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PERU CACAO ALLIANCE

PERU CACAO ALLIANCE PHASE II

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GLOSSARY

CGIAR	Consultative Group on International Agricultural Research
CITE Agroindustrial Huallaga	Centro de Innovación Productiva y Transferencia Tecnológica del Alto Huallaga (Center for Productive Innovation and Technology Transfer of Alto Huallaga)
DEVIDA	Comisión Nacional para el Desarrollo y Vida sin Drogas (National Commission for Development and Life without Drugs)
FI	Financial Institution
FOGAPI	Fundación Fondo de Garantía para la Pequeña Industria (Small Industry Guarantee Fund Foundation)
GDA	Global Development Alliance
GoP	Government of Peru
ICT	Information Communication Technology
INTP	Nutrition and Timely Pruning
IPM	Integrated Pest Management
M&E	Monitoring and Evaluation
MSMEs	Micro, Small, and Medium Enterprises
NDC	Nationally Determined Contributions
NIPO	Integrated Nutrition and Timely Pruning
PCA	Peru Cacao Alliance
PROMPERU	Comision de Promocion del Perú para la Exportación y el Turismo (Peruvian Commission for the Promotion of Export and Tourism)
SCMs	Supply Chain Managers
SENASA	Servicio Nacional de Sanidad Agraria del Peru (National Agrarian Health Service)
SINEACE	Sistema Nacional de Evaluación, Acreditación y Certificación de la Calidad Educativa (National System of Evaluation, Accreditation, and Certification of the Quality of Education)
TA	Technological Agent
UNDP	United Nations Development Programme
USAID	United States Agency for International Development

1 INTRODUCTION

Atilio Huapaya, technical facilitator training Fredy Quispialaya, a cacao leader from the community of Santa Lucía, Huánuco region, in pruning.

The Peru Cacao Alliance Phase II (2016-2022) was a five-year Global Development Alliance (GDA) funded by USAID/Peru and managed by Palladium that used $29.9 million of U.S. Government funds to leverage an additional $56.98 million in private sector investment. The Alliance consolidated alternative development gains in communities where coca had been cultivated by building a sustainable market system for fine flavor cacao in four regions of Peru's Amazon (San Martín, Huánuco, Ucayali, and Pasco).

Phase I of the Alliance (also implemented by Palladium, from 2012-2016) pioneered an innovative approach to alternative development, crowding in private sector co-investments to implement a shared vision for Peru's cacao sector based on the successful planting of 29,088 hectares of new cacao (81% fine flavor) in areas where coca had recently been eradicated. As those seedlings matured and became ready for their first harvest, Phase II was designed to ensure that these new crops would provide a viable and profitable alternative to illicit economic activities for smallholder farmers in the target regions.

PCA Phase II therefore focused on two main ways to improve the profitability of cacao: 1) increasing yields and 2) accessing premium markets (and higher prices) through improved quality and differentiation. Responding to rising consumer demand for ethical, sustainable chocolate products, chocolate companies and importing countries have been increasingly insistent that their supply chains are free of child labor, do not drive deforestation, and pay fair prices to farmers.

Meeting these evolving market standards meant investing in stronger, more integrated supply chains with cooperatives, agricultural suppliers, financial institutions, agricultural traders, and domestic and international chocolatiers all contributing to ensure that farmers had access to the inputs, equipment, expertise, credit, and markets necessary to invest effectively in productivity and quality. It also required producers themselves to buy into the idea that their cacao plots could be real, profitable businesses with the right kinds of investment. PCA was thus tasked with generating a transformation in mindsets all along the value chain, from producers to buyers, to take collective responsibility for the long-term prosperity of the sector.

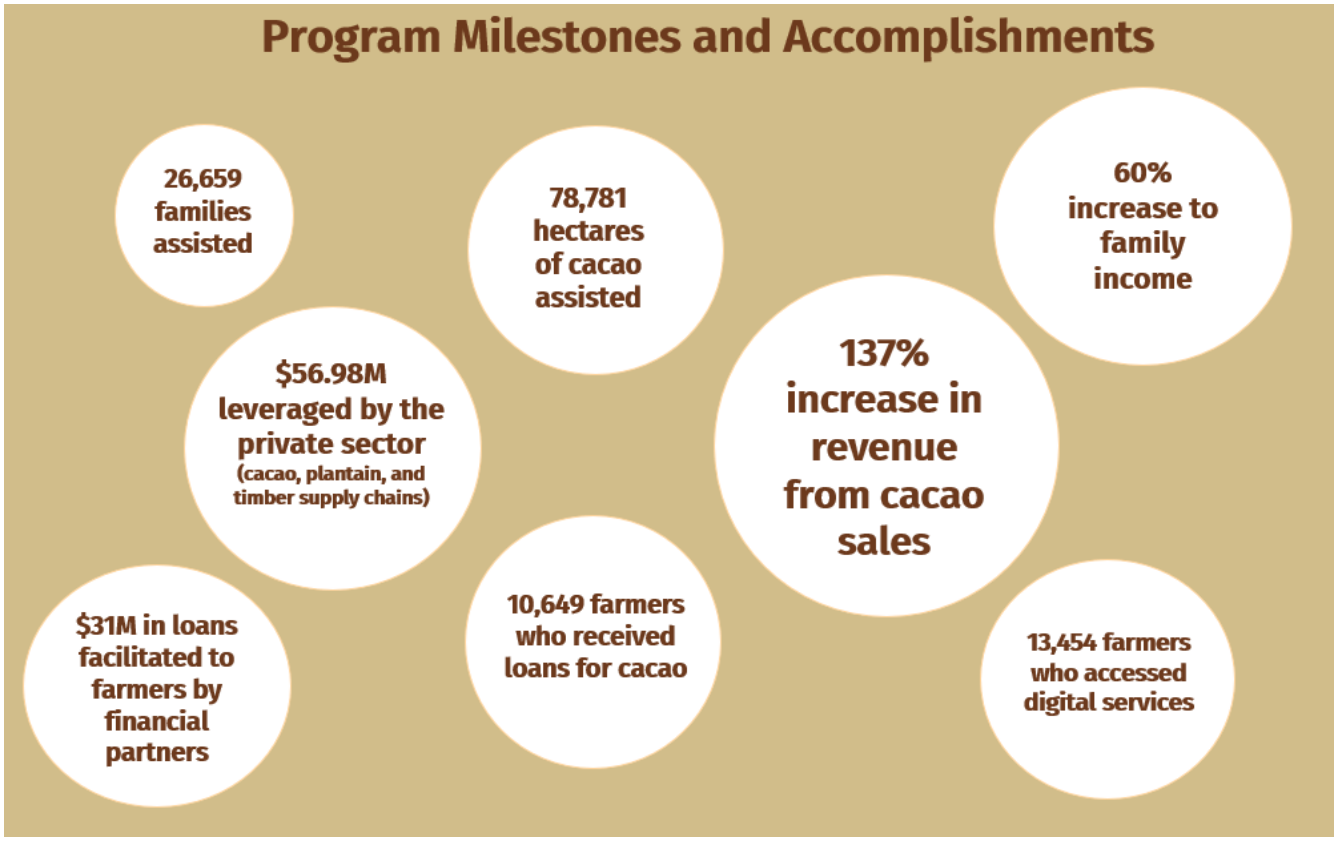
To take on this ambitious challenge, PCA positioned itself as an essential facilitator and trusted source of information both for its 38 members and for the wider cacao market system. It worked with actors throughout the value chain to address market

