in the pooled results. By contrast, remittances did not have significant effects.
- Joint decision-making on income use was positively associated with adoption in Central America and in the pooled sample. This underscores the role of inclusive intra-household dynamics in facilitating labor-intensive practice adoption and supports the idea that equitable decision-making between women and men can enhance outcomes.
- Larger cacao areas are positively associated with adoption in the pooled results, suggesting scale effects.

Table 49. Determinants of the Total Number of Cacao Practices Adopted

Variables	Central America	Ecuador	Peru	All Countries
Survey wave (1=endline)	2.867***	224.199	0.827	2.967***
	(0.410)	(356.939)	(2.735)	(0.359)
Number of training modules received	-0.033	-34.462	0.236	-0.086
	(0.183)	(54.938)	(0.439)	(0.104)
Number of training modules received squared	-0.005	1.312	-0.013	-0.002
	(0.012)	(2.077)	(0.017)	(0.006)
Income use decided jointly by couple (1 = yes)	1.198*	-3.121	0.624	0.865**
	(0.546)	(3.866)	(0.359)	(0.272)
Age of farmer (years)	-0.015	0.111	-0.032	-0.028*
	(0.025)	(0.130)	(0.021)	(0.014)
Sex of farmer (1 = male)	0.968	0.751	0.821	0.825
	(1.040)	(3.741)	(0.646)	(0.479)
Area planted with cacao (ha)	0.397	-0.290	0.296	0.381*
	(0.338)	(8.189)	(0.357)	(0.190)
Area planted with cacao (ha) squared	-0.018	0.019	-0.015	-0.015
	(0.021)	(0.424)	(0.047)	(0.014)
Number of cacao trees per hectare	-0.001	-0.001	0.000	-0.000
	(0.001)	(0.025)	(0.001)	(0.001)
Productive cacao plant density (plants/ha)	0.000	0.001	-0.000	0.000
	(0.001)	(0.018)	(0.001)	(0.000)
Farmer has at least one certification (1 = yes)	1.133*	-5.142	1.226***	1.038***
	(0.459)	(9.413)	(0.357)	(0.259)
Number of cacao varieties planted	-0.029	-1.085	-0.454	-0.116
	(0.204)	(8.011)	(0.232)	(0.140)
Farm altitude (masl)	0.002	-0.431	0.005	0.003
	(0.004)	(0.708)	(0.004)	(0.002)
Farm altitude squared	-0.000	0.002	-0.000	-0.000
	(0.000)	(0.003)	(0.000)	(0.000)
Had a loan and used in cacao (1 = yes)	0.490	-11.912		-0.129
	(1.043)	(13.476)		(0.834)
Household had a migrant in last 12 months (1 = yes)	0.863	-4.084	1.900***	1.537***
	(0.799)	(15.905)	(0.472)	(0.384)
Household received remittances (1 = yes)	0.084	-16.666	-0.341	-0.013
	(0.596)	(20.993)	(1.021)	(0.456)
Obtained information of cacao research products from NGOs or government (1 = yes)	-0.223	2.204	0.562	0.088
	(0.377)	(3.445)	(0.362)	(0.239)
Farmers selecting cacao seeds or grafts from elite trees/mothers (1 = yes)	3.106**	14.297	1.816***	2.005***
	(1.000)	(20.103)	(0.421)	(0.368)
Constant	6.471***	-153.300	6.361**	6.810***
	(1.782)	(220.231)	(2.228)	(1.045)
Observations	**758**	**442**	**792**	**1,992**
R-squared	**0.524**	**0.914**	**0.450**	**0.464**
Country controls	**No**	**No**	**No**	**Yes**
Municipality controls	**Yes**	**Yes**	**Yes**	**Yes**
Winsorized at 3 sd above mean	**Yes**	**Yes**	**Yes**	**Yes**
N baseline	**382**	**218**	**413**	**1013**
N endline	**376**	**224**	**379**	**979**

Standard errors in parentheses and clustered at the municipality level

*** p<0.001, ** p<0.01, * p<0.05

5.4 Results by Key Activities

In this section we report on the results for each of MOCCA's main activity areas - Training, Market Access, Research and Dissemination, Genetic Material, Access to Finance and Strengthening National and Regional Platforms – to assess to what degree MOCCA contributed to market system level changes in the provision of key support services for farmers. For each, we first provide the updated Theory of Change for each activity, developed together with MOCCA to reflect the actual causal pathways that guided implementation. We then respond to the following evaluation questions, using information from interviews with market system actors and information from the farmer surveys:

- What changes do we observe among MOCCA partners and non-partners?
- What are the contributions of MOCCA to the changes in partners and non-partners? What other elements contributed?
- How likely are the changes to be sustained over time by MOCCA partners? What challenges might they face?
- What changes do we observe among MOCCA beneficiary farmers in terms of improved services?

We respond to a fifth question using these findings to position each country along a Systemic Change Pathway. This same process was followed for all activities detailed in this section.

5.4.1 Access to Training

MOCCA's updated ToC:

Through partnerships with anchor firms and market system actors, along with the development and implementation of standardized training plans and cost-efficient training approaches, market system actors strengthen their capacities in GAP and R&R techniques, training approaches and content for the cacao sector. These initiatives (use of digital tools and training of young technicians) strengthened training methodologies and content, allowing implementing partners and other implementers of development projects to replicate and improve these training models. As a result, allied and non-allied actors in the market system adopt improved methodologies, encouraging knowledge transfer to cacao farmers. Farmers gain the knowledge, skills, and understanding needed to apply GAP and R&R techniques, leading to the adoption of low-cost R&R practices. This, in turn, improves farmers' yields, profitability, and sustainability, catalyzing a cycle of R&R investments and ensuring more resilient cacao production systems.

MOCCA planned to increase farmers' knowledge and skills through technical assistance (TA) provision or trainings. **MOCCA worked with 70 partners** across six countries to provide technical assistance and **training to 34,782 cacao farmers**. The number of farmers reached **was significant at sectoral level in all countries**, ranging from approximately 8% in Ecuador to 86% in El Salvador of all cacao farmers. This means that almost one in six cacao farmers across the target countries benefited from MOCCA's training activities, exposing them to novel, low-cost practices through participatory and practical training methods based on Farmer Field Schools, demonstration plots, rural community promoters and personalized follow up with digital tools. We describe below the changes observed in TA and training among MOCCA's partners, MOCCA's contribution to those changes, and highlight where partners are

already investing to maintain those changes post project. Results by country are summarized in ***Table 51***.

What changes do we observe among MOCCA partners and non-partners in terms of implementing new training approaches with producers?

We were able to confirm changes in how partners deliver TA in coffee in all five countries assessed. The key changes across partners in all five contexts included:

- **Improved technical capacity/knowledge of technicians and/or community promotors** for cacao best practices, post-harvest quality management, participatory methodologies (Farmer Field Schools, demonstration plots), use of digital tools (Cacao Movil).
- **More presence/expanded coverage of TA for small farmers** in target areas.
- **Standardized content, methodologies, and digital tools** to support TA.
- **Young farmers trained as TA providers and engaged as service providers in their own communities.**

A**s a result of these changes**, partners reported:

- **Adoption of best practices** (pruning, grafting, agroforestry, organic inputs)
- **Stronger relationships between farmers and farmer organizations and/or exporters**
- **Exporters and/or farmer organizations broaden their supply networks** in Guatemala and Peru.
- **Greater participation (including women)** in Ecuador and Honduras
- Improved **quality**
- Increased **yields**
- Increased **income** (greater volumes of cacao; diversified with fruit, sale of TA services)

MOCCA's contribution COMBINED with that of other actors to bring about changes in four of the five countries, while in Peru MOCCA was the primary contributor to changes observed. The evidence for the changes and MOCCA's contribution to those changes is strong in all countries. Public institutions, farmers organizations, universities, NGOs, exporters, cacao sector organizations and research centers in Ecuador, NGOs, exporters and public institutions in El Salvador, the Ministry of Agriculture and donors in Guatemala, and farmer organizations, public institutions, NGOs and research institutions in Honduras contributed alongside MOCCA to support changes.

Key **MOCCA contributions to these changes** include:

- **Funding** for technicians, community promoters, training workshops and demonstration plots
- **Training** for technicians and community promoters in agronomic best practices and market differentiation (quality standards, flavor profiles, post-harvest practices).
- **Establishment and provision of standardized curriculum, methodology, training materials and digital tools**

- **Strengthening of partnerships** between organizations (farmer organizations, exporters, research institutions) to support expanded and better-quality TA for small farmers, particularly in Ecuador and Guatemala

Contextual factors also facilitated or limited the achievement of MOCCA's objectives and are outlined in ***Table 50***.

Table 50. Contextual factors that affected implementation

Facilitated	Limited
• **High cacao prices** • Increased **demand for high quality** cacao • **New regulations in the EU**	• **Extreme climate events in Central American** countries limited the positive effects of adopted practice on yields and/or quality. • **Covid 19, political events, insecurity, and accessibility to cacao growing areas** all limited provision of in person TA in Ecuador, Guatemala, and Peru. • **Lack of government support** for the sector in Ecuador and Guatemala • **Low acceptance of digital technologies in Ecuador and limited connectivity in Peru** limited the use and benefits of digital tools in South American countries.

Finally, we explored with partners what changes they were most likely to continue, and whether and how they were already investing in maintaining or expanding the changes post MOCCA.

The following are the **changes most likely to be sustained by partners**:

- **Ongoing provision of TA for farmers by farmer organizations and exporters**; scale depends on resource availability.
- **Use of MOCCA introduced training materials, methodology and digital tools** to train farmers and technicians.
- **Implementation of practices by farmers**, especially as prices stay high.
- **Integration of quality standards/protocols** to improve cacao quality into TA
- In Peru, use of pruning brigades; that is, train groups of people to sell pruning services so that farmers could contract service providers to prune their cacao plantations instead of having to do it themselves. This combines several things - you can develop skills at pruning and use specialized tools to offer better services than if the farmer does it themselves and it can be done in shorter time to keep the plantation uniform and reduce impact of pruning too late. This is becoming a model in several countries/sectors. For example, the Government of Honduras is now implementing it in coffee.

In El Salvador and Guatemala, followed by Honduras and Peru we find the greatest number of partners already investing to sustain or expand the changes introduced by MOCCA. In Ecuador and Guatemala, the majority of partners are already implementing changes with their own resources including retaining staff hired under MOCCA, formalizing adoption of MOCCA introduced curriculum for TA, quality standards and inclusive approaches through institutional policies or practices. Non-partners in both countries are aware of MOCCA's work in TA and already implementing some of the tools and curriculum. In El Salvador, a few partners express intentions to continue, highlighting positive results in terms of farmer adoption of practices and satisfaction with practices but none show evidence of investing to sustain the changes as of yet.

Major **challenges** partners face in maintaining or expanding the changes introduced by MOCCA in TA for farmers include:

- **Lack of financial resources/capacity on the part of farmer organizations to maintain and expand TA without external support**.
- **Farmers lack resources to implement practices** and lack access to finance that could fill that gap.
- **Climate conditions** challenge productivity in El Salvador, Guatemala, Honduras, and Peru.
- **Currently high cacao prices** create incentives for practice adoption that will only be sustained until prices drop; currently high prices also pose challenges for farmer organizations due to limited cash flow to buy cacao from farmers challenging the sustainability of an inclusive business model that integrates support services with market access.
- **Persistence of markets for cacao that do not differentiate quality** limit incentives for practices related to improving cacao quality in Guatemala, Honduras, and Peru.

Table 51. Changes in technical assistance

Ecuador	El Salvador	Guatemala	Honduras	Peru
# MOCCA partners participating in Activity				
13	6	9	15	10
# farmers reached; farmers in sector; coverage.[17]				
9,108 120000 8%	3,428 3965 86%	2,183 9172 24%	2,614 3700 71%	12,562 90000 14%
Impact trajectory confirmed?				
CONFIRMED	CONFIRMED	CONFIRMED	CONFIRMED	CONFIRMED

Ecuador	El Salvador	Guatemala	Honduras	Peru
Changes observed				
Greater technical capacity of technicians (pruning, grafting). Better trained, more committed. **More presence of technicians in the field with more continuous, context-relevant, and effective TA services** (partner reactivates TA services; partnerships with exporters to expand TA; Greater TA coverage by farmer organizations). **Integration of rural youth as TA providers**. Integration of **new topics in TA** (gender, nurseries, climate change) **Digital tools** (Cacao Movil) introduced for technicians. Use with farmers limited.	Technicians and community promoters have **a stronger capacity to deliver training in new topics and apply new methodologies. Expanded coverage of farmers and hectares** supported with TA and training. **Farmers trained as community promoters** are empowered to play local leadership roles.	Technicians and community promoters affiliated with exporters, cooperatives, and local NGO's apply **cost efficient training approaches** such as Cacao Móvil, a **new standardized curriculum** and **participatory training methodologies** (including demonstration plots, group training, and virtual training) for small farmers.	**Technicians trained in participatory methods and cacao best practices and the use of Cacao Móvil** NCIs, cooperatives, and farmer associations **expand TA and training to more farmers.** Male and female farmers **participate more actively** in the farmer field schools supported by MOCCA. **Elite farmers replicate training and support the implementation of new practices.**	Technicians employed by exporters and farmer organizations **strengthen their capacity in technical topics related to cacao as well as methodologies for TA.**
Level of MOCCA contribution				
COMBINED	COMBINED	COMBINED	COMBINED	PRIMARY
Strength of evidence for the contribution of MOCCA				
STRONG	STRONG	STRONG	STRONG	STRONG

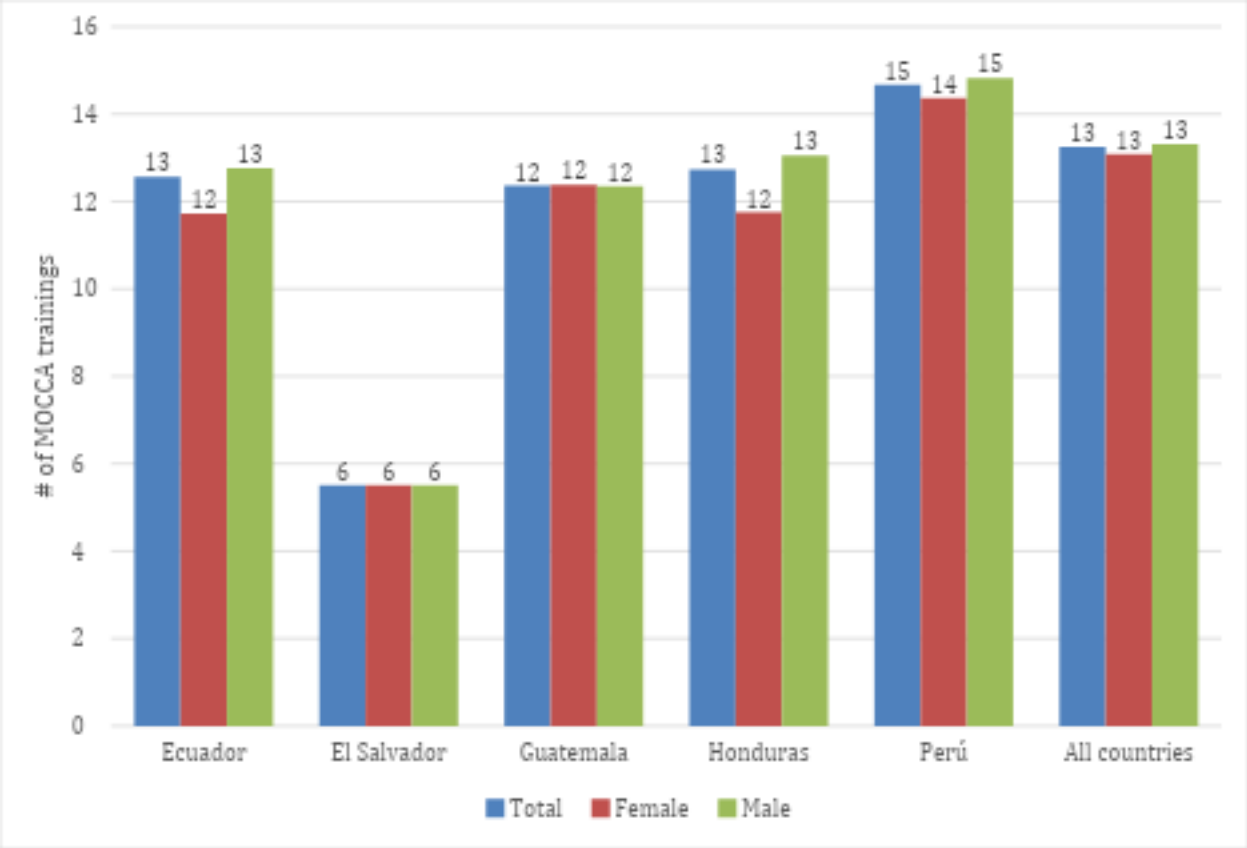
Ecuador	El Salvador	Guatemala	Honduras	Peru
What changes are most likely to be sustained?				
Continuation of training especially for youth and women **Use of methodologies and tools** developed by MOCCA for example cacao flavor analysis and data management **Continuation of best practices** such as management of nurseries and good agronomic practices. **Renovation and rehabilitation practices** in cacao plantations as long as prices remain high	**Community promoters will continue TA supporting other farmers in their community. Application of knowledge learned to other perennial crops** (fruit trees) **On-farm production of biological inputs** by farmers	**Ongoing follow up for new practices by technicians and community promoters. Adoption of quality standards** and protocols introduced by MOCCA Use of MOCCA introduced **methodologies** by universities private sector and research actors; **Development of lesson plans** for training. Farmer **adoption of best practices**	Farmers **continue to implement pruning techniques and agroforestry system management.** Partners implement **trials of conventional fertilizer applications before scaling** to all cacao plots. **Continued use of MOCCA training content**	Community promoters **continue to use Cacao Móvil** as a technical support tool for technical assistance. Farmer organizations **hire staff trained by MOCCA** to support organic production and post-harvest management. **Provision of training for farmers Farmers hire groups of community promoters to carry out pruning on their plantations.**
What is the evidence for sustainability?				
STRONG	WEAK	STRONG	MODERATELY STRONG	MODERATELY STRONG

What changes do we observe among MOCCA beneficiary farmers in terms of training received?

We used monitoring data to assess the number of trainings provided by the project. As shown in **Figure *14***, MOCCA and its partners delivered on average, 13.3 training modules to cacao farmers. The highest averages were recorded in Peru (14.7) and Honduras (12.7), while the lowest was in El Salvador (5.5). The provision of trainings was balanced between male and female farmers across all countries. Additional details are provided in *¡Error! No se encuentra el origen de la referencia.*.

When farmers were asked about the usefulness of the trainings received, most considered them either very useful or useful (**Figure *15***). The highest proportion of farmers rating trainings as “very useful” was observed in Guatemala (71.6%), followed by Honduras (54.2%). Conversely, a notable share of farmers in Ecuador and Peru rated them as “useful” rather than “very useful,” and some in Peru considered them of “little use” or “not useful.”

Figure 14. Cacao: Number of trainings attended by farmers, by sex

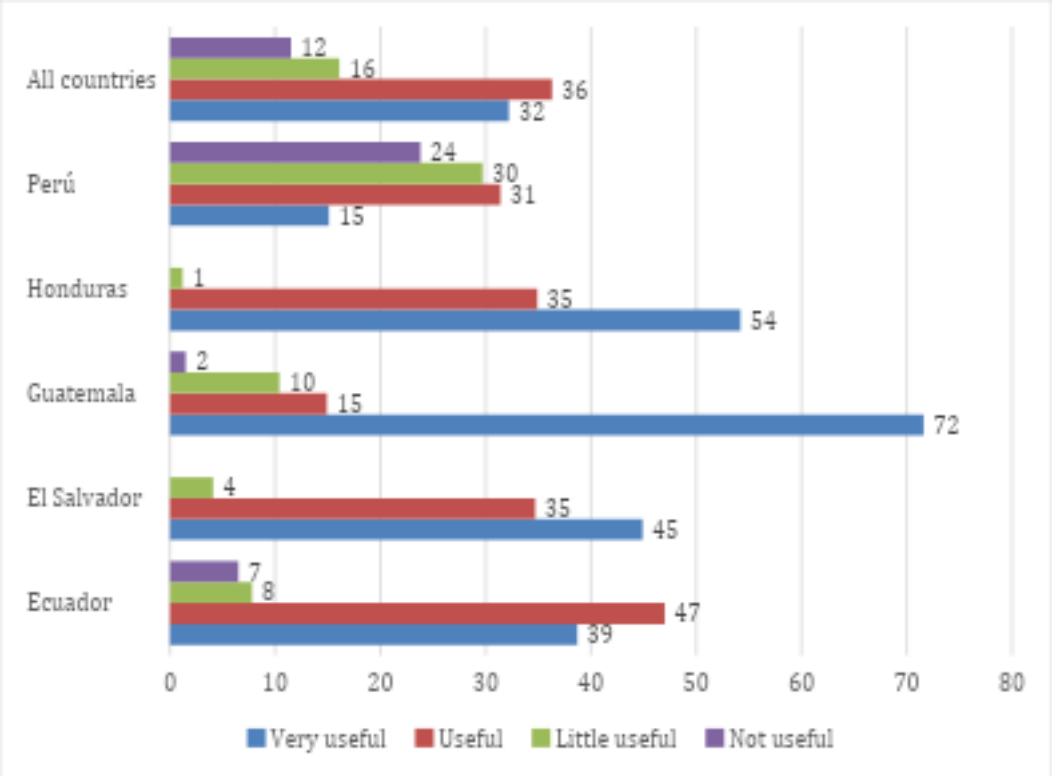


Econometric results indicate that the number of training modules received by farmers had no statistically significant effect on the adoption of most key cacao practices, both at the country level and in the pooled analysis. In fact, in some cases, the association was negative and statistically significant, particularly in Central America, where more training was associated with lower adoption of rehabilitation, shade pruning, and organic fertilizer use. This pattern may reflect that training focused more on other practices or that these specific practices were not prioritized in training content. Qualitatively, stakeholders in Central America noted that training agendas often prioritized other topics, such as participatory methods, certification processes, or diversification, over the specific practices assessed in the econometric models, which could explain the negative associations.