failures, helping to develop and implement collaborative business models that place producer wellbeing and prosperity at the center of the sector's growth, and leveraged its extensive field presence to introduce and encourage new agricultural methods meant to boost productivity and ensure continued access to high-value markets.

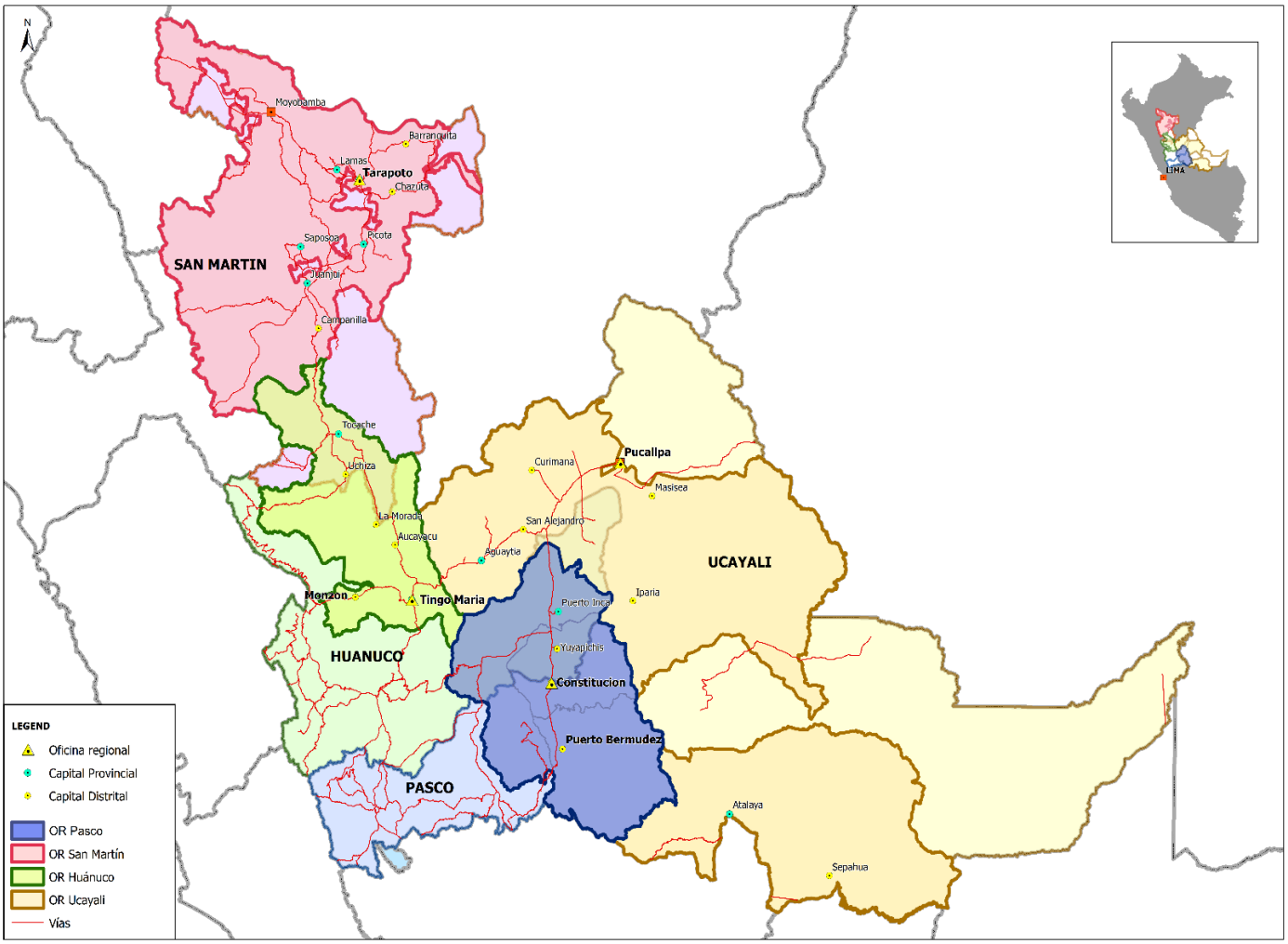
PCA's contact with different actors throughout its model, such as from producers to chocolatiers, has allowed the project to identify problems and propose innovative solutions. For example, the development of the Integrated Nutrition and Timely Pruning (NIPO) and Integrated Pest Management (IPM) Manuals has made it possible to standardize different practices regarding nutrition and pest control in cacao, thus meeting a very specific need of producers and exporting companies. Furthermore, European standards emerged that limited the level of cadmium levels in cacao derivatives. PCA played a leading role in developing Peru's position with respect to the European standard, generating and analyzing information that served as a basis for Peru to raise a Specific Trade Concern with the European Union, which is still in force. such as the "Management of High Value Cacao Plantations" held together with the Agrarian University of La Molina. professionals dedicated to cacao. PCA became a catalyst that allowed for the development of specialized courses

Another need identified by the project's contact with stakeholders in the chain was the need to train and raise the level of The project did the same for the development of post-harvest specialists since it was possible to detect an absence of professionals in the fermentation, drying, and tasting stages of beans and chocolate liquor. This initiative has improved the quality of the beans and the quality of the chocolates made in the regions.

During the implementation of the activity the project came to understand that technical assistance being provided to producers must meet three requirements: 1) It must be consistent and sustainable, 2) It must be available near their working plots, and 3) It must have credibility. These reasons led to the formation of a network of leading farmers called Technological Agents (TAs). TAs served as an innovative way to have potential technical assistance providers in the same production zones the project operated in, while also serving as a point of contact between farmers and input and credit providers. The sharing of technical assistance from a TA, local to the area, to a farmer had much greater power than assistance coming from a technician or even a certified professional. Through its activities, PCA has become a center of innovation at the institutional and scientific levels by catalyzing field experience with that of highly trained specialists.



PERU CACAO ALLIANCE AREAS OF INTERVENTION



Key Activities:

The Peru Cacao Alliance team—based in Lima and with offices in San Martin, Huánuco, Ucayali, and Pasco—generated transformative, systemic change in the sector through the following activities:

- **Linking producer associations more directly with international and domestic buyers** via long- term purchase agreements
- Supporting producer associations and private companies – collectively referred to as supply chain managers (SCMs) - **to establish relationships with independent farming families**
- Working with SCMs and end buyers to **develop and promote differentiated cacao products**
- **Assisting SCMs to implement improved harvest and post-harvest processes**
- Developing, testing, and disseminating a suite of agricultural best practices by **connecting producers with a package of agricultural technologies that enable environmentally sustainable approaches** to significantly boosting productivity
- **Expanding distribution of agricultural inputs,** fertilizers, equipment, and after-sale services
- **Supporting development of micro, small, and medium enterprises (MSMEs) in the Amazon.**

Key Activities:

- **Building both the supply and demand for agricultural credit** by lowering transaction costs for producers and financial institutions (FIs)
- **Strengthening FIs' ability to properly** evaluate loans in the agricultural sector
- **Promoting digital finance solutions** in the target regions with several fintech partners
- **Using strategic communications as a core tool to expand program impact,** facilitating and reinforcing the promotion of key technical messages in ways that encouraged behavior change among producers while also building the capacity of PCA staff to communicate effectively pre- and post-pandemic
- **Mainstreaming gender equality and social inclusion throughout program activities** to promote participation of women and indigenous populations.

After over five years of implementation, the program successfully mobilized $56.98M in private sector leverage from 84 actors to support the growth and resilience of Peru's cacao sector even in the face of pest outbreaks, climate change impacts, and the COVID-19 pandemic.

PCA worked with 26,659 cacao-farming families across 78,781 hectares of cacao, boosting average annual household incomes by 60% (and incomes from cacao by 137%) by connecting them to intermediaries and end buyers in 10 countries. The PCA team helped farmers increase use of fertilizers, irrigation, pruning, and organic pest control practices, allowing many to minimize losses even as droughts, floods, pests, and diseases threatened to reverse hard-won gains in productivity. PCA significantly increased access to finance, facilitating $31M in credit to almost 11,000 farmers, and connected 13,454 people to digital finance services. From 2016-2021, the contribution of cacao to household income grew from 37% to 54% among PCA producers, reflecting the professionalization of PCA- supported farmers.

Finally, the Alliance has served as an important source of innovation within the system, introducing new practices, collaborating on scientific research, co-financing pilot programs, and supporting emerging technologies that promise to further break down the constraints that Peruvian cacao farmers face. As a result of PCA's work over the past decade, Peru's cacao production has grown at an annual rate of 13% between 2010 and 2018 (the fastest in the world), and 67% of the country's cacao is now produced in the PCA target regions. This final report details how Phase II of the Alliance solidified and expanded upon the investments made in Phase I, and successfully established Peru as the 2nd largest producer of fine-flavor cacao in the world.