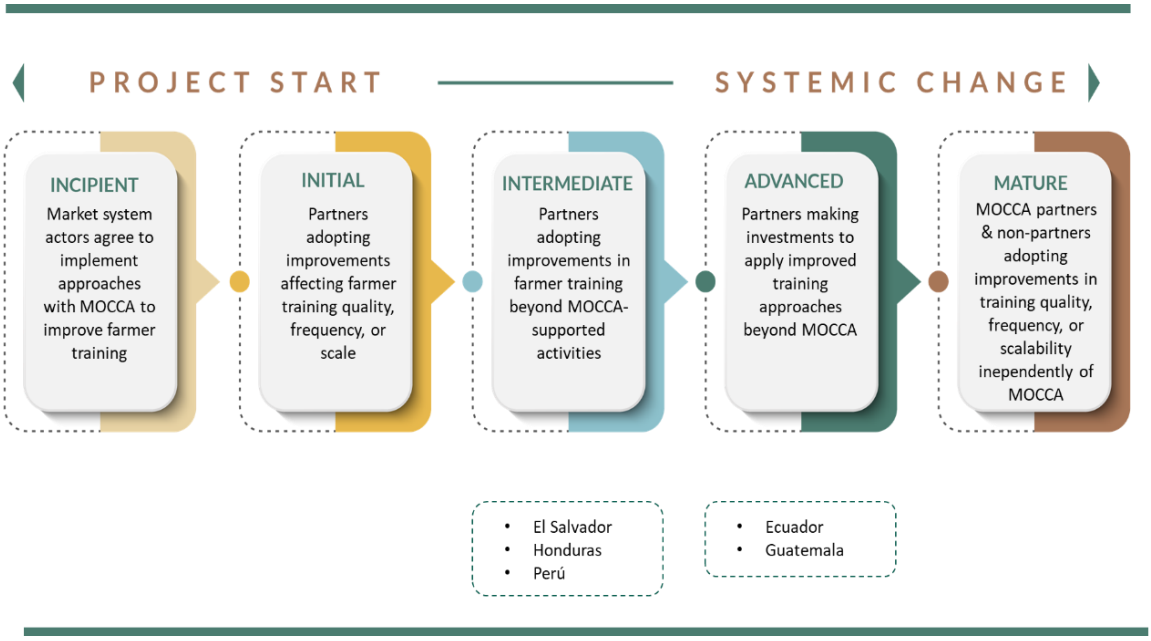
Additionally, obtaining information on cacao research products from NGOs or government sources had a positive and statistically significant effect on renovation decisions in Central America, suggesting that targeted information was more influential than the number of trainings. Interviews highlighted that such information often reached farmers through channels like radio programs, local fairs, and multi-stakeholder platforms integrated into extension systems. These results suggest that while training was widespread, its impact varied by practice and region. Qualitative evidence also points to external

constraints, such as input prices, labor shortages, and social norms related to women and men norms, that limited the application of promoted practices. This underlines the need for complementary technical assistance and targeted communication to enhance adoption.

Figure 15. Cacao: Perception of farmers about the usefulness of trainings received



Where does the available evidence suggest countries sit along the Systemic Change Pathway?



5.4.2 Market Access and Buyer Relationships

MOCCA's updated ToC:

Through strategic partnerships and training efforts, cacao sector actors, including NCIs and farmers' organizations, connect farmers to quality markets. Cacao flavor profiles are integrated into international flavor maps and promoted at trade events, improving visibility and market access. Farmers' organizations are trained to prepare high-quality samples for national and international competitions, linked to programs such as Cacao of Excellence, improving product quality and fermentation protocols. Strengthening business relationships between producers and buyers allows for better alignment and collaboration through platforms and tools that foster connectivity. As a result, farmers' organizations develop the ability to compete in premium markets, offering farmers access to fair prices, clear market opportunities, and long-term business relationships. Ultimately, this promotes sustainable production, improved profitability, and a secure, high-quality supply of cacao for regional and international markets.

What changes do we observe among MOCCA partners and non-partners in terms of market access and buyer relationships?

MOCCA strengthened farmer access to higher value markets and prices by strengthening buyer seller relationships including strengthening capacity for producing better quality cacao, using post harvest protocols to create differentiated flavor profiles, and using international quality standards to assess, improve and negotiate quality. MOCCA also supported connections with new buyers and more formal commercial relationships in quality differentiated markets. **MOCCA worked with 63 partners** across six

countries to support **access to improved markets for 27,279 cacao farmers** including price differentiation based on quality, access to new buyers and higher value markets, and expanded support services (TA, quality assessment, certification, access to finance, provision of seedlings), largely through farmer organizations. The number of farmers who accessed improved markets with support from MOCCA represents 11% of all cocoa farmers across target countries, and ranging from 3% of farmers in Guatemala to 44% of farmers in Nicaragua. We describe below the changes observed in buyer-seller relationships among MOCCA's partners, MOCCA's contribution to those changes, and highlight where partners are already investing to maintain those changes post project. Results by country are summarized in ***Table 53***.

We were able to confirm changes in how partners manage buyer-seller relationships in all countries except Honduras. In Honduras changes in market access have been initiated, but we were unable to confirm outcomes. The **key changes** across all four contexts included:

- **Increased capacity** in the country, among farmer organizations and others, **for post-harvest management of cacao** to optimize quality, including implementation of differentiated fermentation protocols.
- **Increased capacity**, among farmer organizations and others, **to apply quality standards to evaluate sensorial and other quality attributes of cacao** using internationally recognized procedures and language
- **Adoption of best practices for cacao quality management**, including increased implementation of fermentation protocols and quality evaluation
- **Increased participation in national and international cacao quality competitions** and trade fairs
- **Expanded, more direct, more stable buyer seller relationships based on quality standards and pricing**
- **Farmer organizations use sensory profiles/quality attributes of their cacao to negotiate with buyers and attract new clients**
- **Greater use and understanding of flavor maps** to promote flavor diversity in cacao
- **Better compliance with certifications** in Ecuador and Guatemala

As a result of these changes, partners reported:

- **Increased access to support services** as part of commercial relationships in Ecuador.
- Increased **adoption of post-harvest practices** for quality cacao
- **Improved cacao quality**
- Increased **access to high value cacao markets**
- Increased recognition of cacao quality of MOCCA partners and countries by international buyers
- **Improved negotiation skills** in Ecuador and Peru
- **Better prices**
- **Increased income** for farmers and farmer organizations in Guatemala and Peru.

MOCCA was the primary contributor to changes observed in Ecuador and Peru, while in the three Central American countries MOCCA's contribution COMBINED with that of other actors to bring about changes. The evidence for the changes and MOCCA's contribution to those changes is strong in all cases. NGOs, exporters, donors, and public institutions contributed alongside MOCCA to support changes in El

Salvador, Guatemala and Honduras. In Honduras farmer organizations also played an important role in directing change.

Key **MOCCA contributions to these changes** include:

- **Direct support for establishing and implementing commercial relationships** with international buyers
- **Development of differentiated flavor profiles and post-harvest protocols**
- **Capacity building and TA for farmer organizations and others to implement post-harvest practices** for cacao quality
- **Training of cacao tasters** following international standards at national level and within farmer organizations
- **Support for participation in cacao quality competitions** and trade fairs.
- **Creation of national and regional cacao flavor maps** to showcase flavor diversity and attract new buyers.
- **Support for equipment and infrastructure investments** needed to support improved post-harvest management by farmer organizations

Contextual factors also facilitated or limited the achievement of MOCCA's objectives and are outlined in ***Table 52***.

Table 52. Contextual factors that affected implementation

Facilitated	Limited
● **New market requirements** such as the European Union Deforestation Regulation[37] ● **High cacao prices/international demand for quality cacao** ● In El Salvador, the growth of the cacao processing industry, especially chocolate for domestic consumption and tourism. ● In Peru, interest/potential in new agroecological/quality niches for cacao and strong country support for cacao led development.	● **Adverse climate events** in Ecuador and Guatemala ● **Price competition from intermediaries** coupled with **limited financial resources of farmer organizations** in Guatemala ● **Complex export processes** for farmer organizations in Peru ● **Factors were not identified in El Salvador and Honduras.**

Finally, we explored with partners what changes they were most likely to continue, and whether and how they were already investing in maintaining or expanding the changes post MOCCA.
The following are the **changes most likely to be sustained by partners**:

- **Business models centered on quality** and differentiated prices
- Ongoing use of **fermentation protocols, post-harvest best practices, and quality standards,**
- **Continuity of commercial relationships** built under MOCCA
- In Guatemala, expansion of membership in farmer organization and reinvestment of profits in farmers and in cacao commercialization.

[37] The EU Deforestation Regulation (EUDR) is a binding legal framework that prohibits the trade of products linked to deforestation and forest degradation within or from the European Union. EU Deforestation Regulation (EUDR)

In Ecuador and Peru we find the greatest numbers of partners already investing to sustain the changes introduced by MOCCA. In Guatemala many partners express interest in continuing and we find evidence that some partners are investing their own resources in continuing. In El Salvador and Honduras, we found no evidence that changes are being implemented autonomously and partners cited several reasons why changes might be challenging to sustain.

Major **challenges partners face in maintaining or expanding the changes introduced by MOCCA in buyer-seller relationships include**:

- Technical capacity needed to improve cacao quality and flavor attributes is relatively new in the sector and ongoing capacity building and TA will be necessary until sufficient capacity and supporting services are fully developed.
- Low capacity of farmer organizations including dependence on external support, management of quality and new commercial relationships in Ecuador, Guatemala and Peru.
- Low cacao volumes in El Salvador and Honduras
- Competition from undifferentiated buyers in Honduras and Peru
- Price fluctuations in Ecuador and Guatemala

Summary of changes in market access:

We CONFIRM changes in market access in line with MOCCA's ToC among MOCCA partners in cacao **in all countries except Honduras.** In Honduras changes in market access have initiated but we were unable to confirm outcomes.

The **key changes** reported by partners are:

- **Increased capacity** in the country, among farmer organizations and others, **for post-harvest management of cacao** to optimize quality, including implementation of differentiated fermentation protocols.
- **Increased capacity**, among farmer organizations and others, **to apply quality standards to evaluate sensorial and other quality attributes of cacao** using internationally recognized procedures and language
- **Adoption of best practices for cacao quality management**, including increased implementation of fermentation protocols and quality evaluation
- **Increased participation in national and international cacao quality competitions** and trade fairs
- **Expanded, more direct, more stable buyer seller relationships based on quality standards and pricing**
- **Farmer organizations use sensory profiles/quality attributes of their cacao to negotiate with buyers and attract new clients**
- **Greater use and understanding of flavor maps** to promote flavor diversity in cacao
- **Better compliance with certifications** in Ecuador and Guatemala

Table 53. Contributions of MOCCA to changes in buyer-seller relationships

Ecuador	El Salvador	Guatemala	Honduras	Peru
# MOCCA partners participating in Activity				
12	2	9	15	12
# farmers reached; farmers in sector; coverage.[17]				
12,771 120000 11%	106 3965 3%	1,267 9172 14%	1,631 3700 44%	8,740 90000 10%
Impact trajectory confirmed?				
CONFIRMED	CONFIRMED	CONFIRMED	INITIATED	CONFIRMED
Changes observed				
Creation of a national panel of cacao tasters able to **use international standards** **Improvement of post-harvest infrastructure** (dryers, PH meters, fermentation boxes) Behavior changes among farmers towards **more careful management of quality and maintenance of certifications** **Farmers** linked to exporters **access differentiated benefits** such as guaranteed purchase, technical assistance, investments, and **prices differentiated by quality** Increased capacity of cacao market system actors to share and **use cacao flavor profiles to negotiate with buyers** in trade fairs	Farmer organizations **implement fermentation protocols and train others in quality management** Exporters report **new cacao exports of differentiated flavor profiles** **Provision of cacao processing services**	**Increase in number of certified farmers** **Exporters strengthen their oversight of certified cacao** **Farmers improve compliance with certification criteria** **More farmers participate in high value markets** through partnerships with exporters or farmer organizations **More stable commercial relationships between exporters and farmers** including **provision of support services** such as TA, pre-financing and quality-based pricing	**Farmers are trained to implement fermentation protocols** **Farmer organizations have personnel trained in cacao quality assessment** Farmer organizations and NCI **participate in international trade fairs** to promote quality cacao **Farmer organizations sell directly to exporter**	**Men and women farmers adopt new post-harvest practices to improve and differentiate their quality** (fermentation protocols) **More farmers participate in cacao quality competitions** Farmers **use their flavor profiles to increase visibility with buyers** and negotiate differentiated prices Farmer **organizations sell their cacao based on sensory profiles** Farmer organizations **explore opportunities for chocolate-making**
Level of MOCCA contribution				
PRIMARY	COMBINED	COMBINED	COMBINED	PRIMARY
Strength of evidence for the contribution of MOCCA				
STRONG	STRONG	STRONG	STRONG	STRONG

Ecuador	El Salvador	Guatemala	Honduras	Peru
What changes are most likely to be sustained?				
Business model centered on quality; Focus on differentiated markets as a sustainability strategy Promotion of associated crops within **agroforestry systems** **Participation of women and youth** as part of institutional policies Use of MOCCA promoted approaches for **improvement of commercial processes**	Use of **fermentation protocols** **Development of flavor profiles** **Provision of cacao processing services to small cacao businesses**	Application of **quality standards** **Certifications** **Ongoing participation in differentiated export markets**; sustain existing commercial relationships **Organizational strengthening and integration of more farmers** in farmer organizations Shared **investment funds to support farmers** **Reinvestment of cooperative funds** for buying cacao	**Application of new fermentation protocols**	**Long-term** national and international **market relationships** **Use of quality standards, flavor profiles and post-harvest protocols to develop commercial relationships** Ongoing **capacity building on cacao production and quality**
What is the evidence for sustainability?				
MODERATELY STRONG	WEAK	MODERATELY WEAK	WEAK	MODERATELY STRONG

What changes do we observe among MOCCA beneficiary farmers in terms of market access and buyer relationships?

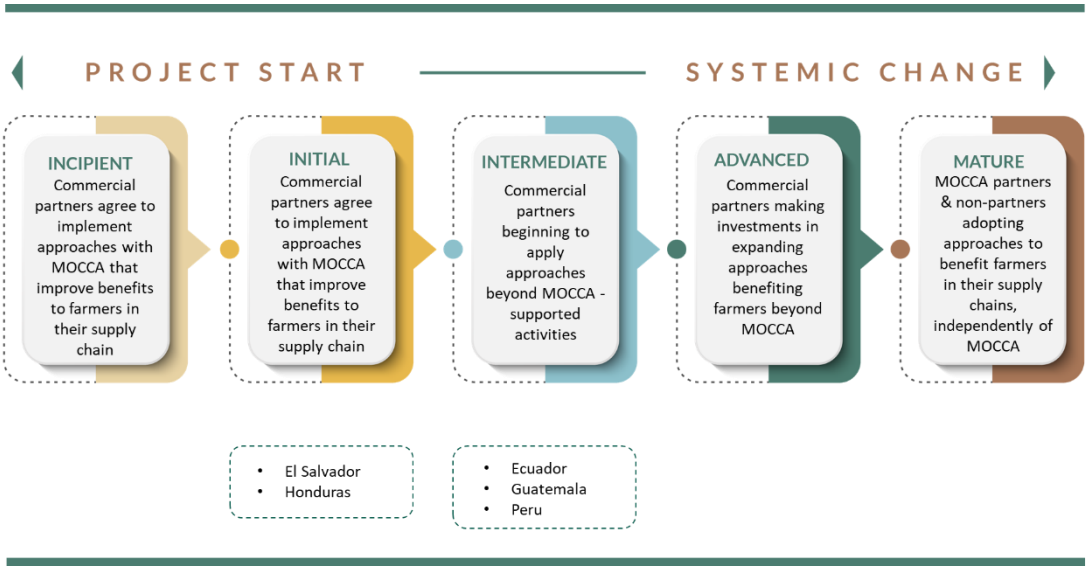
We assessed market access changes primarily through farmer certifications, sales channels (wet vs. dry cacao), and farmgate prices (*¡Error! No se encuentra el origen de la referencia.*). Across the five countries, we observed heterogeneous patterns. The share of farmers with any certification significantly declined in Ecuador, Guatemala, and the pooled analysis, while no significant change was observed in El Salvador, Honduras, or Peru. Disaggregating by certification type reveals important shifts: in Honduras and El Salvador, fair trade certification increased significantly, while in Ecuador, Honduras, and Peru, some certification types decreased. These trends suggest that while some farmers entered new certification schemes, others exited, possibly reflecting cost-benefit considerations, market demand shifts, or certification body requirements.

All farmers in the sample sold cacao at both baseline and endline, but we observed notable changes in the form of sales and prices received. In Ecuador and El Salvador, the share of farmers selling wet cacao decreased significantly, while in these same countries, the share selling dry cacao increased, likely linked to higher price incentives. Indeed, average farmgate prices rose sharply and significantly for both wet and dry cacao in most countries and in the pooled analysis, with some countries seeing more than a doubling of prices for dry cacao between baseline and endline.

From an attribution standpoint, we did not directly estimate the econometric effects of improved buyer–seller relationships on these market outcomes for cacao, as we did in coffee because in some countries, the program did not work with anchor firms, thus, we could not create this variable to include

in all regressions. However, the descriptive evidence suggests that higher prices and shifts toward dry cacao sales could be linked to market signals favoring quality and longer shelf life, which may be reinforced by buyer demands or certification incentives. Conversely, the observed declines in some certifications highlight that market access is dynamic, and sustaining compliance requires continuous investment from farmers and their organizations.

Where does the available evidence suggest countries sit along the Systemic Change Pathway?



5.4.3 Access to Research Outputs

MOCCA's updated ToC:

Through partnerships with research institutions, the dissemination of research results through Cacao Móvil digital platform, and the development of cadmium analyses, both cacao farmers and research institutions benefit. Researchers and NCIs strengthen their capacity through training, mentoring, and sustainable funding pathways, improving collaboration with market players, and aligning research priorities with market needs. As a result, cacao farmers gain access to relevant information, improving their knowledge, skills, and understanding of GAP and R&R techniques. With these capabilities, farmers adopt low-cost R&R practices, increasing yields, profitability and catalyzing sustainable production cycles, ensuring a secure and sustainable supply of cocoa for regional and international markets.

What changes do we observe among MOCCA partners and non-partners in terms of access to research outputs?

MOCCA partnered with research institutions in each country, with farmer organizations and universities in most countries, and with CRC, CATIE and Bioversity at the regional level to expand applied cacao research in each country as well as to invest in vital genetic resources housed at CRC and CATIE to increase their use for crop improvement, and engage regional cacao research centers to carry out collaborative research and build capacity of national research actors. MOCCA also worked to improve dissemination of research to diverse stakeholders and support dissemination to farmers through TA providers, especially farmer organizations, and sectoral institutions. MOCCA partnered with 46 partners across six countries to support the development of 115 technologies, practices or approaches and engaged 47 partners in dissemination of research findings to next users. We describe below the changes observed in TA and training among MOCCA's partners, MOCCA's contribution to those changes, and highlight where partners are already investing to maintain those changes post project. Results by country are summarized in ***Table 55***.

We were able to CONFIRM changes in how partners carry out research and research dissemination in **Ecuador and Guatemala.** Work to introduce changes in research and research dissemination among partners in El Salvador was initiated but outcomes were yet not observed. In Honduras and Peru, we did not have enough evidence to determine changes. The **key changes** observed in Ecuador, El Salvador and Guatemala are:

- **Greater collaboration between diverse actors** on cacao research and greater participation of non-research actors including farmer organizations
- **Greater availability of country specific data** on cadmium and cacao varieties using replicable methodologies (cacao catalogues, research protocols)
- **More structured and regular sharing of research results** between institutions and with non-research actors including use of visual materials and digital platforms to facilitate communication to non-research audiences.
- **Farmer organizations have more access to and use research results** to inform TA.

As a result of these changes, partners (in Ecuador) reported:

- **More dissemination of research results**
- **Greater capacity of technicians to use research results** in TA with farmers.
- **Farmers make management decisions based on disseminated research results.**

Partners in other countries (El Salvador, Honduras)did not identify effects of the changes introduced by MOCCA.

MOCCA was the primary contributor to changes observed in Guatemala, while in Ecuador and El Salvador MOCCA's contribution combined with that of other actors to bring about changes. MOCCA's contribution to changes in Honduras and Peru was indeterminate. The evidence for the changes and

MOCCA's contribution to those changes is strong in Ecuador and Guatemala, moderately weak for El Salvador, and weak for Honduras and Peru. Research institutions and NGOs contributed alongside MOCCA to support changes in Ecuador and El Salvador. In Ecuador specifically the Ministry of Agriculture and exporters were important.

Key **MOCCA contributions to these changes** include:

- **Funding for collaborative research** on cadmium and genetic material characteristics
- **Facilitation of partnerships** between actors for research and dissemination
- **Creation of dissemination materials/formats** such as cadmium maps, clone catalogues, webinars, cacao Movil, field, days, technical briefs, and other formats for sharing research with non-research partners.
- In El Salvador, support to collect evidence in support of denomination of origin for cacao; In Ecuador support to strengthen laboratory for cacao analysis.

Contextual factors also facilitated or limited the achievement of MOCCA's objectives and are outlined in ***Table 54***.

Table 54. Contextual factors that affected implementation

Facilitated	Limited
• increased international demand for high quality cacao	• lack of investment/funding for dissemination and implementation of practices based on research

Finally, we explored with partners what changes they were most likely to continue, and whether and how they were already investing in maintaining or expanding the changes post MOCCA.

The following are the **changes most likely to be sustained by partners**:

- **Continuation of cacao research lines initiated under MOCCA (cadmium, varietal characteristics)**
- **Collaboration between institutions in cacao research and in fundraising**
- **Ongoing research and use of evidence to inform market strategies** - negotiations (around cadmium in Ecuador) and positioning of cacao in differentiated markets (El Salvador and Guatemala)

We found the largest number of partners already investing in continuation of MOCCA introduced changes in Ecuador (moderately strong evidence) while in Guatemala we found only a few partners doing so, and in El Salvador only one. We did not find evidence of non-partners being aware of or replicating any MOCCA introduced changes.

Major **challenges to sustainability** of the changes to research and research dissemination identified by partners are:

- **Lack of funding** for cacao research
- In Ecuador, while INIAP does research on cacao, **politics influence stability of support for research**.
- In Guatemala, there is **no clear leadership for cacao research**.

Table 55. Changes in research and research dissemination

Ecuador	El Salvador	Guatemala	Honduras	Peru
# MOCCA partners participating in Activity				
2	3	7	15	9
technologies; actors disseminating				
8 13	54 4	4 5	9 2	18 17
Impact trajectory confirmed?				
CONFIRMED	INITIATED	CONFIRMED	INDETERMINATE	INDETERMINATE

Ecuador	El Salvador	Guatemala	Honduras	Peru
Changes observed				
Implementation of applied research on cacao flavor and genetics and cadmium mitigation in soils **Research results** on productivity, climate resilience and flavor profiles of cacao varieties **shared in field days with researchers and exporters.** **Technicians** from public and private institutions **have better capacity for sharing and discussing research results** with farmers. **Farmer organizations use cadmium testing** to generate site-specific recommendations for agronomic practices. **Public institutions, sectoral institutions, and NGOs disseminate research results** more effectively to technicians and farmers using **simple, practical printed materials (**cadmium map and 13 research briefs) **Support for multi-stakeholder coordination in development of national cadmium agenda**, positioning in agenda of public institutions, and improving the regulatory framework.	**NCI has scientific evidence to characterize Salvadoran cacao varieties** and plans to use the evidence for denomination of origin to differentiate Salvadoran cacao. Cacao sector actors **have more information and understanding about the presence of cadmium** in El Salvador.	**Greater capacity** of second tier farmer organization and research institute **for cacao research and proposal development.** NCI and research institute **disseminate research more broadly and more regularly** using online platforms to publish printed materials, pictures, infographics and videos, scientific journals, demonstration plots, and webinars. NCI has **more access and makes more use of research results.** **Farmer organizations receive and use research results** to inform practice.	Evidence of changes in research and research dissemination was not found.	Evidence of changes in research and research dissemination was not found.