ECONOMIC GROUPS ORGANIZED BASED ON INCOME FROM CACAO AND THE RELATIONSHIP WITH OTHER VARIABLES, 2022

	INCOME FROM CACAO 2022 PERUVIAN SOLES	AVERAGE HACTARES HARVESTED	SALE PRICE	MEMBER OF AN ORGANIZATION	FERTILIZER USE	PRUNING	ACCESS TO CREDIT
Total	14,478	3.1	8.0	40.2%	31.3%	81.6%	
Economic group 1	2,851	1.4	7.7	25.4%	14.1%	63.1%	
Economic group 2	6,054	2.0	7.9	35.1%	25.9%	75.4%	17.4%
Economic group 3	9,876	2.8	8.1	46.7%	41.7%	88.6%	18.9%
Economic group 4	16,032	3.4	8.1	44.0%	36.9%	89.7%	28.7%
Economic group 5	37,528	6.0	8.2	51.1%	39.3%	93.4%	24.4%

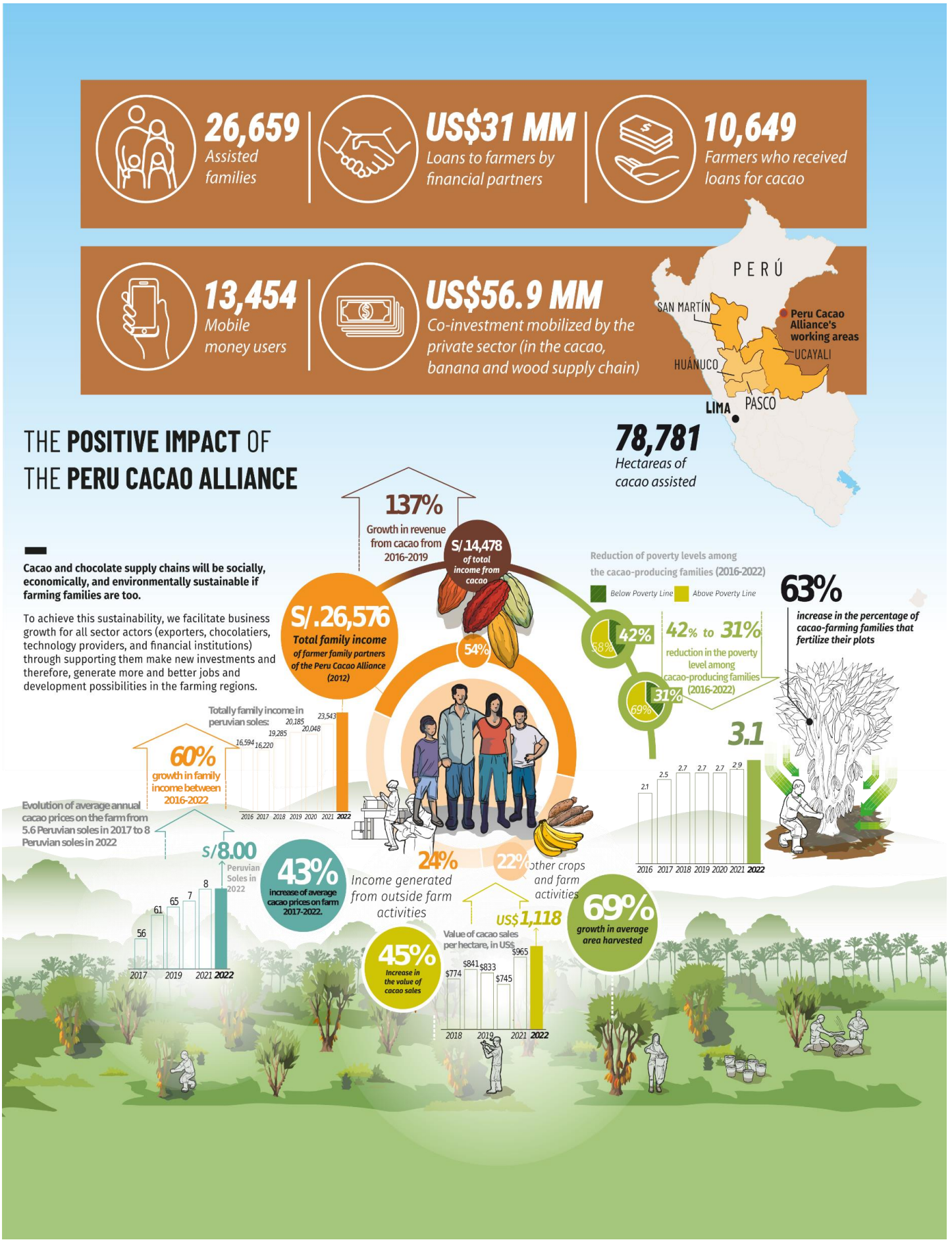

26,659
Assisted families
US$31 MM
Loans to farmers by financial partners
10,649
Farmers who received loans for cacao
13,454
Mobile money users
US$56.9 MM
Co-investment mobilized by the private sector (in the cacao, banana and wood supply chain)
PERÚ
SAN MARTÍN
Peru Cacao Alliance's working areas
UCAYALI
HUÁNUCO
PASCO
LIMA
78,781
Hectareas of cacao assisted
THE POSITIVE IMPACT OF THE PERU CACAO ALLIANCE
Cacao and chocolate supply chains will be socially, economically, and environmentally sustainable if farming families are too.
To achieve this sustainability, we facilitate business growth for all sector actors (exporters, chocolatiers, technology providers, and financial institutions) through supporting them make new investments and therefore, generate more and better jobs and development possibilities in the farming regions.
137%
Growth in revenue from cacao from 2016-2019
S/.14,478
of total income from cacao
54%
S/.26,576
Total family income of farmer family partners of the Peru Cacao Alliance (2012)
Totally family income in peruvian soles:
16,594
16,220
19,285
20,185
20,048
23,543
2016 2017 2018 2019 2020 2021 2022
60%
growth in family income between 2016-2022
Evolution of average annual cacao prices on the farm from 5.6 Peruvian soles in 2017 to 8 Peruvian soles in 2022
S/8.00
Peruvian Soles in 2022
56
61
65
7
8
2017 2019 2021 2022
43%
increase of average cacao prices on farm 2017-2022.
24%
Income generated from outside farm activities
22%
other crops and farm activities
45%
Increase in the value of cacao sales
US$1,118
Value of cacao sales per hectare, in US$
$774
$841
$833
$745
$965
2018 2019 2021 2022
69%
growth in average area harvested
Reduction of poverty levels among the cacao-producing families (2016-2022)
Below Poverty Line
Above Poverty Line
58%
42%
69%
31%
42% to 31%
reduction in the poverty level among cacao-producing families (2016-2022)
63%
increase in the percentage of cacao-farming families that fertilize their plots
3.1
2.1
2.5
2.7
2.7
2.7
2.9
2016 2017 2018 2019 2020 2021 2022