Ecuador	El Salvador	Guatemala	Honduras	Peru
Level of MOCCA contribution				
COMBINED	COMBINED	PRIMARY	INDETERMINATE	INDETERMINATE
Strength of evidence for the contribution of MOCCA				
STRONG	MODERATELY WEAK	STRONG	WEAK	WEAK
What changes are most likely to be sustained?				
Ongoing **individual and institutional capacity strengthening for cacao research.** **Continued collaborative applied research** in cacao (cadmium, traceability, varieties, carbon) **Collaboration with universities** **Consideration of market trends in research agenda** Increased use of **laboratory analyses** for cacao. **Consideration of varietal characteristics in planting decisions**	**Use of research on genetic material for market differentiation**	**Collaborative research** on cacao Collaborative **fundraising for research** **Use of research results for market positioning**	NA	NA
What is the evidence for sustainability?				
MODERATELY STRONG	WEAK	MODERATELY WEAK	WEAK	WEAK

What changes do we observe among MOCCA beneficiary farmers in terms of access to research outputs?

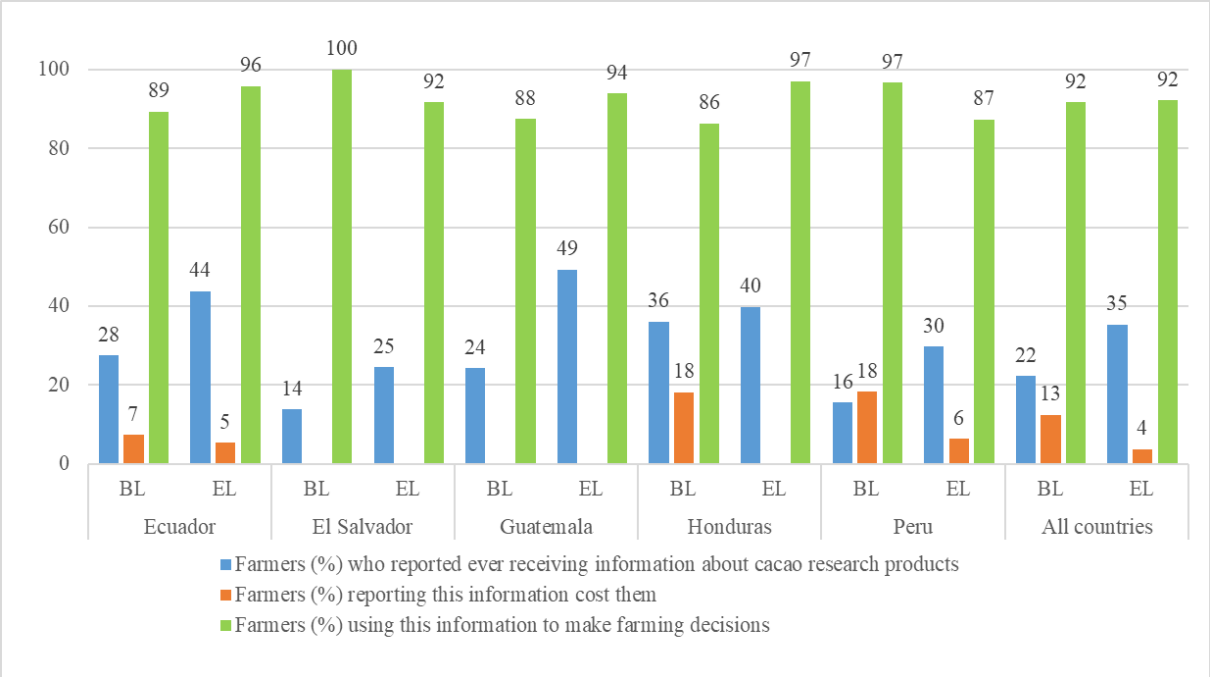
We described the econometric effect of access to research outputs on eight impact and outcome indicators, in sections 5.2 and 5.3. We observed heterogeneous effects across countries. For example, improved access to research outputs had no statistical effect on the likelihood of adopting fertilizer use, shade pruning, or farm waste management in any country. However, this information had a statistically significant positive effect on renovation in both the pooled analysis and in Central America, as well as on selective harvesting in the pooled analysis, despite a generally positive, though non-significant, trend in most countries. Furthermore, qualitative evidence, particularly from El Salvador, indicates that MOCCA played a key role in linking research dissemination to post-harvest quality improvements and renovation decisions.

Statistically, yields and income showed positive but non-significant associations with access to research outputs in most countries, suggesting that information alone may be insufficient without complementary support such as technical follow-up or access to inputs. Qualitative findings from

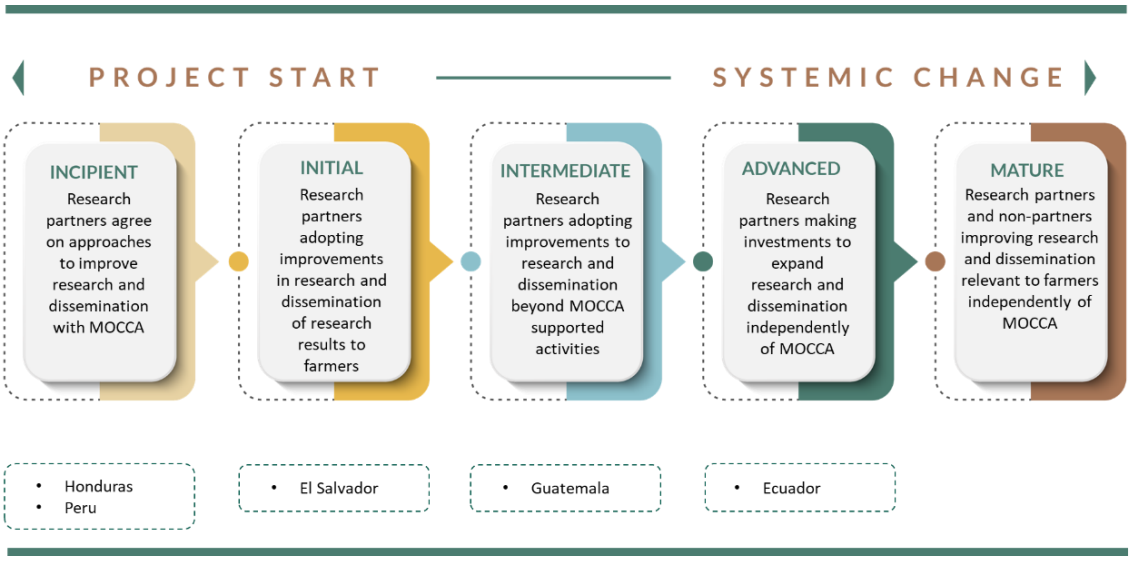
Ecuador and El Salvador confirm this gap: while research on genetics, flavor, and cadmium mitigation was disseminated, adoption was constrained by limited resources to implement recommendations.

At the aggregate level, the share of farmers reporting having received information about cacao research products increased from 22% at baseline to 35% at endline. Notably, the proportion of producers indicating that they used this information to make farming decisions remained consistently high, at around 92% in both periods (**Figure *16***). At the same time, the percentage of farmers stating that this information involved a cost dropped from 13% to 4%, suggesting wider free access to research outputs, likely facilitated by MOCCA. Country-level trends show particularly notable gains in Guatemala and El Salvador, where qualitative reports highlight MOCCA's leadership in research dissemination and capacity-building events. In Honduras and Peru, however, changes were minimal, reflecting weaker engagement of local research networks. Across countries, most farmers identified NGOs and government agencies as their main sources of this information, with some variation in the relative importance of each source.

Figure 16. Cacao: access and use of research-related information



Where does the available evidence suggest countries sit along the Systemic Change Pathway?



5.4.4 Access to High-Quality Planting Material and Other Inputs

MOCCA's updated ToC:
Through prior assessments of the availability of genetic material, partnerships with market system actors and training courses, cacao nurseries and clonal garden operators improve their production and management practices. This improvement allows cacao farmers access to high-quality inputs, encouraging the adoption of R&R practices and ultimately improving yield and profitability. In addition, market system players co-invest in the establishment and expansion of certified nurseries, responding to the growing demand for high-quality genetic material. This co-investment further strengthens farmers' access to superior quality planting materials, improving the long-term sustainability and productivity of their farms.

What changes do we observe among MOCCA partners and non-partners in terms of access to high-quality planting material and other inputs?

MOCCA strengthened cacao nurseries with training and support to implement best practices to improve quality (health and genetics) of cacao budwood and seedlings, including support to improve nursery infrastructure. This was done through development and roll out of training materials for nursery managers, Viverista Estrella[38], provision of resources, distribution of budwood, assessment and characterization of available materials, improvement in traceability and information for selection of genetic materials for planting, and support for certification. MOCCA also trained farmers in methods for changing genetic material of older plantations. MOCCA worked with **55 partners**, many of them farmer organizations, across six countries including a regional partnership with Bioversity International to strengthen 411 nurseries and budwood gardens who provided 665,780 plants or budwood to farmers during the project improving access to high quality planting material. We describe below the changes observed in provision of high-quality planting material among MOCCA's partners, MOCCA's contribution to those changes, and highlight where partners are already investing to maintain those changes post project. Results by country are summarized in ***Table 57***.

We were able to confirm changes in provision of genetic material for planting in all five countries assessed. The key changes across all five contexts included:

- **Stronger knowledge and capacity** on the part of nursery managers, TA providers, public institutions and researchers for best practices for multiplication of genetic material and management of nurseries and budwood gardens.
- **Closer coordination between actors** for training and supporting cacao genetic material production and dissemination.
- **More nurseries applying MOCCA promoted best practices (germination, irrigation, substrates, shade, protocols)**
- **Expansion of nursery capacity** (new nurseries, expansion of existing nurseries, better infrastructure)

[38] Viverista Estrella (Star Nurseries) was the name of MOCCA's program supporting small cacao nurseries, while in coffee the initiative was called El Viverista de Oro (Gold Nurseries).

- **Certification of nurseries**

As a result of these changes, partners reported:

- **Increased availability of high-quality cacao genetic material** (more and better quality) in cacao production areas
- **More availability of diverse genetics**
- **Farmers plant more healthy plants** and have **lower plant mortality rates**
- **More use of information about cacao varieties in selection** (genetic compatibility, flavor, adaptation to climate, resistance to pests)
- **Nurseries and clonal gardens grow as rural small businesses** in the hands of women, youth, farmers, farmer organizations, exporters and public institutions
- **Greater use of regulations/verification mechanisms** for quality cacao genetic material.

MOCCA was the PRIMARY contributor to changes in El Salvador and Peru, while in Ecuador, Guatemala and Honduras, MOCCA's contribution COMBINED with that of other actors to bring about changes. The evidence for the changes and MOCCA's contribution to those changes across all cases is STRONG, except for Guatemala where evidence for MOCCA's contribution is WEAK. Public sectoral institutions in Ecuador, NGOs, universities and public and private sector entities in Guatemala, and NGOs, farmer organizations, a research institute and private sector in Honduras contributed alongside MOCCA to support changes.

Key **MOCCA contributions to these changes** include:

- **Funding** support to improve/expand existing nurseries and create new nurseries and clonal gardens, especially farmer organizations
- **Training** in best practices for multiplication of cacao genetic material
- **Distribution of new materials**
- **Characterization and documentation of traits** of different genetic materials
- **Payment or support for certification** of genetic material providers

Contextual factors also facilitated or limited the achievement of MOCCA's objectives and are outlined in ***Table 56***.

Table 56. Contextual factors that affected implementation

Facilitated	Limited
• **Demand for specialty/certified cacao** in Ecuador and Guatemala • **High cacao prices** in Ecuador • **Lower variability of specialty cacao prices** in Guatemala	• **High informality in the nursery sector** and **absence of mechanisms for verified genetics**, as well as **logistical challenges in remote areas** in Ecuador • **Climate events** in Guatemala affected production of budwood • In Honduras **strong variability in capacity for grafting** limits who can learn/provide this service

Finally, we explored with partners what changes they were most likely to continue, and whether and how they were already investing in maintaining or expanding the changes post MOCCA.

The following are the **changes most likely to be sustained by partners**:

- **Application of best practices in nurseries** for healthy plants and traceable genetic material
- **Continuation of nursery operations**
- **R&R in cacao plantations using quality genetic material** (budwood or seedlings)
- **Expansion of lessons learned/expanded nursery capacity to other species** (fruits, timber)

We found an important number of partners in all countries except El Salvador who were already investing in continuation or expansion of MOCCA introduced changes. Non partners are aware of the work and supportive.

Major **challenges** partners face in maintaining or expanding the changes introduced by MOCCA in TA for farmers include:

- **Lack of sufficient (and sufficiently diverse) sources of certified genetic material** for cacao (to supply nurseries)
- **Financial viability of nursery operations**, especially in areas near small farmers
- **Climate challenges** including extreme rain events in some areas and water scarcity in others, affecting nursery operations
- **Lack of ongoing training for farmers** to ensure adequate management of genetic materials on farm, leading to poor performance
- **Low involvement of youth** in Ecuador and Guatemala
- **Lack of regulation** in Guatemala

Table 57. Changes in provision of quality genetic material for planting

Ecuador	El Salvador	Guatemala	Honduras	Peru
# MOCCA partners participating in Activity				
9	2	6	16	7
# plants; Coverage/Ha; nurseries/clonal gardens				
150,650 <1 75	11,150 14 37	74,700 17 44	56,500 29 36	275,900 2 112

Ecuador	El Salvador	Guatemala	Honduras	Peru
Impact trajectory confirmed?				
CONFIRMED	CONFIRMED	CONFIRMED	CONFIRMED	CONFIRMED
Changes observed				
Managers nurseries and clonal gardens and TA providers have **stronger knowledge and capacity to implement nursery best practices** Technical assistance providers **are replicating trainings for nursery managers and farmers;** INIAP is **providing specialized trainings on production of cacao seedlings** **Expansion/ improvement of production capacity** in the hands of farmer organizations, NCIs, exporters and others for production of higher quality cacao plants **Inspection and certification of nurseries,** including implementation of recommended infrastructure and record-keeping. Farmers, **women and youth establish nurseries** following MOCCA best practices (more income and availability of quality planting material) Nursery managers and TA providers integrated **new varieties** Public institution **disseminated certification regulations** in all provinces	Community promotors, Farmer organizations and NCI have **better knowledge and capacity for management of nurseries and clonal gardens**. Actors apply MOCCA promoted **best practices in nurseries** (grafting, fertilization, synchronized pruning) Nurseries/clonal gardens **expand production capacity**; **new nurseries/clonal gardens established**.	**Improved knowledge of diverse genetic material** and their characteristics in the field Nursery managers **improve practices** in nurseries and clonal gardens Farmers have **stronger selection criteria** for purchasing cacao planting material/budwood Nursery managers offer **higher quality (genetically pure) planting materials** and **are more knowledgeable of their characteristics** (climate, yields, pests)	Technicians from Farmer organizations have **stronger knowledge and abilities for management of nurseries** and cacao genetic materials Farmer organizations **apply best practices in nurseries** Farmer organizations **complete nursery certification** processes Farmers and Farmer organizations **expand nursery areas** to increase provision of high-quality planting material in the near future **Nurseries consider genetic compatibility and adaptation to local agroecological conditions** in the selection of materials to reproduce	**Researchers at research institute have stronger skills for multiplication** of genetic material (grafting) **Greater availability of high-quality cacao genetic material to farmer organizations** **More nurseries certified or accredited** **Creation of a nursery network**

Ecuador	El Salvador	Guatemala	Honduras	Peru
Level of MOCCA contribution				
COMBINED	PRIMARY	COMBINED	COMBINED	PRIMARY
Strength of evidence for the contribution of MOCCA				
STRONG	STRONG	WEAK	STRONG	STRONG
What changes are most likely to be sustained?				
Application of best practices in nurseries **Production of high-quality genetic material** **Integration of fruit and timber** into nursery operations **Maintenance of expanded infrastructure** **Renovation of cacao plantations with improved genetic material traceability** **Training and integration of youth** **Collaborative efforts** between NGOs, private sector, and farmer organizations	**Grafting** as method for propagation of cacao genetic material on farms and nurseries Use of grafting for propagation of **other fruit trees** **Provision of certified seeds and budwood**	**Maintenance and expansion of nurseries** **Farmers continue to distinguish between good and poor-quality planting material** for cacao **Shipment of samples abroad** to evaluate quality **Sharing of knowledge with next generation**	**Continue with nursery** despite low demand for plants Continued **application of best practices** **Change of genetic material in adult cacao** (cambio de copa) **Diversification of nursery operation** to include other trees in agroforestry system	**Nurseries continue providing services** to cacao development projects **Nursery practices that maintain genetic quality** of cacao planting material Farmers continue to **implement R&R in cacao plantations**
What is the evidence for sustainability?				
MODERATELY STRONG	MODERATELY WEAK	MODERATELY STRONG	MODERATELY STRONG	MODERATELY STRONG

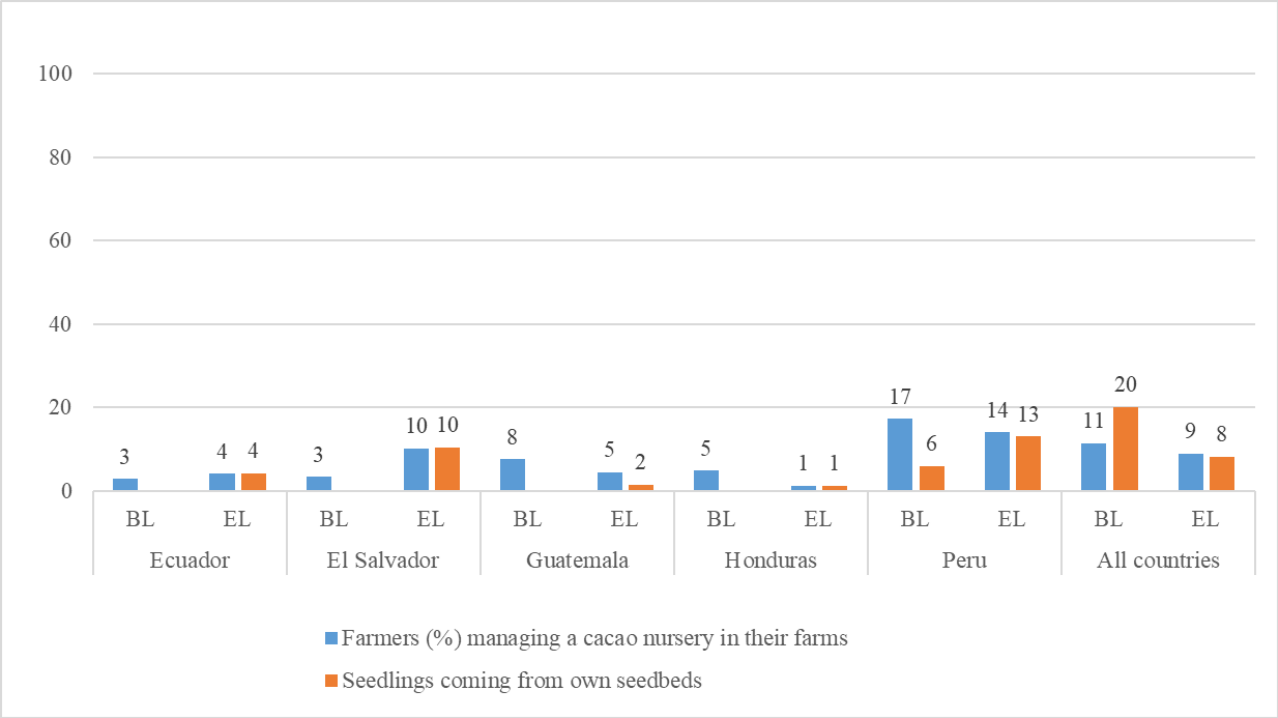
What changes do we observe among MOCCA beneficiary farmers in terms of access to high-quality planting material and other inputs?

We examined the evolution of access to high-quality planting material among MOCCA cacao farmers, focusing on two indicators: (i) farmers managing a cacao nursery on their farm, and (ii) farmers using seedlings from their own seedbeds (**Figure *17***). Across all countries, the percentage of farmers managing a nursery decreased from 11.0% at baseline (BL) to 9.0% at endline (EL), while the use of seedlings from own seedbeds declined more sharply, from 20.0% to 8.0%. This downward trend was observed in most countries, with the notable exception of El Salvador, where both indicators rose from 3% to 10%. In contrast, Peru maintained the highest nursery management rates (17% to 14%) but still saw a decrease, while Guatemala (8% to 5%) and Honduras (5% to 1%) registered clear drops.

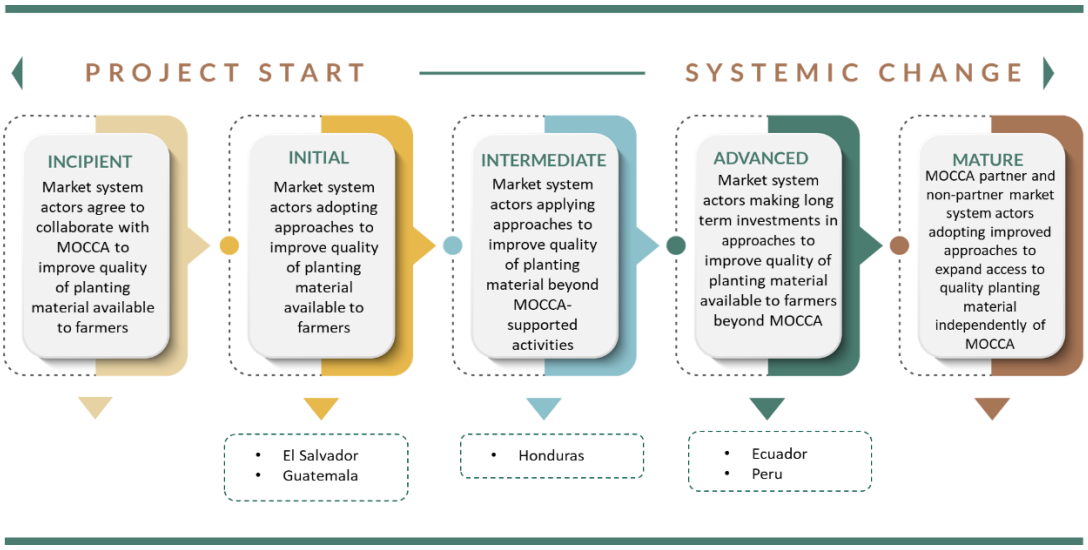
Qualitative evidence confirms that MOCCA's contribution to improving the supply of quality genetic material was strong in most countries, either as the primary driver (El Salvador, Peru) or in collaboration with other actors (Ecuador, Guatemala, Honduras). The project improved the technical capacity of nursery managers, clonal garden operators, and technical assistance providers in practices such as

grafting, fertilization, and synchronized pruning; supported the establishment and expansion of nurseries; and facilitated certification processes. Partnerships, such as those with INIAP in Ecuador, enabled specialized training and dissemination of nursery certification standards, while farmer organizations in Honduras and Guatemala improved their ability to produce genetically pure, locally adapted planting material. MOCCA also introduced new varieties, expanded the availability of certified nurseries, and promoted nursery networks. Overall, impacts were more pronounced at the market system level, through stronger capacities, infrastructure, and supply, than at the individual farm level.

Figure 17. Cacao: seedbeds and nurseries in the farm



Where does the available evidence suggest countries sit along the Systemic Change Pathway?



5.4.5 Access to Financial Services

MOCCA's updated ToC:

Through an in-depth analysis of agricultural lending systems for cacao, together with the establishment of partnerships with local lenders, financial institutions develop short-, medium- and long-term financial products. These include changes in their products aimed at smallholder cacao farmers. In this way, cacao farmers access and use financial products that support their adoption of R&R practices.

What changes do we observe among MOCCA partners and non-partners in terms of access to financial services?

MOCCA sought to increase access to finance for small cacao farmers by working with financial institutions and farmer organizations to improve the design of financial products for small cacao farmers, make it easier and faster to apply for credit, and to connect actors with new partners to facilitate finance for small farmers. **MOCCA worked with 22 partners in four countries to provide over 22 million dollars in financing to 7,058 small farmers** including financing for maintenance of cacao plantations and working capital for farmer organizations. Partners include financial institutions, public institutions, farmer organizations and exporters. We describe below the changes observed in provision of financial services among MOCCA's partners, MOCCA's contribution to those changes, and highlight where partners are already investing to maintain those changes post project. Results by country are summarized in ***Table 59***.

We were able to confirm changes in provision of financial services in Ecuador and Peru. **Changes were Initiated in El Salvador**, but we do not find evidence of achievement of any immediate outcomes. **In Guatemala and Honduras changes were not initiated.** While some exploratory work was done,

unfavorable conditions and unwilling partners led MOCCA to limit work in this area in these countries. The key changes across all five contexts included:

- **Increased collaboration** between public and private financial institutions and farmer organizations to facilitate access to credit for cacao farmers and their organizations
- **Financial products designed/improved** to better serve the needs of small cacao farmers and their organizations
- **Farmers and their organizations are more knowledgeable** about financial products, providers and financial management
- **Financial institutions and other market system actors are more knowledgeable** about the needs and capacities of small cacao farmers and their organizations with regard to credit.

As a result of these changes, partners reported:

- **Larger loan portfolio** in cacao
- **More farmers access formal credits** for cacao
- **Better terms for financial products** for cacao farmers
- **Increased trust between actors, of the financial system, of small farmers**

MOCCA was the primary contributor to changes observed in Ecuador, El Salvador and Peru. The e**vidence** for the changes and MOCCA's contribution to those changes is strong in Ecuador and Peru**,** while in **El Salvador,** evidence for MOCCA's contribution is **WEAK**.

Key **MOCCA contributions to these changes** include:

- Support to **identify gaps in financial services** for cacao farmers
- Support to **disseminate information about existing financial products and providers** to farmers
- Support to **design/adapt financial products** for cacao farmers
- Support to improve response time for loan application process through digitalization/automation of processes
- Direct training/support for **training on financial education**
- In Peru, **direct support for farmers and farmer organizations in loan applications** through hiring of credit promotors.

Contextual factors also facilitated or limited the achievement of MOCCA's objectives and are outlined in ***Table 58***.

Table 58. Contextual factors that affected implementation

Facilitated	Limited
In Peru, he key public sector entity providing credit to farmers was supported supported by the government to reorient towards small farmers, including to increase their presence in production areas through Fondo AgroPerú and to offer subsidized interest rates. This aligned well with MOCCA objectives.	● **Level of previous engagement between small cacao farmers and the formal financial sector is relatively low** across all contexts such that farmers and financial institutions have low levels of interest in engaging. Farmers lack requirements; financial institutions lack tools. ● In Peru, the key public sector entity providing credit to farmers was recovering from a crisis and high prices created challenges for farmer organizations to play a role in supporting financial access for farmers.

Finally, we explored with partners what changes they were most likely to continue, and whether and how they were already investing in maintaining or expanding the changes post MOCCA.

The following are the **changes most likely to be sustained by partners**:

- **Continued offer of adapted/new financial products**
- **Continuation of partnerships** to facilitate credit for small farmers
- **Use of automated tools** in Ecuador

Peru is the only country where we find several partners reporting investments in maintaining MOCCA supported changes. In Ecuador most partners express interest in continuing with MOCCA introduced changes but are not yet doing so, similar to El Salvador.

Major **challenges** partners face in maintaining or expanding the changes introduced by MOCCA in financial services for farmers include:

- **Dependence on external funding/support**
- **Lack of technical capacity** on the part of farmers, financial institutions for financial planning of investments.
- **Climate variability** and **lack of land titles** in Peru
- **Lack of continuity in leadership and institutional priorities** within financial institutions in Ecuador.

Table 59. Changes in provision of financial services

Ecuador	El Salvador	Guatemala	Honduras	Peru
# MOCCA partners participating in Activity				
13	1	-	1	7
# farmers; USD loaned				
2,947 10,352,863	-	-	-	4,111 12,125,967
Impact trajectory confirmed?				
CONFIRMED	INITIATED	NOT INITIATED	NOT INITIATED	CONFIRMED
Changes observed				
More collaboration between institutions (financial institutions, farmer organizations) in access to finance for small farmers; **Farmer organizations made new contacts with financial organizations**, and were able to **expand finance from public institutions**. **Development and dissemination of financial products adapted to small cacao farmers** (lower interest rates, less requirements, repayment plans adapted to cacao production cycle, incentives for repayment, for women) and with more proximity to cacao farmers, mostly organized farmers. Public and private financial institutions offered financial products (working capital, equipment) for small cacao farmers **Increased trust** among actors	**A new short term financial product** was launched in 2025 to finance maintenance of plantations.	NA	NA	Public and private financial institutions **designed/ adapted financial products for farmers and farmer organizations** with low interest, appropriate repayment plans, guarantee systems and products for indebted clients. **Farmers trained in financial services increase trust in financial products** **Farmer organizations trained in financial services access financial products** for working capital and commercialization at low rates, favorable conditions and follow up on their members with debts. Financial institutions **increase the number of small farmers who are first time borrowers** for R&R with favorable repayment plans and interest rates. **Exporter increases trust in lending to small farmers**.

Ecuador	El Salvador	Guatemala	Honduras	Peru
Level of MOCCA contribution				
PRIMARY	PRIMARY	NO CONTRIBUTION	NO CONTRIBUTION	PRIMARY
Strength of evidence for the contribution of MOCCA				
STRONG	WEAK	WEAK	WEAK	STRONG
What changes are most likely to be sustained?				
Use of automated tools to analyze credit applications and risk. **Expanding collaboration with farmer organizations**.	**Continue offering financial products** developed with MOCCA for cacao farmers (establishment, working capital) **Establish partnerships with government** entities to facilitate finance			**Continue with use of adapted products**
What is the evidence for sustainability?				
WEAK	WEAK			MODERATELY STRONG

What changes do we observe among MOCCA beneficiary farmers in terms of access to financial services?

We described the econometric effect of having a loan and using it for cacao-related activities on eight impact and outcome indicators, in sections 5.2 and 5.3. Across all countries, we observed no statistically significant effect of credit use on yields, renovation, rehabilitation, fertilizer use, shade management, selective harvesting, or farm waste management. Income also showed no significant association with credit use, suggesting that repayment obligations or allocation of credit to non-productive purposes may have offset potential short-term gains. Overall, the effect of credit on farm-level outcomes in cacao appears limited and highly context-dependent.

Descriptive statistics indicate that the proportion of farmers requesting and obtaining a loan was high in most countries and remained relatively stable between baseline and endline, with the highest levels in Honduras and the lowest in Ecuador (**Figure *18***). The share of farmers with a loan who were willing to provide additional information increased in several countries, notably in Honduras. Across countries, knowledge of the interest rate paid by farmers with loans was already high at baseline (above 80% in most cases) and remained stable or improved slightly by endline (**Figure *19***).

Loan length showed divergent trends: in Ecuador, it decreased slightly, while in Honduras it fell sharply from 44 to 22 months, potentially reflecting shorter repayment cycles that could limit the ability to invest in long-term farm improvements. The cost of credit, measured as annual interest rates, also displayed mixed trends (**Figure *20***): while some countries experienced substantial reductions (Peru and Guatemala), others saw rates remain similar between baseline and endline. For example, in Ecuador and Peru, MOCCA partners and local institutions introduced financial products with favorable terms, such as lower interest rates, repayment schedules aligned with harvest cycles, and guarantees, which supported farmers' access to credit.

Figure 18. Cacao: access to credit

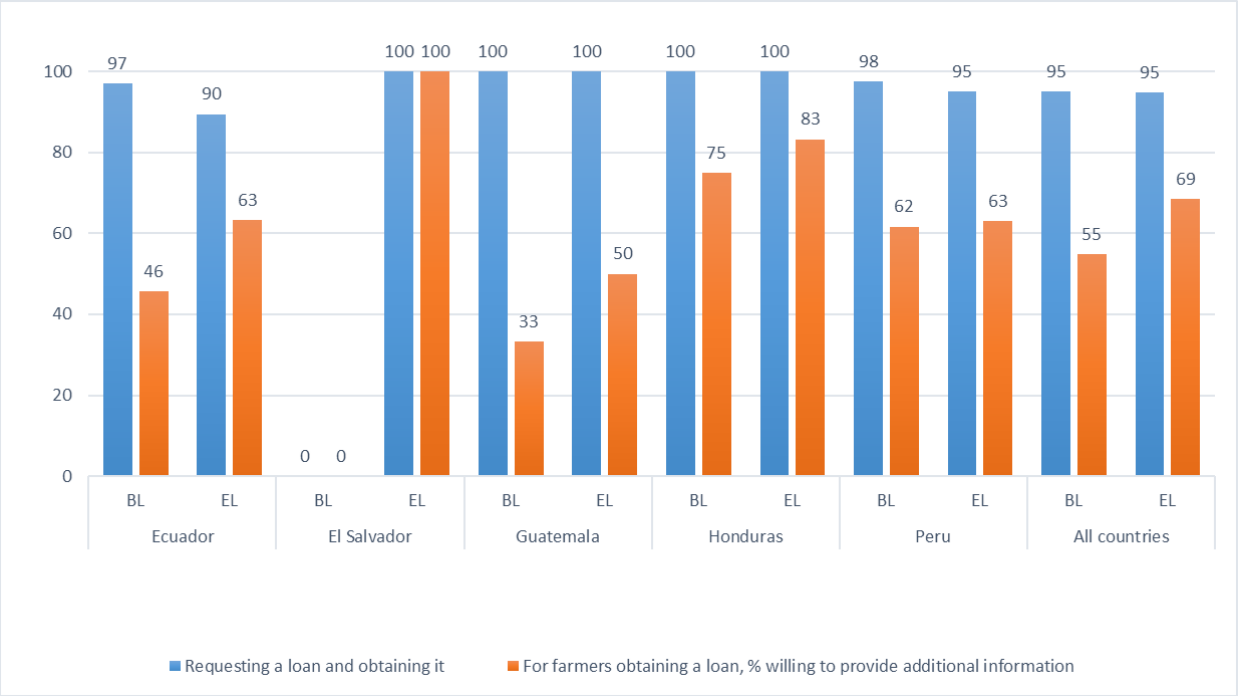


Figure 19. Cacao: length (months) of the loans, and knowledge about interest rate paid

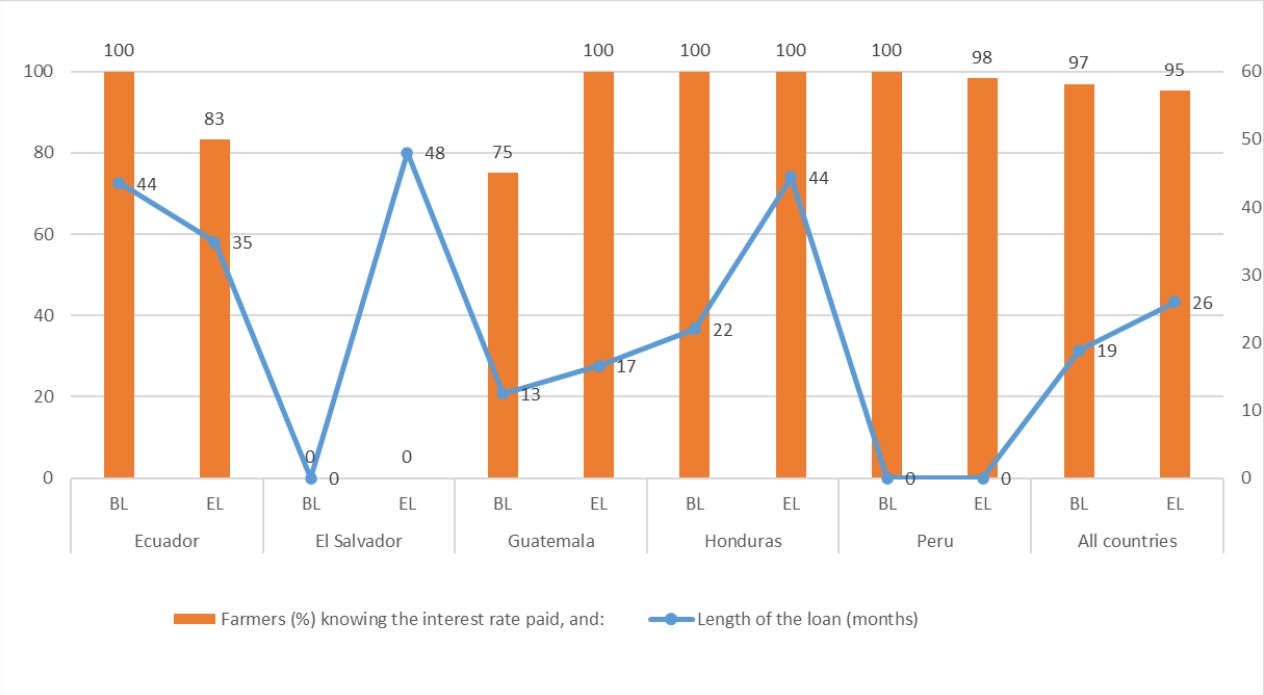
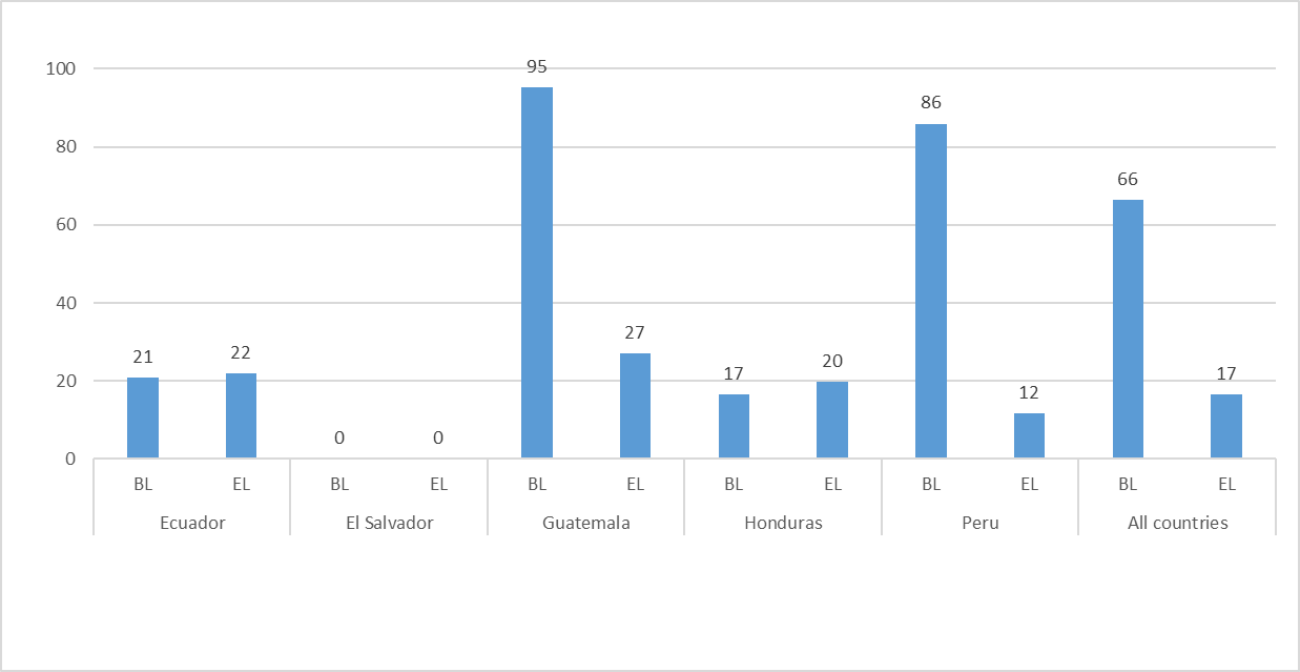
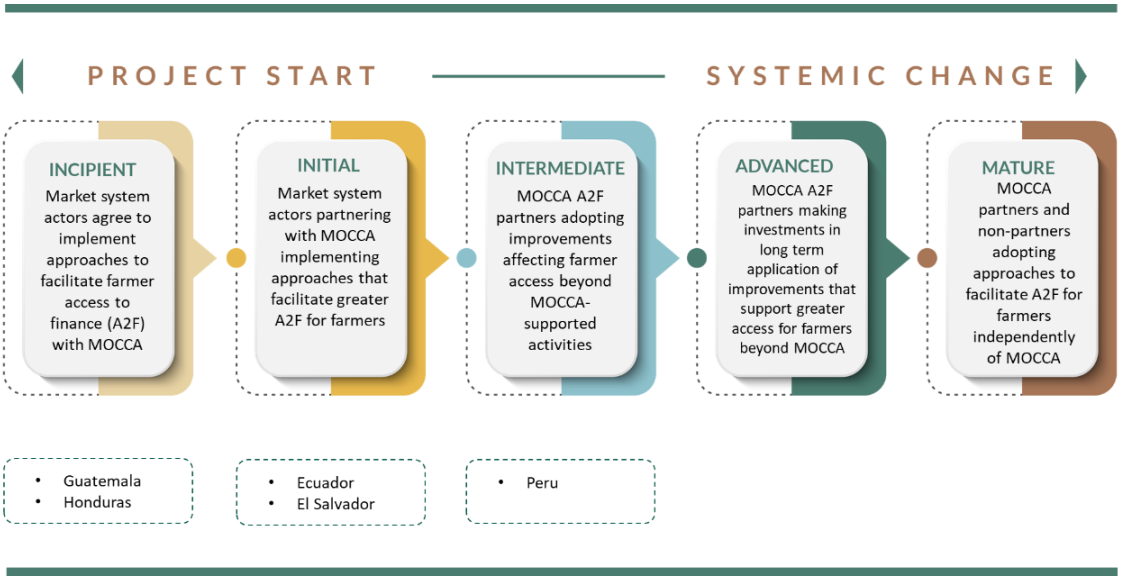


Figure 20. Cacao: annual interest rate (%) paid by farmers



Where does the available evidence suggest countries sit along the Systemic Change Pathway?



5.4.6 Capacity Building of National Coordination Systems (NCS) and Regional Platforms

MOCCA's updated ToC for NCIs:

Through in-depth assessments, organizational action plans, and targeted training, NCIs strengthen their governance, financial sustainability, and ability to engage with market players (development of cacao flavor maps and adoption of quality standards for the cacao sector). These efforts enable NCIs to improve their service delivery, providing farmers with greater support in training, market promotion and access to finance. As NCIs become more able to deliver R&R-related services, farmers gain the knowledge, skills, and understanding needed to adopt GAP and R&R techniques. As a result, farmers are trained to carry out low-cost R&R practices, which results in improved yields and profitability.

What changes do we observe among MOCCA partners and non-partners in terms of capacity building of NCS and regional platforms?

MOCCA engaged with key sectoral institutions and platforms across all countries to support their capacity to facilitate, provide or create an enabling environment for the provision of support services for small cacao farmers including TA, market access, research, genetic material and financial services. Each country's context is different with countries with larger cacao sectors, like Ecuador and Peru, having stronger more recognized sectoral convenors while in Central America, especially El Salvador and Guatemala with smaller cacao export sectors, sectoral coordination is more emergent. In each context MOCCA engaged with different actors or multi-stakeholder platforms playing an important role in bringing stakeholders together and ensuring inclusion of small-farmer representation and needs in their agendas. **MOCCA worked with 10 partners across six countries** including sectoral associations (farmers, exporters), public institutions, and multi-stakeholder platforms. We describe below the changes observed in national coordination systems among MOCCA's partners, MOCCA's contribution to those changes, and highlight where partners are already investing to maintain those changes post project. Results by country are summarized in ***Table 62***.

We were able to confirm changes in how partners support national coordination systems that are inclusive to small cacao farmers in all five countries assessed. The key changes across all four contexts included:

- **Stronger sector coordination** through national and sub national platforms, coalitions, and participation in regional or international spaces
- **Increased use of quality standards** and promotion of quality by NCI
- **Increased capacity/provision of TA** for small cacao farmers
- **NCIs support increased capacity of nurseries**

Partners in El Salvador highlight the provision of processing services for cacao and in Guatemala support for market access for farmers.

Work with NCIs/to strengthen sectoral coordination across all countries focused on facilitating market access (development, introduction and capacity building for use of international cacao quality standards; participation in local, national and international cacao quality competitions; positioning of cacao sector in differentiated markets based on flavor profiles and quality) and strengthening multi-stakeholder collaboration (more stakeholders, especially farmer organizations, small farmer friendly agenda). Four or five countries also strengthened the role of sectoral institutions to facilitate genetic material and

provide/improve TA. In Peru APPCACAO was supported to improve access to finance for farmer organizations. In ***Table 60***we show the different NCIs and support services that were strengthened in each country.

Table 60. Cacao: Key functions strengthened with partner NCIs

Functions	Ecuador	El Salvador	Guatemala	Honduras	Peru
Technical Assistance	ANECACAO		FUNDALACHUA	FENAPROCACAHO	APPCACAO
Inclusive Market Access	ANECACAO	CENTA Mesa Nacional de Cacao	FUNDALACHUA	FENAPROCACAHO	Mesa Técnica San Martín
Research					
Genetic Material	ANECACAO	CENTA Mesa Nacional de Cacao	FUNDALACHUA	FENAPROCACAHO	
Financial Services					APPCACAO
National Platforms	ANECACAO	CENTA Mesa Nacional de Cacao	Plataforma Nacional de Cacao; Comisión Nacional de Cacao, Comité de Chocolate y Cacao Diferenciado	FENAPROCACAHO	APPCACAO; Mesa Técnica San Martín

As a result of these changes, partners reported:

- **More provision of TA services** to farmers
- **Increased support for women's participation** in cacao sector.
- **Increased production in nurseries**
- **Access to export markets**
- **Improved quality**
- Increased **access to credit**

MOCCA was the PRIMARY contributor to changes observed in all countries but El Salvador where **MOCCA's contribution COMBINED with that of other actors to bring about changes**. The evidence for the changes and MOCCA's contribution to those changes across all countries is moderately strong. Donors and large development projects in the sector in El Salvador contributed alongside MOCCA to support changes.