Figure 02: Peru Cacao Alliance Partners

End Buyers

Supply Chain Managers

Technology Partners

Financial Partners

II BUILDING AN INCLUSIVE MARKET SYSTEM

PCA Phase II is the culmination of over 20 years of USAID investment in alternative investment in the Peruvian Amazon. During the 1980s and 1990s, a surge in large-scale coca production for export coincided with significant increases in terrorist attacks and other insecurity in Peru. In response, USAID supported the Peruvian government in implementing widespread coca eradication campaigns in the Amazon region, particularly in the post-eradication phase by connecting former coca farmers with licit economic alternatives, including cacao. **The challenge was to quickly develop strong agricultural value chains in the region that could compete with the highly developed coca value chain managed by narcotraffickers.**

To that end, PCA Phase I took on a massive cacao installation campaign, planting over 29,000 hectares from 2012-2016. The vast majority of this cacao was "fine flavor", which opened up access to differentiated, high- value markets that bring improved profits to farmers, making cacao a viable alternative to coca. This strategy recognized that Peru's higher labor costs compared to major cacao producers in West Africa meant that success would rely on higher productivity and access to premium markets via higher quality and fair trade, organic, and rainforest-friendly certifications.

While PCA Phase I had established some of the building blocks for a self-sustaining cacao sector in Peru, a range of market failures were preventing its consolidation as a viable alternative to coca production. Smallholder farmers did not have the adequate access to finance, inputs, and equipment to boost their productivity and improve harvest and post-harvest processes in order to access high-value markets. Financial institutions and suppliers of inputs and equipment generally viewed smallholder farmers as an unattractive market segment due to high levels of poverty and the high transaction costs needed to reach such a remote, dispersed population. As such, many did not invest in distribution networks in the Amazon, and those who did operate in the region typically charged high interest rates and prices that suppressed demand among potential customers.

PCA Phase II is the culmination of over 20 years of USAID investment in alternative investment in the Peruvian Amazon.

David Herrera, technology agent carrying out a pruning operation in the district of Neshuya, Ucayali region.

Further along the value chain, most SCMs did not grade or price cacao by quality, resulting in a loss of quality control, price premiums, and traceability. Many also lacked the working capital required to aggregate supply and consistently fulfill agreements with buyers. As a result of all these challenges, many end buyers of Peru's cacao products struggled to find a reliable, high- quality supply of traceable cacao to meet consumer demands for unique, sustainable products. Previous attempts to rely on certification (i.e. organic, Fair Trade, etc.) tended to backfire as the extra costs made it inaccessible to many farmers, locking them out of the market.

Nelson Huayre and Livia Bujaico, cacao producers, drying cacao beans in the district of Irazola, Ucayali region.

> **"PCA has been the key to producing more and producing better."**
>
> **Representative from ROMEX, PCA partner**