Key **MOCCA contributions to these changes** include:

- **Financial resources for TA and nurseries**

- **Training of technicians and community promotors** in cacao best practices, training methodologies and digital tools.
- **Training in quality standards** including training of cacao tasters, **organization of competitions**, **support for participation in competitions**
- **Support to engage in national, regional and international cacao events**

Under this component **MOCCA also supported farmer organizations in all countries with organizational assessments, strengthening plans and analysis of male–female gaps.**

Contextual factors also facilitated or limited the achievement of MOCCA's objectives and are outlined in ***Table 61***.

Table 61. Contextual factors that affected implementation

Facilitated	Limited
• **Adoption of virtual tools and meetings during the pandemic** enabled actors to maintain interaction, sustain coordination, and expand training coverage despite mobility restrictions. (Ecuador and Peru)	• **Territorial division between Amazon and Coast** makes national representation and coordination challenging; lack of unified leadership slows progress toward an inclusive national platform (Ecuador) • **Lack of institutional budget** for continuation of MOCCA-supported changes (Guatemala) • **Lack of formalized national cacao platform** to serve as a central coordination mechanism — interactions remained event-based and ad hoc. (Honduras) • **Slow bureaucratic processes** delaying the creation of strategic policy instruments (Peru)

Finally, we explored with partners what changes they were most likely to continue, and whether and how they were already investing in maintaining or expanding the changes post MOCCA.

The following are the **changes most likely to be sustained by partners**:

- **Increased multi-stakeholder coordination and action**
- **Ongoing coordinated support for provision of market access, genetic material and TA**, in that order.

In Ecuador, Honduras and Peru we find some partners already investing in continuation of MOCCA introduced changes, in particular multi-stakeholder coordination and action to integrate new actors and address new priorities. In Honduras the NCI has assigned a budget line for sectoral coordination. In El Salvador and Guatemala, sectoral coordination efforts are weaker and continuation of efforts post MOCCA will rely heavily on the existence of external support, according to partners.

Major **challenges** partners face in maintaining or expanding the changes introduced by MOCCA in financial services for farmers include:

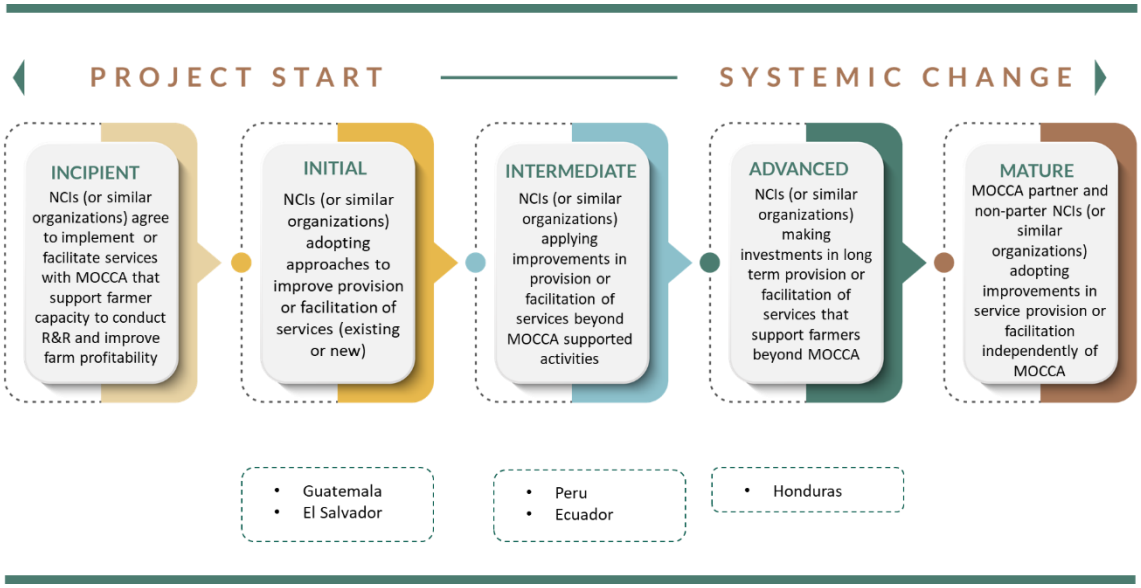
- **Dependence on external funding/support/lack of institutional budget/resources for continuation with services to farmers and/or stakeholder coordination.**

Table 62. Cacao: Changes in strengthening national commodity institutes (NCIs)

Ecuador	El Salvador	Guatemala	Honduras	Peru
# MOCCA partners participating in Activity; NCIs supported				
1 (ANECACAO)	1 (CENTA, Mesa Nacional de Cacao)	7 (FUNDALACHUA, Plataforma Nacional de Cacao, Comisión Nacional de Cacao, Comité de Chocolate y Cacao Diferenciado)	1 (FENAPROCACAHO)	2 (APPCACAO, Mesa Técnica Regional del Cacao San Martín)
Impact trajectory confirmed?				
CONFIRMED	CONFIRMED	CONFIRMED	CONFIRMED	CONFIRMED
Changes observed				
NCI **identified areas for organizational strengthening** **NCI disseminates technical information** and **improves coordination** within the sector Attention given to **integration of women more fully** into the sector **TA services of NCI reactivated** (small scale) NCI **provides support for community nurseries** **NCI facilitates cacao quality** and **use of quality standards** within the sector NCI **strengthens internal coordination and alliances** with exporters, producers, academia, and NGOs including **creation of National Cocoa Coalition** to improve communication and coordination	**NCI strengthened services for processing** cacao **NCI organized a national cacao competition** **NCI created a panel of cacao tasters** **NCI laboratory has new equipment** for cacao analyses **Staff of NCI have stronger technical skills** in cacao NCI has **stronger capacities for multiplying genetic materia**l for distribution to farmers NCI facilitates stakeholder participation in drafting of Cocoa Promotion Law.	**NCI strengthens capacity for managing projects, post-harvest management, TA and training** **NCI establishes nursery** to provide plants **NCI establishes demonstration plots** with best practices in cacao **NCI has better information on genetic materials** available **NCI buys cacao from new farmer organizations** to export Guatemala's National Cocoa Platform creates a branch for **quality improvement, organizational strengthening, and training, improving the country's market positioning and advancing a national strategy**.	**G**reater use of digital tools and FFS methodology by NCI for TA provision to farmers **Increased support for certification of nurseries** **NCI engages with cacao sector organizations in other countries** to exchange experiences NCI participates and **gains visibility in national and international events** such as quality competitions and trade fairs	**NCI adopts virtual tools for training**, increasing visibility and coverage of farmers and community promoters **Greater engagement of farmers in quality competitions** **Increased support for access to finance** for farmers **NCI expands their membership**/connections **NCI advocates for farmer organizations** (Agricultural Cooperatives Law (Law 31.335)) **NCI engages diverse stakeholders** to develop joint plan for improving quality; National cocoa and chocolate plan, plan for deforestation-free cacao

Ecuador	El Salvador	Guatemala	Honduras	Peru
Level of MOCCA contribution				
PRMARY	COMBINED	PRMARY	PRMARY	PRMARY
Strength of evidence for the contribution of MOCCA				
MODERATELY STRONG	MODERATELY STRONG	MODERATELY STRONG	MODERATELY STRONG	MODERATELY STRONG
What changes are most likely to be sustained?				
Strengthening of multi-stakeholder coordination **Collective action between stakeholders** (ministries, NGOs, private sector and regional governments in support of cacao sector) Continuation of **TA using local community promotors**	**Multiplication of unique genetic material** for distribution to farmers with genetic traceability Coordination support for **organization of cacao quality competitions** **Provision of cacao processing services** to support small chocolate businesses	**Implementation of organizational strengthening plan** developed with MOCCA support Ongoing **engagement with farmers** to strengthen their capacities Ongoing **engagement of universities** in the sector	Ongoing **capacity building for NCI technical staff** **Organizational budget assigned to coordination role in sector**	**Expansion of membership/stakeholder participation** in sectoral coordination spaces
What is the evidence for sustainability?				
MODERATELY STRONG	MODERATELY WEAK	MODERATELY WEAK	MODERATELY STRONG	MODERATELY STRONG

Where does the available evidence suggest countries sit along the Systemic Change Pathway?



5.4.7 Regional Platforms

MOCCA's updated ToC for Regional Platforms:

MOCCA sought to support the creation of a regional cacao platform similar to PROMECAFE. While establishing a new PROMECACAO platform was not feasible due to the existence of other initiatives with different approaches, the project engaged with and strengthened existing platforms. These included the FONTAGRO platform (covering Peru, Ecuador, Colombia, and Costa Rica), the Clima-Loca regional program led by the Alliance Bioversity-CIAT for issues related to cadmium and cacao genetics, and the SICACAO platform promoted under the Central American Integration System (SICA). In parallel, MOCCA coordinated with national cacao boards in each country. Through these engagements, the project fostered multi-stakeholder collaboration, facilitated research exchange, promoted sustainable production, supported policy dialogue, and contributed to improved regulatory frameworks. As a result, cacao farmers accessed fairer market opportunities, enhanced their knowledge of Good Agricultural Practices (GAPs) and renovation and rehabilitation (R&R) techniques, and adopted cost-effective R&R practices that improved their yields and profitability.

What changes do we observe among MOCCA partners and non-partners in terms of regional platforms?

MOCCA engaged with regional sectoral platforms to strengthen their role in cross country capacity sharing and coordinated action to support inclusive market systems. MOCCA engaged with three different multi-country platforms including SICACAO which brings together Central American countries and the DR; ALCACAO at Latin American level, and a regional research consortium funded by FONTAGRO. As part of this final evaluation we were unable to interview representatives of any of these platforms so our evidence overall on changes in this component is weak. Below we summarize what we were able to learn from other informants and in the ToC exercise carried out with MOCCA.

At the regional level, MOCCA worked to strengthen multi-stakeholder collaboration in the cacao sector, **engaging with SICACAO**, the Central American integration mechanism for cacao. While there is some evidence of MOCCA's participation in activities alongside government and private sector actors to support and strengthen the platform, the **available information is limited**, and there is **little concrete evidence of sustained regional actions or measurable outcomes from this engagement**.

MOCCA also **partnered with Peru in the context of la ICCO for policy advocacy** at the LAC and global levels (approval of the Cacao of Excellence program, leadership in advancing Fine Flavour Cocoa). **Both of these initiatives are seen as critical to LAC strategies for differentiating their cacaos from those of other regions to support better market access for farmers.**

6 Project Relevance, Effectiveness, and Sustainability

6.1 Relevance

Relevance: The extent to which the intervention's objectives and design respond to beneficiaries, global, country and partner/institution needs, policies and priorities, and continue to do so if circumstances change.

We use two sources of evidence to assess relevance:

- Perceptions of key partners (**Table 63**).
- MOCCA's adaptations to key factors that affected project implementation (***Table 64***).

Table 63. Perceived Relevance of MOCCA Interventions by Country and Crop

	Café	Cacao
Ecuador	NA	2.6
El Salvador	2.3	2.6
Guatemala	2.3	2.3
Honduras	2.8	2.5
Peru	2.3	2.8

Note : 0=Not Relevant; 1=Little Relevant; 2=Relevant; 3=Very Relevant

- Partners and non-partners across all countries for both coffee and cacao considered MOCCA's interventions to be between relevant and very relevant. Informants in coffee in Honduras and Peru in cacao gave the project the highest relevance score.
- Across all countries for coffee, informants highlight as highly relevant the projects interventions in support of expanding technical assistance and presence in the field with farmers to increase production and organize farmers to access better markets and services. Informants highlight MOCCA's technical contributions to improving TA including training of technicians; promoting new production practices focused on productivity and quality, adapted to small farmer production systems (practical); funding for research to support innovation; connections with financial service providers; improvements in genetic material systems; introduction of digital tools for information management; and alignment with partner business models. They highlight these approaches as relevant for small farmers who are facing labor challenges, high production costs, and small coffee areas.
- Informants also highlighted as highly relevant MOCCA's achievements in increasing connections, relationships, and collaboration between actors at the local level, particularly between farmer organizations and exporters but also with financial institutions.
- In cacao, MOCCA was rated as highly relevant for responding to a felt need within the sector for specialized technical training in cacao including in best practices for production, nurseries, grafting, fermentation, tasting, and shade management. MOCCA's strategy of training local community TA agents was considered highly relevant to increase technical knowledge and capacity within communities while supporting adaptation of content to local conditions and

stronger trust between technicians and farmers. The organization of training for farmers according to the crop cycle was highly relevant as it allowed farmers to plan and implement crop management practices at the right moment to improve effectiveness.

- Similar to coffee, informants highlighted as highly relevant MOCCA's attention to building connections and collaborations between market system actors including farmer organizations, financial institutions, and public institutions to strengthen the support ecosystem.
- Informants also indicated that the distribution of high-quality genetic material and the strengthening of farmer organizations' capacity for planning, marketing and internal control as highly relevant to the needs of the sector.
- Partners in Guatemala, Honduras and Peru highlighted the high relevance of MOCCA's approaches to engage women, youth and historically excluded producers and to support more equitable participation within organizations.
- In Ecuador, Guatemala and Peru informants highlighted the relevance of MOCCA's interventions to improve quality in cacao through improved fermentation protocols, quality standards and differentiated markets.
- In El Salvador and Peru partners highlighted the projects' ability to adapt to adverse operating contexts including
- Across all contexts and sectors, among the few who considered MOCCA not effective, it was due to its limited coverage of farmers/partners. In other words, it would have been more relevant had it been able to have a greater reach.
- Several contextual factors hindered the achievement of MOCCA objectives. Below how MOCCA adapted:

Overall, the project had to adapt to several changes in context. In most cases the project was able to adapt positively, redirecting in a positive direction. In addition to those above, several political situations particularly in Peru and Ecuador created challenges for implementation. Climate events, especially in Central America, had important negative impacts on MOCCA partners and will continue to shape the development of the sector. Climate resilience strategies are a clear need that new projects will need to address. Despite factors working against MOCCA targets, the project was able to deliver.

Table 64. MOCCA Adaptations to External Shocks and Sectoral Challenges

Factor	MOCCA adaptation
Pandemic limited movement and in person activities as MOCCA was just ramping up field activities.	MOCCA moved quickly to adjust their TA model to make use of virtual tools and minimize, initially, group trainings. This adaptation caused some delay in the start of TA activities, but by end of project, with approved time extension, MOCCA was able to reach TA targets and integrate the use of digital tools in support of TA into the overall model for both farmers and nurseries. This strategy was of course limited in areas with low connectivity and use of smart phones such as in Peru and Ecuador and parts of Guatemala.
Rise in fertilizer costs as the Ukraine war set in	MOCCA promoted low-cost practices and pivoted to include biological fertilizers to help fill the gap
Intensified workforce shortage, migration of males, aging farmers, an ongoing trend that intensified its impact on the coffee sector in particular	MOCCA's women'sand youth inclusion activities, especially recognized in cacao, supported inclusion of other family members in activities
Lack of regulations for genetic materials turned out to be a limiting factor for provision of high-quality genetic material for coffee and cacao	MOCCA worked at national and regional level to support in diverse and creative ways the development, improvement and/or implementation of regulations to create the conditions for long term shifts in how the genetic material sector operates.
Extreme climate events including storms and droughts impacted yields, limiting the positive results of adoption of practices and market access, starting with Eta and Iota in 2020	No clear/insufficient adaptation
Price increases drove competition from intermediaries, and while it created incentives for practice adoption where productivity links were clear, it also created disincentives for renovation and rehabilitation practices.	No clear/insufficient adaptation

6.2 Effectiveness

Effectiveness: The extent to which the intervention achieved, or is expected to achieve, its objectives and its results, including any differential results across groups.

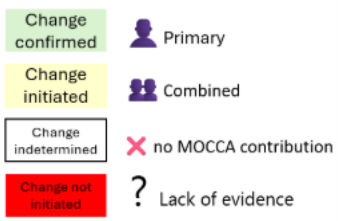
To what extent did MOCCA interventions and approaches achieve their objectives and results (in terms of income, adoption of practices, training, market access, planting material, research and dissemination, financial services, and/or facilitation of access to services for small farmers)

Below we summarize the findings for results at the level of support services, adoption, yields and impact across countries for coffee (***Table 65***) and cacao (**Table 66**).

Coffee

Table 65. Achievement of project results in coffee

	Income	Yields	Adoption	Technical assistance	Market access	Research	Genetic material	Financial services	National platforms
El Salvador	+	Neutral	+	👥	👤 ?	?	👤	👤 ?	👤
Guatemala	+	Neutral	++	👥	👤	👤	👤	👤	👤
Honduras	+	Neutral	+	👤	👤 ?	👥	👤	👥	👤 ?
Peru	++	Neutral	++	👤	✕	👥	👤	👤	👥



+++ (Very strong positive): Consistent and large positive effects, supported by both econometric analysis and strong descriptive trends.
++ (Strong positive): Statistically significant positive effects, with more limited descriptive support.
+ (Positive): Only positive descriptive trends observed, without statistical significance.
Neutral: Neutral or ambiguous results, with no clear evidence of a positive or negative effect.

Adoption, yields and income:

- In all countries we observe positive descriptive changes in adoption of improved coffee management practices (with strongest positive effects in Guatemala and Peru), and benefits for farmers in terms of income (with strongest positive effects in Peru). We were unable to confirm positive effects on yields.
- Across all countries, income gains are influenced by a combination of MOCCA interventions (notably support for adoption of promoted practices and improved market linkages) and the global coffee price spike in 2024, which increased sales revenue regardless of yield changes. Interestingly, the strongest income effect, in Peru, is associated with confirmed changes in market access not attributable to MOCCA.
- Adoption of MOCCA-promoted practices is consistently positive, with the strongest alignment of econometric and descriptive evidence in Guatemala and Peru. In these two countries, the market system evaluation highlights MOCCA's contributions to changes across all targeted support services, establishing and strengthening relationships with key market system actors. In Guatemala, positive effects for adoption and income are associated with confirmed changes for all support services except research where changes were initiated but not yet confirmed. These improvements in service delivery have likely contributed to higher adoption rates.

- Yields show the weakest performance, with neutral or negative results in most cases, suggesting that agronomic gains from applied practices require longer timeframes. Moreover, external factors, such as extreme climate events, pest and disease incidence, and broader market dynamics, also influenced production outcomes during the evaluation period, making it difficult to attribute yield changes solely to MOCCA interventions.

Market system changes:

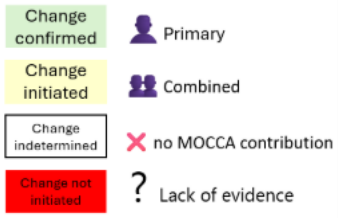
- We were able to confirm changes at the market system level (in the behavior of market system actors) in line with MOCCA's ToC, to improve key support services for small coffee farmers across all countries and services.
- In most cases, we were able to confirm immediate and intermediate outcomes across countries and support services. In some cases, notably research and national platforms, we were only able to confirm immediate outcomes. In one case, market access in Peru, we confirmed outcomes but not a clear contribution from MOCCA. In Honduras we had insufficient evidence to confirm changes in sectoral coordination.
- Across MOCCA activities, TA, market access, genetic material and financial services are showing the most advanced outcomes.
- Genetic material is the activity where MOCCA has been the most recognized as primary contributor to those outcomes.
- Guatemala and Honduras are the countries where outcomes have been confirmed for at least five of the six MOCCA activities, while for El Salvador, followed by Peru, we confirmed outcomes for four and three activities respectively. For El Salvador, outcomes were confirmed for TA, market access, genetic material and financial services. However, the level of evidence is weak for changes in market access and financial services.
- In Guatemala, changes were confirmed for all MOCCA activities except research.
- In Honduras, changes were confirmed for all activities . Evidence is weak for changes in market access and national platform.
- In Peru, changes with contributions from MOCCA were confirmed for TA, genetic material and financial resources only.

Overall, for coffee, MOCCA has achieved behavior changes in key market system actors in all countries and support services, with few exceptions, in line with MOCCA's ToC. These changes appear to be contributing to the observed changes in the behavior of small coffee farmers in terms of adoption of improved agronomic practices. Adoption of improved practices in turn appears to be contributing to observed increases in income (benefits for small farmers) also observed for all countries. The fact that we do not observe positive changes in yields suggests that agronomic practices may not yet be generating returns to productivity (practices take time). Increases in income without increases in yields suggest that prices have likely improved, as a result of MOCCA-supported changes in the market system or as a result of global price trends which have been favorable for coffee in recent years and MOCCA farmers have been able to capture them.

Cacao

Table 66. Achievement of project results in cacao

Country	Income	Yields	Adoption	Technical assistance	Market access	Research	Genetic material	Financial services	National platforms
Ecuador	Neutral	Neutral	+	👥	👤	👥	👤	👤	👤
El Salvador	Neutral	Neutral	+	👥	👥	👥	👤	👤 ?	👥
Guatemala	Neutral	Neutral	+	👥	👥	👤	👥	X	👤
Honduras	Neutral	Neutral	+	👥	👥	?	👥	X	👤
Peru	Neutral	Neutral	++	👤	👤	?	👤	👤	👤



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++ (Strong positive): Statistically significant positive effects, with more limited descriptive support.
+ (Positive): Only positive descriptive trends observed, without statistical significance.
Neutral: Neutral or ambiguous results, with no clear evidence of a positive or negative effect.

Adoption, yields and income:

- In all countries we observe positive descriptive changes in adoption of improved cacao management practices, with stronger positive effects in Peru. Benefits for farmers in terms of yields or income were not observed in any of the countries for cacao.
- Across all countries, adoption shows positive descriptive trends, with stronger evidence in Peru. In parts of Central America, certain practices were less prioritized in training, limiting their uptake. In Peru, the market-systems evaluation highlights MOCCA's contributions to changes across all targeted support services except research, establishing and strengthening relationships with key market system actors. These improvements in service delivery, where MOCCA is identified as primary contributor, have likely contributed to higher adoption rates.
- Across all countries, income effects are neutral, with observed variations driven primarily by external market conditions, such as international price fluctuations, rather than direct project impacts.
- Yields are also neutral across the board, indicating that significant productivity gains may require longer implementation horizons, more intensive technical assistance, and targeted measures to address climate variability, pest and disease pressure, and constraints in access to quality inputs.

Market system changes:

- We were able to confirm changes at the market system level (in the behavior of market system actors) in line with MOCCA's ToC, to improve key support services for small cacao farmers across all countries and services, with some gaps in research and financial services.
- In most cases, we were able to confirm immediate and intermediate outcomes across countries and support services. In some cases, notably research in Honduras and Peru and financial services in Guatemala and Honduras, we were unable to confirm changes.
- Across MOCCA activities, TA, genetic material and national platforms are showing the most advanced outcomes. Market access shows advanced outcomes in four countries, and initial (but not advanced) outcomes in Honduras. Financial services only show outcomes in Ecuador and Peru. Research only in Ecuador and Guatemala.
- National platforms is where MOCCA has been most recognized as primary contributor. Where changes are observed in financial services, MOCCA is recognized as primary contributor. In TA, outcomes were always combined with other actors, except in Peru.
- In Ecuador, outcomes are confirmed for all MOCCA activities. In Guatemala and Peru outcomes were documented for five of the six activities. In El Salvador, outcomes are confirmed for four activities and initiated for the other two. Honduras only shows outcomes for TA, genetic material and national platforms.
- Regarding financial services, change was indeterminate in Guatemala and Honduras and just initiated in El Salvador. Changes were most advanced in Ecuador and Peru with the primary contribution of MOCCA.

Overall, for cacao, MOCCA has achieved behavior changes in key market system actors in all countries and support services, with a few exceptions noted above, in line with MOCCA's ToC. These changes appear to be contributing to the observed changes in the behavior of small coffee farmers in terms of adoption of improved agronomic practices. However, we do not observe the expected increases in yields and income (benefits for small farmers) posited by MOCCAs ToC in any of the countries. The fact that we do not observe positive changes in yields suggests that agronomic practices may not yet be generating returns to productivity (practices take time) nor income.

6.3 Sustainability

Sustainability: The extent to which the net benefits of the intervention continue or are likely to continue

How likely are the changes to which MOCCA contributed to be sustained over time?

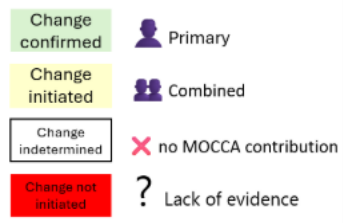
While there is strong evidence for changes introduced by MOCCA with a broad network of stakeholders across different countries and sectors, whether or not those changes are likely to continue is a different question that considers not only the changes made, but the evidence that those changes will continue without MOCCA's support. This depends on things like capacity built within individuals and institutions, incentives created to support continued modified behavior, and the availability of minimal resources required to continue with provision of services to small farmers. While some MOCCA activities were

focused on supporting and building capacity of market system actors, MOCCA directly or indirectly provided resources, financial, technical and logistical, to make things happen. For example, MOCCA in many cases hired TA providers directly to expand provision of TA to farmers; MOCCA funded the research fund used to fund coffee research projects; and MOCCA funded extra staff and support to financial institutions to be able to engage with farmers. All of these behaviors require resources to continue. For many partners and activities, partners continue to depend on external financial support. Below we show and discuss the level of evidence for sustainability of MOCCA introduced changes across activities, countries and sectors (***Table 6767, Table 68***).

Coffee

Table 67. Evidence for sustainability of project results in coffee

Country	Income	Yields	Adoption	Technical assistance	Market access	Research	Genetic material	Financial services	National platforms
El Salvador	Neutral	Neutral	+	WEAK	MODERATELY WEAK	NA	**STRONG**	MODERATELY STRONG	MODERATELY STRONG
Guatemala	Neutral	Neutral	+	MODERATELY STRONG	MODERATELY STRONG	MODERATELY STRONG	MODERATELY STRONG	MODERATELY WEAK	**STRONG**
Honduras	Neutral	Neutral	+	**STRONG**	MODERATELY STRONG	MODERATELY WEAK	MODERATELY STRONG	MODERATELY STRONG	WEAK
Peru	Neutral	+	+	MODERATELY STRONG	NA	MODERATELY WEAK	MODERATELY STRONG	MODERATELY STRON	MODERATELY STRONG



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++ (Strong positive): Statistically significant positive effects, with more limited descriptive support.
+ (Positive): Only positive descriptive trends observed, without statistical significance.
Neutral: Neutral or ambiguous results, with no clear evidence of a positive or negative effect.
NA= not applicable. El Salvador change in Research was indeterminate. Peru no contribution from MOCCA in market access.

Adoption, yields and income:

- All countries experienced income increases during the evaluation period, but these were significantly influenced by the global coffee price spike. While market linkages promoted by MOCCA may have improved farmers' ability to benefit from higher prices, such gains are not

inherently sustainable; they could erode quickly if prices normalize or decline. Sustaining income growth in the absence of favorable market conditions will require continued improvements in productivity, quality, and bargaining power.

- The neutral yield results highlight a common dynamic in agricultural projects: agronomic gains often take longer to materialize than market or behavioral changes. Even with adoption in place, yields can be constrained by climatic shocks, disease outbreaks, and inconsistent access to inputs or credit. Without continuous support, yield improvements will depend heavily on local capacity and resilience mechanisms, such as integrated pest management and climate-adaptive practices.
- Countries with stronger connections to technical assistance (TA) networks, especially where MOCCA helped institutionalize these relationships (e.g., Peru) , are better positioned to sustain and even expand adoption without ongoing project funding.

Market system changes:

- Evidence for the sustainability of behavior changes in market system actors is strongest for changes in genetic material, technical assistance, and national platforms.
- In Guatemala there is evidence for sustainability of changes across all activities, though evidence for sustainability of changes was weak for TA and financial services. Peru shows strong evidence for sustainability of changes in all activities but market access, with only weak evidence for research. Honduras shows strong evidence for sustainability of changes in most areas, with evidence for sustainability in research and national platforms weak. In El Salvador evidence is strong for sustainability of changes in genetic material, financial services and national platforms, while evidence for sustainability of changes in market access and technical assistance are weak.

Cacao

Table 68. Evidence for sustainability of project results in cacao

Country	Income	Yields	Adoption	Technical assistance	Market access	Research	Genetic material	Financial services	National platforms
Ecuador	Neutral	Neutral	+	**STRONG**	MODERATELY STRONG	MODERATELY STRONG	MODERATELY STRONG	WEAK	MODERATELY STRONG
El Salvador	Neutral	Neutral	+	WEAK	WEAK	WEAK	MODERATELY WEAK	WEAK	MODERATELY WEAK
Guatemala	Neutral	Neutral	+	**STRONG**	MODERATELY WEAK	MODERATELY WEAK	MODERATELY STRONG	NA	MODERATELY WEAK
Honduras	Neutral	Neutral	+	MODERATELY STRONG	WEAK	NA	MODERATELY STRONG	NA	MODERATELY STRONG
Peru	Neutral	Neutral	++	MODERATELY STRONG	MODERATELY STRONG	NA	MODERATELY STRONG	MODERATELY STRONG	MODERATELY STRONG

Change confirmed — Primary
Change initiated — Combined
Change indetermined — ✕ no MOCCA contribution
Change not initiated — ? Lack of evidence

+++ (Very strong positive): Consistent and large positive effects, supported by both econometric analysis and strong descriptive trends.
++ (Strong positive): Statistically significant positive effects, with more limited descriptive support.
+ (Positive): Only positive descriptive trends observed, without statistical significance.
Neutral: Neutral or ambiguous results, with no clear evidence of a positive or negative effect.
NA= not applicable. Honduras and Peru Research we lacked evidence to determine changes. Guatemala and Honduras financial services there was no MOCCA contribution.

Adoption, yields and income:

- Evidence for sustainability of yields and income is neutral across all countries. While price fluctuations explain part of the variation in income, the absence of yield gains suggests that MOCCA's income effects in cacao were limited during the project period. Key promoted practices, such as renovation and rehabilitation, typically require multi-year horizons to generate measurable productivity and quality improvements, meaning that the project's duration was insufficient for these changes to translate into higher, sustainable incomes. Without longer-term follow-up, the observed income increase cannot be directly attributed to MOCCA interventions.
- Neutral results for yields suggest that productivity improvements in cacao require longer timelines and more specialized interventions. Climatic variability, pest and disease incidence, and limited access to quality inputs remain binding constraints.
- Evidence for sustainability in the adoption of practices is positive across all countries, strongest in Peru. Strengthened links to technical assistance providers have helped improve service delivery and uptake of promoted practices. However, in some Central American countries, lower prioritization of certain practices in training has limited their diffusion. Sustained adoption could, in the medium term, contribute to yield improvements if paired with consistent support. If, however, yield gains do not materialize, this may create disincentives for pactice adoption over time, challenging the sustainability of gains in practice adoption.

Market system changes:

- Evidence for the sustainability of behavior changes in market system actors is strongest for changes in technical assistance, genetic material and national platforms. Evidence is weakest for sustainability of financial services, research and market access, in that order.
- In Ecuador and Peru, also the countries with the largest and most developed cacao sectors, evidence for sustainability is present for five out of six MOCCA activities. For El Salvador, evidence is weak across four out of six activities and in Honduras evidence is weak or change not initiated in three out of six activities.

Comparing cacao and coffee sectors:

- Looking across both sectors, TA, genetic material and national platforms seem to be the most likely areas for changes to be sustained over time.
- Changes achieved and potential for sustainability of changes in provision of financial services for small farmers are greater in coffee than in cacao and is associated with a stronger initial market system supporting financial services in coffee than in cacao.

- Guatemala and Peru across both sectors, along with Ecuador in cacao and Honduras for coffee, seem to be the countries with greatest number of activities where changes are likely to be sustained. El Salvador and Honduras in cacao are the countries with most activities with lower likelihood for sustaining change.
- Assuming support services are maintained, small farmers should continue to have a support ecosystem for adoption of agronomic best practices in coffee and cacao. However, if adoption does not translate into yield or income gains, incentives or resources needed by farmers to continue applying practices will not create the positive feedback loops (virtuous circle) in support of practice adoption envisioned in MOCCA's ToC. We only see slightly positive evidence for effects on yields for coffee in Peru.

7 Conclusions and Recommendations

7.1 Conclusions

1. Overall, despite the complexity of MOCCA's design and the challenging operating environment, including the COVID-19 pandemic, hurricanes in Central America, rising fertilizer costs, and other market and climate shocks, the project has made important contributions toward its objectives in both coffee and cacao, being able to adapt its implementation, in some cases, to address such challenges.

2. In line with MOCCA's market systems design, this evaluation sought to assess MOCCA's impacts at the level of the distinct market systems (coffee and cacao across the six target countries) MOCCA sought to engage, to assess changes in behavior of key market system actors towards system level change, as well as MOCCA's impacts in target beneficiaries, small cacao and coffee farmers. This endeavor included consolidating large volumes of primary information from more than 250 individuals representing more than 100 different market system actors and between 3189 (at endline) and 3349 (at baseline)- small coffee and cacao farmers across six countries, as well as secondary information from MOCCA documentation. While it would be impossible to capture all of MOCCA's contributions across such a diversity of contexts and partnerships, we amassed enough evidence to assess the projects' contributions vis a vis their ToC.

3. On average, MOCCA met or exceeded project targets in all areas except market access. MOCCA excelled at reaching small farmers with technical assistance, exceeding training targets by over 25% and in the volume of financing accessed by farmers, where targets were also exceeded by more than 50%. For market access, while MOCCA exceeded targets for number of farmers accessing improved markets, the targets for volume were not met, achieving between 80% and 83% of targets. The target for value of commodities sold was 95% for coffee and 115% for cacao; while the target for leverage of new investments is expected to be achieved soon after the project ends as two private sector commitments are in the process to be leveraged for coffee but will not be spent during the project lifetime.

4. MOCCA engaged with a broad network of diverse partners in each country and sector, ranging from farmer organizations and nursery owners to transnational exporters and processors, specialty chocolatiers, government ministries, banks and universities. Through strong partnerships and multi-stakeholder collaboration, and attention to the particularities of each country and sectoral context, MOCCA was able to introduce a broad range of changes in the provision and quality of six key support services for small farmers – technical assistance, market access, research, genetic material, finance and sector coordination. The evaluation team was able to confirm outcome trajectories for multiple changes in each context. For coffee, strongest changes were in TA, market access, genetic material and financial services, and in Honduras and Guatemala. For cacao, strongest changes were observed in TA, genetic material, national platforms and market access, and in Ecuador, Guatemala and Peru.

5. For many of the changes, we have already observed evidence of autonomous action by market system actors to continue, adapt or expand changes introduced by MOCCA. For coffee the evidence for sustainability is stronger in genetic material, national platforms, and financial services, as well as Guatemala and Peru. For cacao evidence for sustainability is strongest for TA, Genetic material and national platforms, as well as Ecuador and Peru.

6. Market system actors themselves rated MOCCA as highly relevant, especially coffee partners in Honduras and cacao partners in Peru. Informants from all countries and sectors highlighted the effectiveness of MOCCA emphasizing the proximity to farmers and the facilitation of new partnerships.

7. Across both value chains, MOCCA successfully engaged a broad network of market system actors in technical assistance, market access, research, and genetic material supply. However, the uptake of financial services remains low, limiting producers' ability to invest in productivity-enhancing activities. While market linkages and institutional capacities have improved, providing a foundation for long-term sustainability, many partners still depend on external resources. Ensuring the continuity of these gains will require targeted incentives, increased local investment, and follow-on support beyond the project's lifecycle.

8. The results for farmers in coffee were stronger than in cacao, particularly in the adoption of MOCCA-promoted practices and in activities related to financial services and research. Guatemala and Peru registered the highest increases in adoption. In coffee, the highest number of trainings was delivered in Guatemala, El Salvador, and Honduras; however, producers in Peru and Guatemala rated these trainings as most useful for improving their practices.

9. Increases in adoption were notable across several countries; however, these have not yet translated into significant yield gains, highlighting the need for continued and sustained agronomic support. That said, annual survey data and the midline evaluation, based on a subsample and descriptive t-tests, suggested productivity increases relative to the baseline. These findings, while indicative, are less robust than the econometric analysis conducted with the full sample at baseline and endline. Moreover, the El Niño and La Niña climate phenomena in the final evaluation year affected yields for both coffee and cacao, masking potential gains from the interventions. Despite this, secondary data from ENVERITAS suggest that farmers without technical assistance may have experienced a larger drop in their yields compared to MOCCA beneficiaries, as our results show that beneficiaries' yields have not statistically decreased over time (except for Guatemala). Income levels rose across all coffee-producing countries, but these gains were driven primarily by favorable global coffee prices rather than productivity improvements.

10. For cacao, income and yields show largely neutral effects across countries, suggesting that productivity and revenue gains may require longer implementation horizons, more targeted technical assistance, and improved access to inputs. While no statistically significant effects were observed in the quantity of adoption for most countries, adoption trends are positive, with the strongest results in Peru, likely linked to receiving a higher-than-average number of training sessions compared to all other countries. Although incomes in cacao-producing countries increased, these gains are primarily attributable to temporal market effects rather than direct project impact.

11. The benefits of market participation for small coffee and cacao farmers will continue to be influenced by climatic events, moments of political instability and international price variations, all well beyond the control of the coffee or cacao market system in any single country. The changes promoted by MOCCA to more directly link small farmers, their organizations and exporters, as well as the strengthening of platforms for multi-stakeholder action to address challenges of the sector at the sub-national and national levels, including strengthening the representation of the interests of small farmers in these spaces will contribute to a future where these challenges can be faced in a more collaborative and inclusive way.
12. The inclusion of different dimensions (market, TA, financial services, genetic material, research, national platforms) and actors (NCIs, farmers organization, researchers, exporters) was a very ambitious, innovative and holistic approach to foster changes in small farmers lives. Doing so successfully in two different commodities across six different country contexts reveals a level of sophistication, flexibility and adaptive capacity in MOCCA's operational, technical and engagement strategies that is to be commended.

7.2 Recommendations for future market system interventions:

For future evaluations

- Reduce the risk of bias from sample attrition in future evaluations by improving systems under the project's control, such as maintaining standardized producer contact information, ensuring accurate geolocation records, and strengthening coordination between monitoring and survey teams, to facilitate re-contact and follow-up.
- Strengthen the alignment between monitoring systems and evaluation surveys so that the most recent harvest data is consistently integrated into outcome measurement.
- Engaging at market system level requires flexibility to adapt to emerging contextual changes and opportunities for supporting changes, but it also requires an monitoring and evaluation component that rigorously tracks partnerships and potential outcomes in terms of partner behavior change. One key challenge for evaluating MOCCA at both midline and endline was identifying clearly who MOCCA partners were, and how they had been engaged by the project.

For implementers

- To more strongly support adoption and productivity improvements, complement technical assistance with follow-up visits, facilitated access to inputs, and market-based incentive mechanisms.
- Developing strategies to maintain income stability in the face of fluctuations in international prices, while maybe impossible, is likely a strategy that will also provide stability and efficiency for coffee and cacao production, particularly farmers.
- Technical assistance activities were highly valued by market system actors for the proximity it offered to farmers and the opportunity to build trust and loyalty, important assets for successful

long-term commercial partnerships. In particular, in the context of MOCCA, it brought together farmers and their organizations, farmers and exporters, farmers and public institutions, and even farmers and financial institutions.

- Working with large and small nurseries requires different approaches as they operate, effectively, within two overlapping yet distinct market systems in terms of clients, providers, regulations and business models. Regulation is critical to providing mechanisms that differentiate (genetic) quality that is not visible to the eye. This is true of almost anything that cannot be simply differentiated visually.
- Financial services for small farmers are not only about changing financial institutions and the services they offer. It is equally, if not more, about a shift in how farmers manage their businesses in terms of financial planning and investment, and the role credit plays (or not), as well as understanding the real costs and risks for farmers. Without strong financial education and awareness-raising activities the adaptation of financial services to target small farmers will not lead to their adoption.
- Training and hiring community members from producing communities as TA providers is not only a cost-effective way to serve remote communities, it also helps bridge cultural gaps and builds capacity and knowledge within communities. For some, the opportunity has evolved into an income stream associated with provision of technical assistance to other farmers or projects, generating new ways to integrate youth into the sector.
- Farmer organizations continue to be valuable partners for market system interventions as a bridge to farmers as well as for the roles they play in support services, but especially in commercialization. Yet farmer organizations are not as well-resourced as their competing buyers, especially when prices are high. The best plans can fall apart when farmer organizations, for lack of cashflow, are unable to buy sufficient volume from their members to ensure processing, shipping, certification and many other services are cost efficient.
- Future projects should include a strong component to support farmers in addressing climate shocks.

For implementers in coffee

- Guatemala & Peru: Consolidate and build on high adoption rates, supporting the translation of adoption into yield improvements through targeted technical assistance and access to critical inputs.
- Honduras & El Salvador: Sustain adoption gains and address yield gaps with specialized agronomic training and tailored post-training support.

For implementers in cacao

- Peru: Leverage the high volume of training delivery to consolidate adoption gains and expand them to practices with the greatest potential for yield and quality improvements.
- Central America: Prioritize renovation, rehabilitation, and shade management practices in training content and facilitate access to inputs for effective implementation.

- Using quality and flavor to differentiate products is a powerful strategy to improve market access. Using a standards-based approach to quality assessment is critical to democratizing who determines quality. While MOCCA demonstrated the huge potential for small farmers and their organizations to produce high quality, differentiated cacao flavors, the demand for this capacity still needs to be developed. MOCCA has definitely contributed to proof of concept in this regard, but many partners are not yet commercializing their differentiated cacaos due to lack of demand from buyers and/or volumes to meet demand.

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9 Appendices

9.1 Appendix 1: Annex tables for farmer level evaluation

Table A 1. Differences in baseline characteristics between panel and attriter farmers

Country	Characteristics of producers at baseline	Coffee					Cacao				
		Attriter farmers	N attriters	Panel farmers	N panel	p-value	Attriter farmers	N attriters	Panel farmers	N panel	p-value
Ecuador	**Impact variables**										
	Yields (kg/ha)						384.64	199	248.98	26	0.000***
	Quantity of coffee/cacao sold (kg)						977.01	199	379.09	26	0.000***
	Income from coffee/cacao sales (US$)						2,710.16	197	1,834.31	26	0.167
	Sociodemographic variables										
	Age of respondent (years)						56.42	199	60	26	0.237
	Female-headed household (% yes)						0.25	199	0.19	26	0.528
	Farm characteristics										
	Coffee/cacao area (ha)						3.32	197	2.1	26	0.024**
	Farm has certifications (% yes)						0.75	201	0.92	26	0.008***
	Average tree age (years)	Not applicable					7.74	199	7.92	26	0.913
	Adoption of practices										
	Did renovation (% yes)						0.15	201	0.08	26	0.228
	Did pruning (% yes)						0.66	201	0.65	26	0.977
	Applied fertilizer to coffee based on visual characteristics of the plant or using soil analysis (% yes)						n.a.	n.a.	n.a.	n.a.	n.a.
	Applied fertilizer to cacao using soil analyses or based on nutrient balance of expected harvest (% yes)						0	201	0	26	.
	Implemented any pest and disease monitoring system (% yes)						0.78	201	0.85	26	0.409
El Salvador	**Impact variables**										
	Yields (kg/ha)	477.35	220	335.45	83	0.11	37.84	65	28.89	38	0.542
	Quantity of coffee/cacao sold (kg)	483.69	229	256.72	87	0.005***	42.07	65	10	38	0.012**
	Income from coffee/cacao sales (US$)	1,118.01	229	716.42	87	0.144	110.28	65	21.13	38	0.004***
	Sociodemographic variables										
	Age of respondent (years)	52.26	220	51.85	85	0.831	55.29	65	53.26	38	0.478
	Female-headed household (% yes)	0.33	229	0.44	87	0.079*	0.26	65	0.26	38	0.986
	Farm characteristics										
	Coffee/cacao area (ha)	1.59	220	1.34	83	0.505	1.1	65	1.2	38	0.711

	Farm has certifications (% yes)	0.01	229	0.02	87	0.412	0	65	0	38	.
	Average tree age (years)	6.71	220	5.65	81	0.051*	0.27	58	0.48	33	0.159
	Adoption of practices										
	Did renovation (% yes)	0.14	229	0.06	87	0.022**	0.08	65	0.18	38	0.141
	Did pruning (% yes)	0.47	229	0.37	87	0.109	0.8	65	0.87	38	0.363
	Applied fertilizer to coffee based on visual characteristics of the plant or using soil analysis (% yes)	0.08	208	0.08	77	0.978	n.a.	n.a.	n.a.	n.a.	n.a.
	Applied fertilizer to cacao using soil analyses or based on nutrient balance of expected harvest (% yes)	n.a.	n.a.	n.a.	n.a.	n.a.	0	65	0	38	.
	Implemented any pest and disease monitoring system (% yes)	0.96	172	0.93	74	0.418	0.35	65	0.58	38	0.029**
Guatemala	**Impact variables**										
	Yields (kg/ha)	1,119.39	257	673.76	182	0.000***	272.66	21	316.45	52	0.504
	Quantity of coffee/cacao sold (kg)	994.68	265	840.43	186	0.386	194.62	21	359.6	52	0.065
	Income from coffee/cacao sales (US$)	2,921.92	265	2,412.87	186	0.364	342.37	21	566.14	52	0.243
	Sociodemographic variables										
	Age of respondent (years)	49.73	260	46.58	184	0.029**	52.19	21	48.02	52	0.311
	Female-headed household (% yes)	0.22	262	0.32	184	0.029**	0.29	21	0.29	52	0.982
	Farm characteristics										
	Coffee/cacao area (ha)	1.07	265	1.14	186	0.637	1.24	21	1.23	52	0.971
	Farm has certifications (% yes)	0.04	265	0.04	186	0.996	0.67	21	0.77	52	0.402
	Average tree age (years)	8.65	253	8.23	170	0.404	1	21	1.73	52	0.143
	Adoption of practices										
	Did renovation (% yes)	0.17	265	0.16	186	0.694	0.1	21	0.15	52	0.483
	Did pruning (% yes)	0.58	265	0.52	186	0.15	0.9	21	0.96	52	0.431
	Applied fertilizer to coffee based on visual characteristics of the plant or using soil analysis (% yes)	0.15	247	0.12	163	0.501	n.a.	n.a.	n.a.	n.a.	n.a.
	Applied fertilizer to cacao using soil analyses or based on nutrient balance of expected harvest (% yes)	n.a.	n.a.	n.a.	n.a.	n.a.	0	21	0	52	.
	Implemented any pest and disease monitoring system (% yes)	0.47	245	0.42	164	0.375	0.9	21	0.87	52	0.63
Honduras	**Impact variables**										
	Yields (kg/ha)	891.05	208	882.35	210	0.905	166.2	46	180.1	40	0.71
	Quantity of coffee/cacao sold (kg)	1,899.79	208	2,130.17	214	0.512	234.79	46	266.37	41	0.719