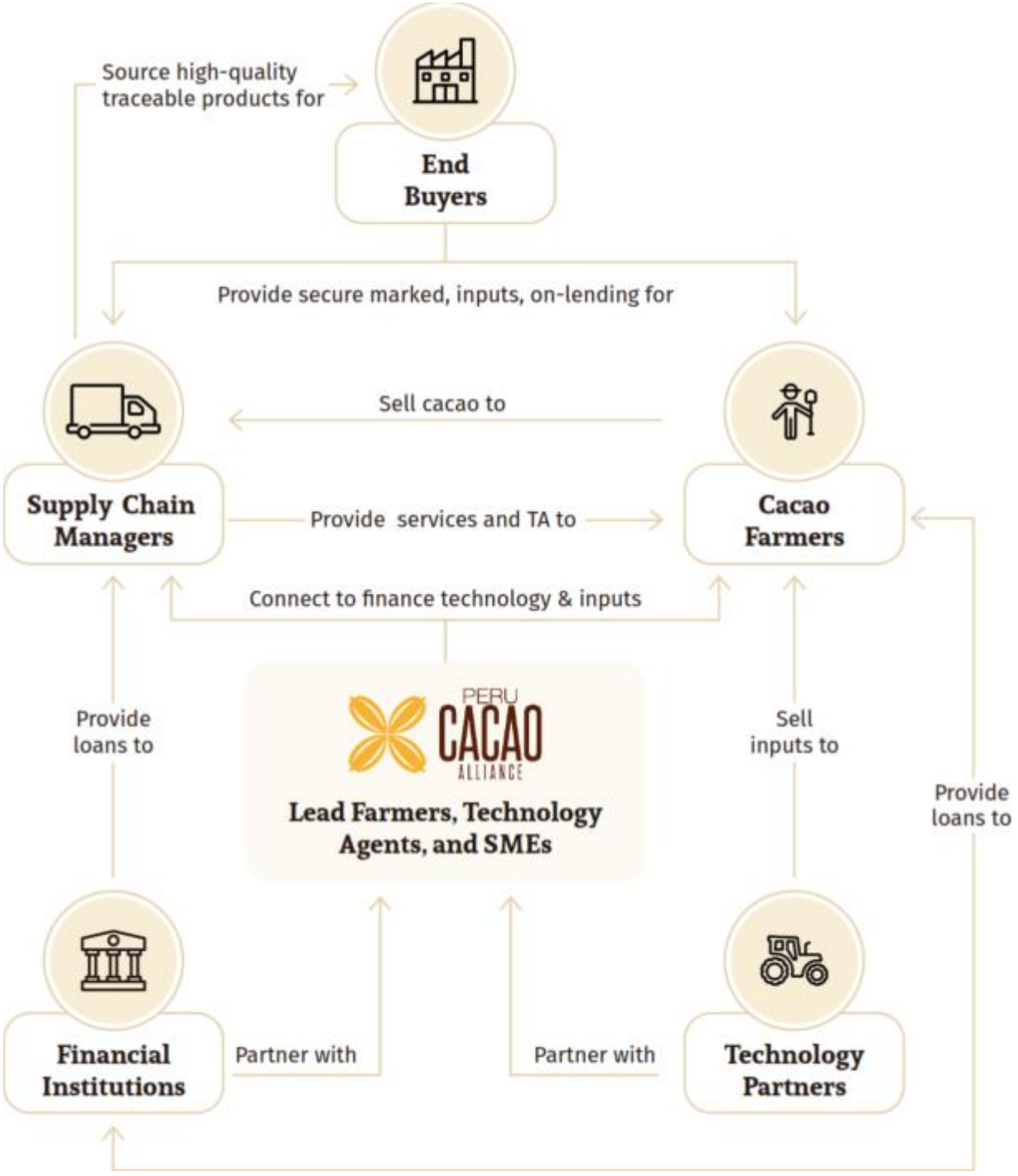
The goal of PCA Phase II was to catalyze transformative change in the system by connecting all these market actors with the knowledge, resources, and networks needed to overcome these challenges via mutually beneficial relationships. To do so, the team engaged a wide range of private sector actors (end buyers, financial institutions, intermediaries, and technology suppliers) as active partners and co-investors in the target regions. It was their purchasing commitments and investments in the supply chain that unlocked access to technology, finance, and markets for smallholder farmers.

In parallel, PCA established an extensive network of Technology Agents and lead farmers, local farmer-entrepreneurs charged with promoting yield- and quality-boosting practices and technologies among their peers in the target regions. These farmer partners helped instill and expand a "culture of cacao" in the region, and acted as last-mile agents allowing PCA's other private sector partners to efficiently reach and serve a remote and disbursed new client base.

This has also generated a sea of change in the attitude of small producers in the area, who now think of themselves not as charity recipients but as small business owners instead.

Previous donor programs had worked for decades to solve the cacao sector's issues in the region. However, these projects typically relied on subsidies and direct delivery of services to producers, distorting the market with a stream of support that disappeared when the project ended. PCA took a different approach more focused on lasting change and sustainable impact. As shown in Figure 03 below, PCA helped form and strengthen mutually beneficial relationships throughout the market system, facilitating lasting, win-win connections between private sector partners and smallholder farmers to the benefit of the whole ecosystem.

Figure 03: PCA's role in Peru's cacao ecosystem



PCA Phase II focused on three main objectives: improving access to markets, improving farmer productivity through better access to technology and knowledge, and increasing access to finance. The sections below provide additional detail on the achievements within each workstream.

IMPROVING ACCESS TO MARKETS

During Phase I, PCA's market analyses made clear that Peru's comparative advantage in the global cacao sector consisted of two pillars: **higher productivity** (to offset higher labor costs), and **differentiation through higher-quality varieties and practices.** Peru has the highest cacao biodiversity in the world, with 66% of the major genetic families of cacao growing in the Amazon. Most of these are "fine flavor" cacao, which are distinguished by the complexity of their taste, including floral, fruity, herbal, and nutty notes. Fine flavor cacao prices can be more than twice those of conventional cacao, making it a strong option to improve incomes for farmers and others involved in the sector. However, it had a mixed reputation in Peru, with some criticizing it as being unprofitable and too susceptible to pests and diseases. PCA's activities focused on introducing and catalyzing widespread uptake of the farming practices and technologies needed to realize the massive potential of these varieties to lift farmers out of poverty.

From 2012-2016, PCA Phase I had overseen the planting of more than 23,500 hectares of fine flavor cacao (and an additional 5,500 hectares of conventional cacao). The next step was to connect this new supply with buyers willing to pay a premium for quality. PCA Phase II therefore engaged chocolate makers and buyers in Peru and throughout the world to promote demand for Peruvian cacao. In tandem, PCA worked to reduce the number of intermediaries between producers and buyers so that farmers could take home a larger share of the profits from these new markets.

Promoting Demand for Peruvian Cacao. PCA built the market for Peruvian cacao in several different ways. First, the team brought local chocolate makers such as Nina Chocolates, Ucayali River, Tesoro Amazónico and UCAW to national and international events where they could promote their products to potential buyers. This included the annual Salon de Chocolate, which PCA co-organized with the Ministry of Agriculture, DEVIDA, PromPeru, and others (see box), as well as trips to flagship events such as the Fancy Food Show in New York City and the Northwest Chocolate Festival in Seattle, Washington.