	Income from coffee/cacao sales (US$)	6,061.1	208	6,810.45	214	0.498	545.98	46	487.65	41	0.788
	Sociodemographic variables										
	Age of respondent (years)	45.06	208	46.95	213	0.153	50.54	46	48.51	41	0.528
	Female-headed household (% yes)	0.21	208	0.27	214	0.15	0.22	46	0.34	41	0.204
	Farm characteristics										
	Coffee/cacao area (ha)	2.37	208	2.65	210	0.426	1.33	46	1.84	41	0.083*
	Farm has certifications (% yes)	0.31	208	0.38	214	0.155	0.59	46	0.73	41	0.157
	Average tree age (years)	6.63	207	7.22	211	0.082*	1.54	46	4.25	41	0.008***
	Adoption of practices										
	Did renovation (% yes)	0.16	208	0.14	214	0.422	0.17	46	0.27	41	0.298
	Did pruning (% yes)	0.59	208	0.61	214	0.592	1	46	1	41	.
	Applied fertilizer to coffee based on visual characteristics of the plant or using soil analysis (% yes)	0.31	199	0.49	197	0.000***	n.a.	n.a.	n.a.	n.a.	n.a.
	Applied fertilizer to cacao using soil analyses or based on nutrient balance of expected harvest (% yes)	n.a.	n.a.	n.a.	n.a.	n.a.	0	46	0	41	.
	Implemented any pest and disease monitoring system (% yes)	0.26	185	0.59	196	0.000***	0.78	46	0.9	41	0.125
Peru	**Impact variables**										
	Yields (kg/ha)	721.3	335	717.84	342	0.924	492.29	206	425.63	222	0.062*
	Quantity of coffee/cacao sold (kg)	1,739.55	335	1,745.28	342	0.96	1,099.64	206	831.54	220	0.021**
	Income from coffee/cacao sales (US$)	5,891.52	335	5,643.44	342	0.693	1,939.85	204	1,585.05	221	0.087*
	Sociodemographic variables										
	Age of respondent (years)	46.58	335	44.81	342	0.091*	45.44	204	49.93	223	0.001***
	Female-headed household (% yes)	0.21	335	0.27	342	0.0998	0.33	206	0.24	223	0.026**
	Farm characteristics										
	Coffee/cacao area (ha)	2.54	335	2.58	342	0.744	2.25	206	2.02	223	0.147
	Farm has certifications (% yes)	0.84	335	0.84	342	0.929	0.21	206	0.35	223	0.001***
	Average tree age (years)	5.74	315	5.59	318	0.493	2.06	206	4.35	223	0.000***
	Adoption of practices										
	Did renovation (% yes)	0.27	335	0.3	342	0.394	0.13	206	0.29	223	0.000***
	Did pruning (% yes)	0.73	335	0.75	342	0.611	0.89	206	0.89	223	0.894
	Applied fertilizer to coffee based on visual characteristics of the plant or using soil analysis (% yes)	0.21	237	0.26	254	0.165	n.a.	n.a.	n.a.	n.a.	n.a.

Applied fertilizer to cacao using soil analyses or based on nutrient balance of expected harvest (% yes)	n.a.	n.a.	n.a.	n.a.	n.a.	0	206	0	223	.
Implemented any pest and disease monitoring system (% yes)	0.61	313	0.64	332	0.326	0.98	206	0.98	223	0.65

Table A 2. Reasons for baseline sample attrition

Reason for attrition	Ecuador	El Salvador	Guatemala	Honduras	Peru
Coffee producers					
Reason 1 (# farmers)		Voluntarily withdrew from MOCCA (109)	Fraud in intervention region (63)	Not interested (59)	Withdrew from the cooperative (53)
Reason 2 (# farmers)		Was expecting financial aid from MOCCA (29)	Did not want to continue sharing information (40)	No trainings received (45)	Intervention region withdrawn from MOCCA (52)
Reason 3 (# farmers)	n.a.	Migrated (29)	Not located (24)	Intervention region withdrawn from MOCCA (30)	Withdrew from the anchor firm (42)
Reason 4 (# farmers)		Sold farm (7)	Migrated (12)	Migrated (19)	No trainings received (20)
Any other reason		Other reasons (13)	Other reasons (41)	Other reasons (23)	Other reasons (16)
Total # farmers		**187**	**180**	**176**	**183**
Cacao producers					
Reason 1 (# farmers)	Withdrew from the cooperative (64)	Did not wish to participate in MOCCA (18)	Withdrew from the organization (9)	Lost the farm to hurricane (11)	Stopped producing cacao (87)
Reason 2 (# farmers)	No details (28)	Not located (17)	Did not participate in MOCCA (1)	Migrated (10)	Withdrew from the cooperative (29)
Reason 3 (# farmers)	Anecacao withdrew from the region (20)	Died (1)	n.a.	Do not have the farm anymore (8)	Migrated (10)
Reason 4 (# farmers)	Did not wish to participate in MOCCA (14)	Lost the farm (1)	n.a.	Voluntarily withdrew from MOCCA (5)	Sold farm (8)
Any other reason	Other reasons (9)	Other reasons (1)	n.a.	Other reasons (4)	Other reasons (9)
Total # farmers	**135**	**38**	**10**	**38**	**143**

Reasons estimated for baseline surveyed households, prior to implement endline survey. During endline survey implementation, additional households were replaced, and the reasons for this are not included in this table.

Table A 3. Coffee: MOCCA-promoted practices and definition of adopter farmer

Type	Practice detail	Definition of adoption
Nurseries	Seed selection -Applies ONLY for farmers that have nurseries	Selects seed from outstanding, highly productive plants, or purchases genetic material from a certified/verified nursery
	Substrate mix for the establishment of seed germinators -Applies ONLY for farmers that have nurseries	Substrate mix has at least 30% to 50% sand
	Substrate mix disinfection -Applies ONLY for farmers that have nurseries	Disinfects substrate mix (with any method, e.g. solarization, boiling water)
	Plant selection for transplant (renovation or replacement) -Applies ONLY for farmers that have nurseries	Chooses plants for transplant that are free of pests and diseases, and chooses vigorous/robust plants
Renovation and Rehabilitation	Does renovation	Renovates: planted new trees
	Does rehabilitation	Rehabilitates: implements recepa, and/or '*poda esqueleto*' (type of pruning)
	Implements pruning	Prunning: does at least 1 type of pruning (e.g. *poda esqueletada, sanitaria, recepo, deshije, descope, poda baja*)
Nutrition	Fertilizes based on nutritional deficiencies	Fertilizes using table of visible deficiencies symptoms, or uses soil analysis
	In young non-productive plants: frequency of fertilization	Fertilizes young non-productive plants at least 3 times per year
	In productive plants: frequency of fertilization	Fertilizes productive plants at least 2 times per year
	In young non-productive plants: fertilizer applied at right time	Fertilizes young non-productive plants in june, september and november
	In productive plants: fertilizer applied at right time	Fertilizes productive plants between may-june and july-september
	Place of fertilizer application	Randomly spread fertilizer close to roots (al voleo), or applied under the canopy (copa), or applied in fertilization band (zona de abonamiento)
	Application of MOCCA-recommended nutritional formulas	Applies at least 1 of these MOCCA-recommended formulas: organic fertilizer, compost, diluted fertilization
Pest and disease management	Uses methods to control pests	Uses at least one control method for each pest identified (*control manual, cultural, etológico, biológico y/o químico*)
	Uses methods to control diseases	Uses at least one control method for each disease identified (*control manual, cultural, etológico, biológico y/o químico*)
	Prevents plague prevalence	Implements repela and pepena (under IPM)
Soil conservation	Does soil conservation practices	Does at least one of the following MOCCA-recommended soil conservation practices: established covers - grass, legumes; or covers between furrows with organic matter
Weed control	Implements cost-saving practices to control weeds	Does at least one of the following cost-saving weed control practices: use of *guadañas*, or ecoweed and/or covers between furrows with organic matter
Shade management	Existing coffee shade system	Coffee has 25% shade, or have planted shade trees recently (2 years ago)
	Coffee shade management	Does shade pruning
Harvest	Coffee harvest practices	Does selective harvest according to field sample indicating 75% of ripped berries
	Classification of coffee cherries after harvest	Coffee cherries classified (separated good from low-quality cherries)
Wet milling (post-harvest)	Coffee cherry pulp removal	Removed pulp same day coffee was harvested
	Coffee fermentation	Coffee fermented for <12 hrs
	Coffee beans moisture measurement	Coffee beans dried up to 12% moisture, measured using touch and visual methods

Waste management	Waste water treatment	Treating waste water (other than from wet milling)
	Pulp treatment	Manages (treats) the coffee pulp
	Treatment of waste water from wet milling	Manages (treats) the water from wet milling
Record keeping	Systematically registers costs of production	Uses any tool to register costs (e.g. notebook or folder)

Table A 4. Cacao: MOCCA-promoted practices and definition of adopter farmer

Type	Practice detail	Definition of adoption
Cacao establishment	Renovation	Renovates: planted new trees
	Re-planting cacao/compacting cacao areas	Has 5 or fewer clones per hectare OR renovation done with 80% grafts and 20% from plants coming from seeds
Cacao pruning and management of accompanying trees	Implements Pruning	Does 3 or more of the recommended cacao pruning
	Shade	Cacao field has at least 25% shade, OR shade trees planted within the last 2 year
	Shade pruning	Farmers pruning shade
	Shade pruning	Farmers managing shade based on the farm's location or temperature to guide cacao shade pruning.
Cacao seedlings (nurseries)	Seed selection and/or grafts - Applies only for farmers that have nurseries	Selects seeds or plants/grafts from elite trees/mothers (highly productive, vigorous, disease and pest tolerant trees)
	Substrate mix disinfection Applies only for farmers that have nurseries	Disinfects substrate mix with ash, boiling water or solarization (but not lime)
	Implement grafting techniques - Applies only for farmers that have nurseries	Does lateral bud grafting in the greenhouse (benefits: produces more plants and is easier to expand within the farm)
Nutrition	Fertilizes based on nutritional deficiencies	Does a nutrients balance based on expected harvest (N, P, K) OR uses soil analysis results to determine fertilization needs
	Fertilization frequency	Does at least 2 fertilizer applications (one every 6 months)
	Preparation and application of organic fertilizers (compost, worm-compost, bocashi, others)	Prepares and applies "enmiendas"/organic fertilizers
Pest and disease management	Control of monilia, black pods, witches' broom, pod worm, others	Does at least 1 control method for every pest/disease present
Floor management in cacao plantations	Weeding or weed cutting	Does at least 1 of the following weeding practices: selective weeding, applying herbicides, applying herbicides with ecoweed, incorporating weed residues in cacao rows
	Increase in dead or alive soil cover	Implements at least 1 soil cover crop (legumes, other crops) or dead cover
	Floor management method (live barriers, cover crops, uses herbicides)	Implements at least 1 of these methods to manage the floor: live barriers, cover crops, uses herbicides
	Incorporation of organic matter	Incorporates organic matter in the trees
Cacao harvest	Harvest and pod selection	Pods harvested according to ripeness
	Harvest and pod selection	Diseased, damaged, overripe, and unripe pods were removed
	Harvested cacao grain selection	Selects cacao beans according to color, shape, and size
	Harvested cacao grain selection	The beans or seeds from the harvested pods were extracted within 3 days or less
Cacao commercializatio n	Records for expenses/costs of production and harvest, post-harvest, commercialization and sales	Uses any type of format to register costs and sales

Table A 5. Coffee: changes in farm characteristics

Farm characteristics	El Salvador				Guatemala				Honduras			
	BL	EL	p-value		BL	EL	p-value		BL	EL	p-value	
Total farm area (ha),* and area (ha) under…:	1.89	2.78	0.211		1.37	0.87	0.000	***	2.73	2.39	0.198	
Coffee	1.38	1.64	0.340		1.11	0.8	0.001	***	2.49	2.16	0.107	
Households (%) with…:												
One coffee plot	93.0%	90.0%	0.282		71.0%	72.0%	0.702		62.0%	68.0%	0.062	*
Two coffee plots	7.0%	9.0%	0.575		18.0%	17.0%	0.786		19.0%	22.0%	0.384	
Three or more coffee plots	0.0%	1.0%	0.058	*	12.0%	11.0%	0.907		19.0%	10.0%	0.000	***
Households (%) with at least one plot acquired between 2021-2025	n.a.	6.1%			n.a.	6.6%			n.a.	4.4%		
Farmers (%) doing a production diagnosis of their coffee crop	7.0%	20.0%	0.000	***	31.0%	48.0%	0.000	***	21.0%	17.0%	0.124	
Farmers (%) using any tool to register cost of production and income	11.0%	27.0%	0.000	***	26.0%	32.0%	0.058	*	31.0%	73.0%	0.000	***
Number of households	**256**	**215**			**394**	**377**			**391**	**463**		

Table A 5 continued

Farm characteristics	Peru				All countries			
	BL	EL	p-value		BL	EL	p-value	
Total farm area (ha),* and area (ha) under…:	4.16	3.91	0.484		3.4	3.54	0.498	
Coffee	2.46	2.47	0.876		2.28	2.28	0.999	
Households (%) with…:								
One coffee plot	58.0%	55.0%	0.359		64.0%	68.0%	0.026	**
Two coffee plots	30.0%	34.0%	0.203		22.0%	22.0%	0.897	
Three or more coffee plots	12.0%	11.0%	0.667		13.0%	10.0%	0.002	***
Households (%) with at least one plot acquired between 2021-2025		n.a.			n.a.	6.3%		
Farmers (%) doing a production diagnosis of their coffee crop	31.0%	36.0%	0.075	*	25.0%	31.0%	0.000	***
Farmers (%) using any tool to register cost of production and income	61.0%	81.0%	0.000	***	37.0%	60.0%	0.000	***
Number of households	**619**	**479**			**2002**	**1933**		

*1 ha (hectare) = 10,000 square meters

Notes

BL=baseline; EL=endline

p-value: differences in means between groups are significant at the 10% level (*), 5% level (**) or 1% level (***)

The variables coffee area, farmers doing a production diagnosis and farmers using any tool to register cost have less than 0.4% missing observation in BL

Table A 6. Coffee: changes in key MOCCA indicators, by sex of farmer

	El Salvador							Guatemala						
	Female			Male			DiD	Female			Male			DiD
Key MOCCA indicators	**BL**	**EL**	**p-value**	**BL**	**EL**	**p-value**	**p-value**	**BL**	**EL**	**p-value**	**BL**	**EL**	**p-value**	**p-value**
Yield (sold green kg/ha)	334	476.7	0.026**	400.2	425.7	0.635	0.15	757.6	798.8	0.617	998.6	921	0.217	0.248
Coffee area (ha)*	1	1.6	0.187	1.6	1.6	0.94	0.267	0.7	0.6	0.465	1.3	0.9	0.011**	0.2
Farmers (%) with access to financing for agriculture	0.0%	0.0%	0.33	0.0%	0.0%	0.022**	0.027**	0.0%	0.0%	0.027**	0.0%	10.0%	0.392	0.25
Value of annual coffee sales (US$)	672.5	3380.8	0.000***	1135.9	3292.5	0.000***	0.536	1242.3	3552.8	0.001***	4175.1	6543	0.004***	0.956
Farmers (%) with access to improved markets thru MOCCA's anchor firms	0.0%	0.0%	0.075*	0.0%	10.0%	0.032**	0.576	20.0%	10.0%	0.012**	10.0%	10.0%	0.014**	0.413
Number of households	**90**	**86**		**166**	**129**			**101**	**148**		**293**	**229**		

Table A 6 continued

	Honduras							Peru						
	Female			Male			DiD	Female			Male			DiD
Key MOCCA indicators	**BL**	**EL**	**p-value**	**BL**	**EL**	**p-value**	**p-value**	**BL**	**EL**	**p-value**	**BL**	**EL**	**p-value**	**p-value**
Yield (sold green kg/ha)	763.9	784.7	0.742	832	798.9	0.431	0.484	683.4	715.8	0.475	694.4	700.8	0.812	0.62
Coffee area (ha)*	2.5	1.6	0.014**	2.5	2.4	0.583	0.11	2.3	2.3	0.993	2.5	2.5	0.738	0.849
Farmers (%) with access to financing for agriculture	10.0%	0.0%	0.278	10.0%	10.0%	0.361	0.168	0.0%	10.0%	0.007***	10.0%	20.0%	0.000***	0.748
Value of annual coffee sales (US$)	6952.5	9104.8	0.175	7996.6	12998.4	0.000***	0.145	5708.1	8387.2	0.000***	6689.5	7822.9	0.008***	0.062*
Farmers (%) with access to improved markets thru MOCCA's anchor firms	20.0%	10.0%	0.273	20.0%	10.0%	0.008***	0.784	80.0%	60.0%	0.000***	70.0%	60.0%	0.023**	0.021**
Number of households	**95**	**125**		**296**	**338**			**151**	**147**		**468**	**332**		

Table A 6 continued

	All countries						
	Female			Male			DiD
Key MOCCA indicators	**BL**	**EL**	**p-value**	**BL**	**EL**	**p-value**	**p-value**
Yield (sold green kg/ha)	671	701.7	0.306	781.5	727.6	0.008***	0.020**
Coffee area (ha)*	1.8	1.7	0.221	2.4	2.6	0.314	0.116
Farmers (%) with access to financing for agriculture	10.0%	10.0%	0.008***	10.0%	20.0%	0.000***	0.204
Value of annual coffee sales (US$)	4187.4	6437.7	0.000***	6450.2	10049.2	0.000***	0.066*
Farmers (%) with access to improved markets thru MOCCA's anchor firms	40.0%	20.0%	0.000***	40.0%	20.0%	0.000***	0.551
Number of households	**498**	**614**		**1504**	**1319**		

*1 ha (hectare) = 10,000 square meters

Notes

BL=baseline; EL=endline

p-value: differences in means between groups are significant at the 10% level (*), 5% level (**) or 1% level (***)

DiD: p-value for the difference in the difference, estimated as DiD = (female EL - female BL) - (male EL - male BL)

Table A 7. Coffee: changes in key MOCCA indicators, by age of farmer

	El Salvador							Guatemala						
	15-29 years			>30 years				15-29 years			>30 years			
Key MOCCA indicators	**BL**	**EL**	**p-value**	**BL**	**EL**	**p-value**	**DiD p-value**	**BL**	**EL**	**p-value**	**BL**	**EL**	**p-value**	**DiD p-value**
Yield (sold green kg/ha)	186.7	455.3	0.026**	396.6	445.8	0.255	0.045**	726.8	834.3	0.486	962	876.1	0.104	0.251
Coffee area (ha)*	1.1	1	0.831	1.4	1.7	0.375	0.437	0.8	0.7	0.434	1.1	0.8	0.002***	0.385
Farmers (%) with access to financing for agriculture	0.0%	0.0%	.	0.0%	0.0%	0.141	0.155	0.0%	10.0%	0.039**	0.0%	10.0%	0.334	0.144
Value of annual coffee sales (US$)	1025	1676.5	0.547	967.6	3383.4	0.000***	0.040**	2664.9	3998	0.187	3514.1	5479.1	0.003***	0.612
Number of households	**24**	**7**		**232**	**208**			**38**	**28**		**355**	**349**		

Table A 7 continued

	Honduras							Peru						
	15-29 years			>30 years				15-29 years			>30 years			
Key MOCCA indicators	**BL**	**EL**	**p-value**	**BL**	**EL**	**p-value**	**DiD p-value**	**BL**	**EL**	**p-value**	**BL**	**EL**	**p-value**	**DiD p-value**
Yield (sold green kg/ha)	734.9	887.8	0.182	826	787.2	0.297	0.113	630.6	750.9	0.131	700.2	702.8	0.914	0.182
Coffee area (ha)*	1.8	1.5	0.653	2.6	2.2	0.090*	0.741	1.9	2.5	0.092*	2.5	2.5	0.531	0.157
Farmers (%) with access to financing for agriculture	10.0%	10.0%	0.575	10.0%	10.0%	0.641	0.488	0.0%	20.0%	0.007***	10.0%	20.0%	0.000***	0.307
Value of annual coffee sales (US$)	6194.6	8172	0.447	7944.3	12265.5	0.000***	0.397	4391.1	7719.2	0.000***	6694.7	8011.9	0.001***	0.083*
Number of households	**45**	**36**		**346**	**427**			**65**	**26**		**553**	**453**		

Table A 7 continued

Key MOCCA indicators	All countries						
	15-29 years			>30 years			
	BL	EL	p-value	BL	EL	p-value	DiD p-value
Yield (sold green kg/ha)	677.2	781.4	0.070*	764.5	715.2	0.005***	0.011**
Coffee area (ha)*	1.8	1.8	0.963	2.3	2.3	0.776	0.879
Farmers (%) with access to financing for agriculture	10.0%	10.0%	0.596	10.0%	20.0%	0.000***	0.021**
Value of annual coffee sales (US$)	4595.2	7165.3	0.008***	6053.3	9019	0.000***	0.73
Number of households	**223**	**122**		**1777**	**1811**		

*1 ha (hectare) = 10,000 square meters

Notes

BL=baseline; EL=endline

p-value: differences in means between groups are significant at the 10% level (*), 5% level (**) or 1% level (***)

DiD: p-value for the difference in the difference, estimated as DiD = (female EL - female BL) - (male EL - male BL)

Table A 8. Coffee: number of trainings received during MOCCA, by sex of farmer

MOCCA-trainings	El Salvador				Guatemala				Honduras			
	Total	Female	Male	p-value	Total	Female	Male	p-value	Total	Female	Male	p-value
# of trainings given to farmers (from monitoring data)	10.08	9.66	10.36	0.2554	12.31	12.92	11.92	0.016 **	9.10	9.11	9.09	0.949
Farmers (%) considering the MOCCA trainings were:												
Very useful	50.2%	46.5%	52.7%	0.375	26.6%	29.3%	24.9%	0.352	44.5%	37.6%	47.0%	0.070 *
Useful	40.0%	46.5%	35.7%	0.113	50.3%	51.0%	49.8%	0.815	40.8%	42.4%	40.2%	0.675
Little useful	5.1%	3.5%	6.2%	0.379	10.9%	10.2%	11.4%	0.728	5.6%	8.8%	4.4%	0.071 *
Not useful	0.9%	1.2%	0.8%	0.773	2.1%	2.7%	1.7%	0.524	1.5%	1.6%	1.5%	0.925
Number of households	**215**	**86**	**129**		**377**	**148**	**229**		**463**	**125**	**338**	

Table A 8 continued

MOCCA-trainings	Peru				All countries			
	Total	Female	Male	p-value	Total	Female	Male	p-value
# of trainings given to farmers (from monitoring data)	7.97	8.52	7.73	0.062 *	9.12	9.47	8.95	0.014 **
Farmers (%) considering the MOCCA trainings were:								
Very useful	21.1%	24.5%	19.6%	0.225	32.9%	32.1%	33.3%	0.618
Useful	59.7%	57.8%	60.5%	0.577	47.7%	48.8%	47.2%	0.528
Little useful	14.2%	12.2%	15.1%	0.417	9.0%	8.6%	9.2%	0.706
Not useful	5.0%	5.4%	4.8%	0.774	2.8%	3.3%	2.6%	0.396
Number of households	**479**	**147**	**332.0**		**1933**	**614**	**1319**	

Source: MOCCA monitoring data.

p-value: differences in means between groups are significant at the 10% level (*), 5% level (**) or 1% level (***)

Variables have less than 0.09% of missing observations

Variables of "farmers (%) considering the MOCCA trainings were" have one missing observation

Table A 9. Coffee: changes in farm certification, premiums, and reported price ($/kg)

Details	El Salvador				Guatemala				Honduras			
	BL	EL		p-value	BL	EL		p-value	BL	EL		p-value
Farmers (%) with farm certifications	1.0%	1.0%	0.799		4.0%	10.0%	0.002	***	32.0%	22.0%	0.000	***
% of farmers selling coffee	91.0%	100.0%	0.000	***	98.0%	100.0%	0.004	***	99.0%	100.0%	0.056	*
Of farmers selling, % receiving price premium due to cup quality	0.0%	2.0%	0.680		1.0%	3.0%	0.089	*	26.0%	2.0%	0.000	***
Estimated average price (US$/kg of green coffee)	2.6	4.9	0.000	***	3.4	8.4	0.000	***	3.9	7.5	0.000	***
Number of households	**256**	**215**			**394**	**377**			**391**	**463**		

Table A 9 continued

Details	Peru				All countries			
	BL	EL		p-value	BL	EL		p-value
Farmers (%) with farm certifications	83.0%	82.0%	0.513		39.0%	30.0%	0.000	***
% of farmers selling coffee	100.0%	100.0%	0.127		98.0%	100.0%	0.000	***
Of farmers selling, % receiving price premium due to cup quality	23.0%	10.0%	0.000	***	12.0%	5.0%	0.000	***
Estimated average price (US$/kg of green coffee)	3.7	4.8	0.000	***	3.4	6.2	0.000	***
Number of households	**619**	**479**			**2002**	**1933**		

Notes

BL=baseline; EL=endline

p-value: differences in means between groups are significant at the 10% level (*), 5% level (**) or 1% level (***)

Variables of "Farmers (%) with farm certifications", "% of farmers selling coffee", "Of farmers selling, % receiving price premium due to cup quality" have missing observations

Average price (US$/kg of green coffee) was estimated by obtaining the total income from coffee sales (sum of all types of coffee sold x the reported price) and dividing by the estimated total green coffee sold

Table A 10. Cacao: changes in farm characteristics

Farm characteristics	Ecuador			El Salvador			Guatemala		
	BL	EL	p-value	BL	EL	p-value	BL	EL	p-value
Total farm area (ha),* and area (ha) under…:	6.55	4.34	0.007***	9.16	7.23	0.61	3.67	1.72	0.012**
Cacao	3.69	2.82	0.015**	1.57	2.64	0.275	1.32	1.06	0.215
Households (%) with…:									
One cacao plot	71.1	66.4	0.298	96.6	91.8	0.418	83.3	86.6	0.605
Two cacao plots	26	25.8	0.968	0	6.1	0.179	10.6	10.4	0.976
Three or more cacao plots	2.9	7.8	0.027**	3.4	2	0.708	6.1	3	0.397
Households (%) with at least one plot acquired between 2021-2025	n.a.	4.1		n.a	6.1		n.a	4.5	
Farmers (%) doing a production diagnosis of their coffee crop	26	18	0.047**	10.3	16.3	0.47	19.7	14.9	0.471
Farmers (%) using any tool to register cost of production and income	n.a.	43.8		n.a	40.8		n.a	82.1	
Number of households	**204**	**217**		**29**	**49**		**66**	**67**	

Table A 10 continued

Farm characteristics	Honduras			Peru			All countries		
	BL	EL	p-value	BL	EL	p-value	BL	EL	p-value
Total farm area (ha),* and area (ha) under…:	2.78	3.59	0.313	8.79	9.04	0.835	8.14	7.35	0.234
Cacao	1.71	1.65	0.803	2.17	2.41	0.083*	2.35	2.27	0.476
Households (%) with…:									
One cacao plot	80.3	77.1	0.645	89.9	79.5	0.000***	85.2	77.3	0.000***
Two cacao plots	18	18.1	0.995	8.8	15.4	0.005***	12.9	17.5	0.007***
Three or more cacao plots	1.6	4.8	0.306	1.3	5.1	0.002***	2	5.3	0.000***
Households (%) with at least one plot acquired between 2021-2025	n.a	6.0		n.a	n.a		n.a	4.2	
Farmers (%) doing a production diagnosis of their coffee crop	29.5	31.3	0.817	31.2	35.1	0.249	27.8	25.5	0.269
Farmers (%) using any tool to register cost of production and income	n.a	39.8		n.a	41.6		n.a	44.5	
Number of households	**61**	**83**		**388**	**371**		**871**	**911**	

*1 ha (hectare) = 10,000 square meters

Notes

BL=baseline; EL=endline

p-value: differences in means between groups are significant at the 10% level (*), 5% level (**) or 1% level (***)

Table A 11. Cacao: changes in key MOCCA indicators, by sex of farmer

Key MOCCA indicators	Ecuador							El Salvador						
	Female			Male			DiD p-value	Female			Male			DiD p-value
	BL	EL	p-value	BL	EL	p-value		BL	EL	p-value	BL	EL	p-value	
Yield (kg dry/ha)	316.09	428.74	0.065*	283.69	398.03	0.000***	0.980	83.26	185.70	0.079*	58.57	184.65	0.002***	0.764
Cacao area (ha)*	2.51	2.34	0.769	4.09	2.95	0.007***	0.167	1.65	0.61	0.156	1.55	2.82	0.273	0.022**
Farmers (%) with access to financing for agriculture	4	0	0.188	6	2	0.047**	1.00	0	25.0	0.2	0	0	.	0.391
Value of annual cacao sales (US$)	2274.18	5667.39	0.000***	3958.58	8468.42	0.000***	0.432	245.89	1177.50	0.064*	308.57	3201.51	0.027**	0.081*
Annual amount of cacao sold (kg dry)	799.55	777.19	0.939	1111.36	1017.15	0.531	0.820	109.55	138.86	0.677	70.16	347.54	0.025**	0.040**
Number of households	**51**	**44**		**153**	**173**			**7**	**4**		**22**	**45**		

Table A 11 continued

Key MOCCA indicators	Guatemala							Honduras						
	Female			Male			DiD p-value	Female			Male			DiD p-value
	BL	EL	p-value	BL	EL	p-value		BL	EL	p-value	BL	EL	p-value	
Yield (kg dry/ha)	272.65	178.16	0.105	306.67	226.01	0.045**	0.843	151.46	172.21	0.681	226.94	156.92	0.007***	0.12702
Cacao area (ha)*	0.83	0.91	0.668	1.51	1.13	0.172	0.171	1.62	1.28	0.459	1.74	1.77	0.896	0.496
Farmers (%) with access to financing for agriculture	0	5	0.348	4	4	0.983	0.437	0	0	.	0.07	0.03	0.414	0.355
Value of annual cacao sales (US$)	485.24	926.05	0.127	743.17	1377.98	0.009***	0.604	530.73	770.93	0.348	940.68	1289.09	0.190	0.771
Annual amount of cacao sold (kg dry)	202.50	131.20	0.202	393.30	227.25	0.077*	0.386	227.11	168.97	0.500	333.96	251.24	0.149	0.826
Number of households	**19**	**21**		**47**	**46**			**15**	**20**		**46**	**63**		

Table A 11 continued

Key MOCCA indicators	Peru							All countries						
	Female			Male			DiD p-value	Female			Male			DiD p-value
	BL	EL	p-value	BL	EL	p-value		BL	EL	p-value	BL	EL	p-value	
Yield (kg dry/ha)	481.16	470.89	0.788	427.13	504.67	0.008***	0.067*	362.25	380.99	0.488	335.52	379.86	0.006***	0.41411
Cacao area (ha)*	2.18	2.37	0.421	2.17	2.43	0.124	0.807	1.97	1.96	0.947	2.48	2.37	0.467	0.66796
Farmers (%) with access to financing for agriculture	7	0	0.002***	10	0	0.000***	0.333	4	1	0.037**	7	2	0.000***	0.30123
Value of annual cacao sales (US$)	2348.83	8412.78	0.000***	2476.13	9121.53	0.000***	0.692	1787.19	5657.60	0.000***	2301.09	6524.24	0.000***	0.64917
Annual amount of cacao sold (kg dry)	1067.22	1200.92	0.452	1033.12	1285.04	0.125	0.624	756.30	812.89	0.618	838.42	891.75	0.504	0.98123
Number of households	**110**	**118**		**278**	**252**			**223**	**237**		**648**	**674**		

*1 ha (hectare) = 10,000 square meters

Notes

BL=baseline; EL=endline

p-value: differences in means between groups are significant at the 10% level (*), 5% level (**) or 1% level (***)

DiD: p-value for the difference in the difference, estimated as DiD = (female EL - female BL) - (male EL - male BL)

Table A 12. Cacao: changes in key MOCCA indicators, by age of farmer

Key MOCCA indicators	Ecuador							El Salvador						
	15-29 years			>30 years			DiD p-value	15-29 years			>30 years			DiD p-value
	BL	EL	p-value	BL	EL	p-value		BL	EL	p-value	BL	EL	p-value	
Yield (kg dry/ha)	326.11	443.64	0.608	290.92	403.32	0.000***	0.982	64.53	n.a.	.	64.53	184.73	0.000***	.
Cacao area (ha)*	2.18	1.89	0.722	3.73	2.85	0.015**	0.510	1.57	n.a.	.	1.57	2.64	0.275	.
Farmers (%) with access to financing for agriculture	20	0	0.347	5	1	0.036**	0.469	0	n.a.	.	0	2	0.445	.
Value of annual cacao sales (US$) includes only producers who sold	1886.74	9620.00	0.141	3578.95	7859.91	0.000***	0.507	293.4	n.a.	.	293.44	3036.29	0.012**	.
Value of annual cacao sales (US$)	793.82	1016.63	0.792	1039.43	967.36	0.595	0.731	79.6	n.a.	.	79.66	330.50	0.016**	.
Number of households	**5**	**5**		**199**	**212**			**8**			**21**	**49**		

Table A 12 continued

Key MOCCA indicators	Guatemala							Honduras						
	15-29 years			>30 years			DiD p-value	15-29 years			>30 years			DiD p-value
	BL	EL	p-value	BL	EL	p-value		BL	EL	p-value	BL	EL	p-value	
Yield (kg dry/ha)	334.67	160.26	0.33073	289.32	212.57	0.025**	0.280	296.73	242.49	0.644	202.18	158.58	0.067*	0.897
Cacao area (ha)*	0.73	0.44	0.6218	1.43	1.08	0.113	0.890	1.19	2.59	0.078*	1.74	1.63	0.619	0.147
Farmers (%) with access to financing for agriculture	0	0	.	4	5	0.791	0.785	0	0	.	5	2	0.391	0.387
Value of annual cacao sales (US$) includes only producers who sold	172.96	536.94	0.2149	768.11	1257.85	0.018**	0.678	555.07	3469.37	0.012**	859.86	1107.32	0.250	0.211
Value of annual cacao sales (US$)	191.19	60.45	0.19946	367.81	201.35	0.027**	0.694	294.56	630.42	0.055*	308.60	221.57	0.080*	0.152
Number of households	**11**	**2**		**55**	**65**			**4**	**2**		**57**	**81**		

Table A 12 continued

	Peru							All countries						
	15-29 years			>30 years				15-29 years			>30 years			
Key MOCCA indicators	**BL**	**EL**	**p-value**	**BL**	**EL**	**p-value**	**DiD p-value**	**BL**	**EL**	**p-value**	**BL**	**EL**	**p-value**	**DiD p-value**
Yield (kg dry/ha)	432.99	509.67	0.415	443.30	493.23	0.040**	0.746	375.81	425.45	0.428	339.62	378.61	0.006***	0.868
Cacao area (ha)*	1.93	2.93	0.088*	2.20	2.39	0.173	0.300	1.51	2.26	0.029**	2.42	2.27	0.220	0.045**
Farmers (%) with access to financing for agriculture	6.25	0	0.333	9.8	0	0.000***	0.392	6	0	0.172	6.6	2	0.000***	0.749
Value of annual cacao sales (US$) includes only producers who sold	2251.60	10393.6	0.000***	2456.98	8832.20	0.000***	0.538	1442.98	7512.82	0.000***	2229.08	6257.44	0.000***	0.244
Value of annual cacao sales (US$)	895.79	1535.93	0.122	1056.01	1246.48	0.150	0.346	610.34	1070.35	0.053*	834.37	864.46	0.661	0.126
Number of households	**32**	**15**		**356**	**355**			**66**	**30**		**805**	**881**		

Table A 13. Cacao: number of trainings received during MOCCA, by sex of farmer

MOCCA-trainings	Ecuador				El Salvador				Guatemala			
	Total	Female	Male	p-value	Total	Female	Male	p-value	Total	Female	Male	p-value
# of trainings given to farmers (from monitoring data)	12.56	11.73	12.77	0.029**	5.51	5.50	5.51	0.993	12.36	12.38	12.35	0.975
Farmers (%) considering the MOCCA trainings were:												
Very useful	38.7	34.1	39.9	0.483	44.9	50.0	44.4	0.835	71.6	71.4	71.7	0.98
Useful	47.0	45.5	47.4	0.819	34.7	50.0	33.3	0.512	14.9	14.3	15.2	0.922
Little useful	7.8	13.6	6.4	0.110	4.1	0.0	4.4	0.675	10.4	4.8	13.0	0.311
Not useful	6.5	6.8	6.4	0.912	0.0	0.0	0.0	.	1.5	4.8	0.0	0.140
Number of households	**217**	**44**	**173**		**49**	**4**	**45**		**67**	**21**	**46**	

Table A 13 continued

MOCCA-trainings	Honduras				Peru				All countries			
	Total	Female	Male	p-value	Total	Female	Male	p-value	Total	Female	Male	p-value
# of trainings given to farmers (from monitoring data)	12.74	11.75	13.05	0.173	14.68	14.37	14.82	0.091*	13.26	13.08	13.32	0.469
Farmers (%) considering the MOCCA trainings were:												
Very useful	54.2	50.0	55.6	0.669	15.1	15.3	15.1	0.965	32.2	27.8	33.7	0.099*
Useful	34.9	45.0	31.7	0.284	31.4	29.7	32.1	0.633	36.3	35.0	36.8	0.626
Little useful	1.2	0.0	1.6	0.576	29.7	33.1	28.2	0.340	16.1	21.1	14.4	0.016**
Not useful	0.0	0.0	0.0	.	23.8	22.0	24.6	0.590	11.5	12.7	11.1	0.526
Number of households	**83**	**20**	**63**		**370**	**118**	**252**		**911**	**237**	**674**	

Source: MOCCA monitoring data.

p-value: differences in means between groups are significant at the 10% level (*), 5% level (**) or 1% level (***)

Table A 14. Cacao: changes in farm certification and reported price ($/kg)

Details	Ecuador			El Salvador			Guatemala		
	BL	EL	p-value	BL	EL	p-value	BL	EL	p-value
Farmers (%) with farm certifications, and % farmers with…:	77.9	57.1	0.000***	0.0	2.00	0.445	75.8	26.9	0.000***
Organic certification	84.9	91.9	0.072*	0.0	100.00	.	100.0	100.0	.
Fair trade certification	18.2	12.1	0.158	0.0	0.00	.	0.0	0.0	.
FLO certification	46.5	8.1	0.000***	0.0	0.00	.	0.0	0.0	.
FLO-organic certification	1.3	7.3	0.009***	0.0	0.00	.	0.0	0.0	.
UTZ certification	13.2	3.2	0.003***	0.0	0.00	.	0.0	0.0	.
CLAC certification	47.2	0.0	0.000***	0.0	0.00	.	0.0	0.0	.
Other certifications	0.0	0.0	.	0.0	0.00	.	0.0	0.0	.
Farmers (%) selling cacao	100.0	100.0		100.0	100.0		100.0	100.0	
Of farmers selling cacao:									
% of farmers selling wet cacao	80.9	63.1	0.000***	17.2	0.0	0.002***	89.4	94.0	0.336
And price of wet cacao (US$/kg)	1.99	3.41	0.020**	1.08	.	.	0.59	2.72	0.000***
% of farmers selling dry cacao	20.1	38.2	0.000***	72.4	95.9	0.002***	10.6	7.5	0.531
And price of dry cacao (US$/kg)	2.42	6.71	0.000***	3.71	7.76	0.000***	1.16	5.75	0.001***
Number of households	**204**	**217**		**29**	**49**		**66**	**67**	

Table A 14 continued

Details	Honduras			Peru			All countries		
	BL	EL	p-value	BL	EL	p-value	BL	EL	p-value
Farmers (%) with farm certifications, and % farmers with…:	78.7	88.0	0.136	29.40	34.30	0.144	50.4	42.5	0.001***
Organic certification	100.0	89.0	0.017**	95.60	95.30	0.90	83.8	86.8	0.227
Fair trade certification	41.7	91.8	0.000***	23.70	23.60	0.991	21.2	31.0	0.001***
FLO certification	6.2	21.9	0.020**	2.60	2.40	0.894	21.9	8.3	0.000***
FLO-organic certification	25.0	0.0	0.000***	5.30	3.90	0.624	4.8	4.1	0.653
UTZ certification	0.0	0.0	.	0.90	10.20	0.002***	14.4	9.3	0.026**
CLAC certification	0.0	0.0	.	0.00	0.00	.	17.3	0.0	0.000***
Other certifications	0.0	0.0	.	1.80	0.80	0.50	0.5	1.0	0.33
Farmers (%) selling cacao	100.0	100.0		100.0	100.0		100.0	100.0	
Of farmers selling cacao:									
% of farmers selling wet cacao	86.9	94.0	0.144	38.90	45.10	0.083*	61.2	59.8	0.555
And price of wet cacao (US$/kg)	0.99	1.87	0.000***	1.07	2.58	0.000***	1.25	2.63	0.000***
% of farmers selling dry cacao	14.8	18.1	0.601	61.10	69.20	0.019**	38.7	47.3	0.000***
And price of dry cacao (US$/kg)	1.45	5.96	0.000***	2.16	6.79	0.000***	2.26	6.73	0.000***
Number of households	**61**	**83**		**388**	**370**		**871**	**911**	

9.2 Appendix 2: Ethics approval letters

Baseline approvals

CIAT is a CGIAR Center

CIAT
International Center for Tropical Agriculture
Since 1967 Science to cultivate change

March 29, 2019

Dear Carolina Gonzalez,

Reference: Qualitative baseline study on market systems for MOCCA

The CIAT Institutional Review Board evaluated your request for review of the research study referenced above. Your research is exempt from full review and with two minor changes, you are clear to move forward with the activity, following the guidelines you developed in the submission.

- Please add a short statement to the informed consent that indicates there is minimal risk of harm associated with participation in the study.
- Indicate that the participants may request the aggregate/summarized results.

Thank you for taking the time to submit the proposal. We wish you luck in the endeavor. Please feel free to call me if you have any questions.

Sincerely,

Steven D. Prager
Senior Scientist for Integrated Modeling, DAPA
IRB Committee Chair

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CIAT is a
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CIAT
International Center for Tropical Agriculture
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August 10, 2020

Dear Carolina González Rojas,

Reference: MOCCA (2020-IRB18)

The Institutional Review Board (IRB) of the Alliance of Bioversity International and CIAT has evaluated your request for review of the baseline survey under the project referenced above. Your research is exempt from full review and with this letter the IRB provides clearance to move forward with the activity. The survey shall be implemented following the guidelines, protocols and consent form that you have described in, and attached to the request for review.

I take this opportunity to inform you that the Alliance is working towards aligning with international standards relevant to the Institutional Review Board and research ethics more broadly. This will influence the composition and procedures of the Board, the institutional policy landscape, and the Alliance researchers' training.

As an Alliance Principal Investigator, please be aware that you and any researcher working under your supervision should complete the CITI human research training offered through CIAT institutional subscription. We are happy to help you identify the most relevant training. You can locate the training here: https://about.citiprogram.org/en/series/human-subjects-research-hsr/

Thank you for taking the time to submit the application, and for addressing the IRB's comments. We wish you success in the project.

Sincerely,

Isabel López Noriega

Alliance IRB Committee Co-Chair

Headquarters
and Latin America and the Caribbean
Regional Office

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Endline approvals

Reference: Evaluación final cualitativa del proyecto Maximizando Oportunidades para el Café y el Cacao en Las Américas (MOCCA) a nivel de sistema de mercado (268)

Dear Luisa Maria Claros Trujillo and project team,

The Institutional Review Board (IRB) of the Alliance of Bioversity International and CIAT has evaluated your request for review of the research activities under the project referenced above. Your research is exempt from full review and with this letter the IRB provides clearance to move forward with the activity. The study shall be implemented following the guidelines, protocols and consent forms that you have described in, and attached to the request for review.

This IRB clearance is valid for one year from today. If you need to modify the research activities during this period, please submit an addendum form to the IRB before implementing the modifications.

Thank you for taking the time to submit your application, and for addressing the IRB's comments. We wish you success in the project.

I take this opportunity to invite you to take training on research ethics, provided through our institutional account on CITI Program. Find more information here

Sincerely,
Juliana Muriel
Alliance IRB Committee Co-Chair

The Alliance of Bioversity International and the International Center for Tropical Agriculture (CIAT) is part of CGIAR, a global research partnership for a food-secure future.
Bioversity International is the operational name of the International Plant Genetic Resources Institute (IPGRI).

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alliancebioversityciat.org/
www.cgiar.org

Reference: Farmer level endline surveys (MOCCA)

Dear Byron Reyes and project team,

The Institutional Review Board (IRB) of the Alliance of Bioversity International and CIAT has evaluated your request for review of the research activities under the project referenced above. Your research is exempt from full review and with this letter the IRB provides clearance to move forward with the activity. The study shall be implemented following the guidelines, protocols and consent forms that you have described in, and attached to the request for review.

This IRB clearance is valid for one year from today. If you need to modify the research activities during this period, please submit an addendum form to the IRB before implementing the modifications.

Thank you for taking the time to submit your application, and for addressing the IRB's comments. We wish you success in the project.

I take this opportunity to invite you to take training on research ethics, provided through our institutional account on CITI Program. Find more information here

Sincerely,

Juliana Muriel
Alliance IRB Committee Co-Chair

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