PCA also worked directly with these chocolate makers on their branding and marketing efforts, helping them incorporate popular trends and messages such as promoting single-origin chocolate. These efforts introduced Peru's fine flavor cacao to the global market for the first time. They also helped build the domestic market for cacao. While these local chocolate makers purchase relatively small volumes (about 10% of total production), they have won multiple national and international awards and act as ambassadors for Peruvian cacao in general.

PCA also worked directly with these chocolate makers on their branding and marketing efforts, helping them incorporate popular trends and messages such as promoting single-origin chocolate.

USAID, DEVIDA, Ministry of Agriculture & Irrigation, APPCACAO, and PCA representatives at the Cacao and Chocolate Fair 2022 launch.

The Salón de Cacao y Chocolate in Peru

The Salón de Cacao y Chocolate is one of the most important developments in the last 10 years of the sector, and has been essential in bringing market attention and acclaim to Peru's cacao potential. The Salón brings companies of all sizes from across the country to Lima to meet with national and international buyers, facilitating market linkages and exports. The multiday event includes a full schedule of demos, tastings, talks, and networking events. Participating companies learn firsthand about buyer requirements and global standards, and interested buyers learn more about Peru's unique fine flavor offerings and potential sources of supply. Government officials and donors also attend, presenting a chance for the public and private sectors to engage in dialogue and exchange ideas on further strengthening the sector.

The Salón has occurred annually since 2010 (the 2020 edition was held virtually due to COVID-19, and subsequent editions have offered both online and in- person options). At first, most of the companies that attended were from Lima, but thanks to PCA's support to the sector, in recent years most participants have come from the provinces of San Martin, Ucayali, Huánuco, and Pasco. Their participation has raised the profile of these regions in the global market, turning products sourced from these areas into desired "single origin" varieties. The 2022 iteration of the Salón de Chocolate expanded its scope to all of Latin America, further positioning Peru as the region's "chocolate capital" and the Salón as the premiere event in Latin America for the sector.

In addition, PCA helped extend the event to four days a year, bringing in a range of experts, buyers, and other partners to make it a much more valuable event for all involved. PCA also led the creation of the Foro Latinoamericano del Cacao y Chocolate starting in 2019, which provides actors with the opportunity to share perspectives and solutions with their peers on market trends and concerns at the international level, including regulations on cadmium and pesticide levels, and (most recently) the new EU regulation on deforestation-free cacao.

Strengthening Supply Chain Managers. Second, PCA worked with producers, SCMs, and domestic chocolate makers to ensure that their processes and procedures met market standards and buyer requirements. Its network of SCM partners included seven cooperatives and four traders: Ucayali River Cacao (exclusively fine flavor cacao), Villa Andina (certified conventional cacao), AGROSUN (fine flavor cacao) and Romex (conventional and fine flavor). PCA also partnered with two aggregators of plantains – Inka Crops and their local subsidiary Procesadora Tropical – to strengthen markets for plantains, therefore supporting cacao farmers using PCA's recommended agroforestry approach that intercropped cacao, plantain, and timber species.

Chocolate entrepreneurs from the Huanuco region, winners of the IV International Chocolate Awards, at the Cacao and Chocolate Fair 2019.

Harvesting and preparing cacao for processing and export is a complex, multistep process, and requires strong control over a range of factors including temperature, humidity, and contamination (see table). Maintaining this quality throughout the process takes both technical knowledge and investment in the proper equipment and infrastructure.

Step	PCA Recommendations for Improved Quality
Harvesting the pods	Separate mature, healthy pods from infected and/or green pods.
Extracting the beans	Cut open the pods with a blunt knife or block of wood to make sure the beans aren't damaged
Draining the beans (~15 hours)	Place beans in a clean sack (that has not been used to store other crops) and place over a drain that will channel excess liquid to a biodigester
Fermentation (3-5 days)	Closely monitor temperature and humidity and adjust amount of light/shade accordingly to ensure fermentation proceeds correctly. Rotate the fermenting cacao at regular intervals. Fermentation containers should be protected from wind and lower temperatures at night. Containers should be located over drains to channel excess liquid to a biodigester.
Drying (5+ days)	Spread out the beans evenly to ensure consistent exposure to the sun. Regularly move the beans to avoid over-fermentation. Monitor humidity until it is less than 7.5%.
Sorting	Discard any damaged beans. Sort according to size, quality, and type.
Storage	Store in an area dedicated to cacao. Use clean sacks that have not been used for other crops. Place sacks on top of wooden pallets or another elevated surface. Store by type of cacao. Do not place sacks directly against the wall to avoid moisture. Prohibit any use of pesticides or insect repellent by those working in the storage areas.
Transport	Disinfect all vehicles used to transport the cacao to avoid cross contamination. Try to use vehicles dedicated only to cacao.

To ensure that PCA partners were producing fine flavor cacao products in line with market standards, the Alliance first assessed each partner's existing processes to determine weak points, then worked with each partner to invest in and implement needed improvements. The team also helped several partners create Good Manufacturing Practices (GMP) manuals, Hygiene and Sanitation Plans (HSP), and Hazard Analysis and Critical Control Points (HACCP) procedures to facilitate certification by SENASA. PCA also developed a template for a Manual for Best Management Practices (BMP) and Health and Hygiene (H+H) for other organizations to tailor for their own use.

PCA also worked with DEVIDA to develop and implement Schools of Excellence in Quality, focused on post-harvest processing and taste testing.

These Schools introduced 900 representatives from 46 associations, cooperatives, and chocolate companies to the quality control process for cacao and helping them develop and taste-test samples of their cacao products. Upon completion of these courses, participants received certification from the Sistema Nacional de Evaluación, Acreditación y Certificación de la Calidad Educativa (SINEACE) in collaboration with the Peruvian Association of Cacao Producers (APPCACAO). In 2020, PCA also implemented tailored Schools of Excellence for technical staff from DEVIDA and Sierra y Selva Exportadora. We complemented these with additional trainings and workshops on quality-related issues, collaborating with other partners such as SENASA, Universidad Agraria la Molina, and CITE Agroindustrial Huallaga as relevant.

DEVIDA team at the School of Excellence in Quality workshops, Huanuco region.

Steps for Quality Control

Physical Analysis	Ensure that pH and moisture levels are adequate. Remove any debris as well as beans that are damaged or not fully fermented.
Sample Preparation	Roast and grind the beans, then blend refine, conch, and mold into samples
Sensory Analysis	Assess sample in terms of aroma, acidity, bitterness, astringency, defects, flavor, and aftertaste.

Finally, PCA helped negotiate new purchase agreements between buyers and SCMs. With PCA supporting producers and SCMs to produce consistent volumes of high-quality cacao, buyers were more likely to commit to longer-term purchase agreements. This advance was key to generating a virtuous circle in which purchase agreements increased financial institutions' willingness to lend to farmers, which allowed them to invest in productivity and quality, which in turn made them more likely to fulfill the purchase agreements. As a result, buyers became more comfortable entering into subsequent agreements, perpetuating the cycle. As a result, producers and SCMs were connected to 36 buyers (18 international and 18 domestic) via purchase agreements over the life of the project.

KEY RESULTS:

14,223

families with access to new market opportunities;

$285M

in sales over the life of the program (increasing from $20.5M to $69.3M in annual sales);

141,800

metric tons of cacao sold over the life of the program (increasing from 12,000 to 33,556 metric tons in annual sales).

Photo of cacao in drying process.

Carmí Vega and Genrry Díaz, cacao entrepreneurs and owners of Chocolates DIV brand.

Partner Profile: Chocolates DIV

Carmi Vega Muñoz and Genrry Diaz are the co-owners of Chocolates DIV, a bean-to-bar chocolate company located in their hometown of Tingo Maria in the Peruvian Amazon. Before founding their chocolate store and processing plant, the Díaz Vegas sold dried cacao beans, but when cacao prices dropped in 2016, they decided to invest in producing and selling chocolate bars, using the seven hectares of cacao they own. Ever since, they have worked closely with PCA to improve their on-farm production practices as well as their post-harvest processes to improve quality and taste.

Carmi and Genrry first opened their store in 2017. That same year, Chocolates DIV accomplished something unexpected. Thanks to support from PCA, Chocolates DIV participated in the "XI National Cacao Competition 2017 Regional Stage" organized by APPCACAO, and won first place. Winning the competition's top prize opened many doors for their business, which started to gain traction and recognition.

To ensure the quality of their chocolate, Genrry and Carmí use a selective picking method and follow strict protocols for the pulping and fermentation process. The quality control trainings offered by PCA played a major role in the evolution of Chocolates DIV. "The quality control and chocolate production trainings really inspired us to set up the factory, to be visionaries, and to keep growing," Genrry notes. "These three things have been key to improving our cacao beans and ensuring that they are the highest quality. PCA holds a special place in our hearts." In September 2020, they purchased the land where the processing plant sits, and in October they started to build a chocolate factory, which is still underway.

"The quality control and chocolate production trainings really inspired us to set up the factory, to be visionaries, and to keep growing,"

Chocolates DIV currently offers 11 chocolate flavors, each of which meet all the necessary health authority certifications for commercialization. The company's primary customers are minimarts, such as Minisol and Megaplaza, other shops and points of sale in Tingo María and Huánuco, and buyers in other regions of Peru.

Genrry and Carmí have three daughters and a son, and hope to leave Chocolates DIV in their hands. The whole family is involved in the chocolate production process, and their children help with specific tasks. "Eventually, this is all going to be theirs," said Genrry. The growth of Chocolates DIV has allowed Genrry and Carmí to invest in their school-age children's education and enroll them in sports, both extremely important activities for their children's development. Within the next five years, they also hope to increase cacao production on their plot, introduce new cacao varietals for use in gourmet chocolate, better position Chocolates DIV in Peru, and begin to export internationally.

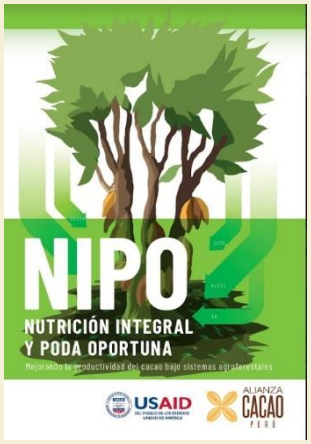
IMPROVING ACCESS TO TECHNOLOGY

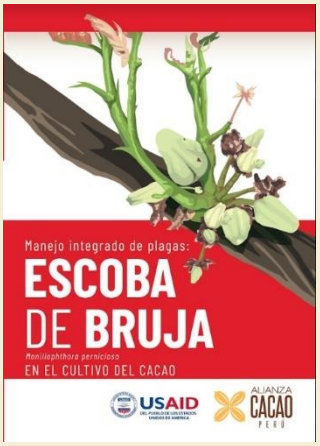
PCA's strategy for lifting smallholder farmers out of poverty required maintaining and improving productivity in the target areas, while reducing deforestation. This, in turn, meant increasing farmers' access to the knowledge, inputs, equipment, and technical after-sale services needed to maximize the yields from their existing plots.

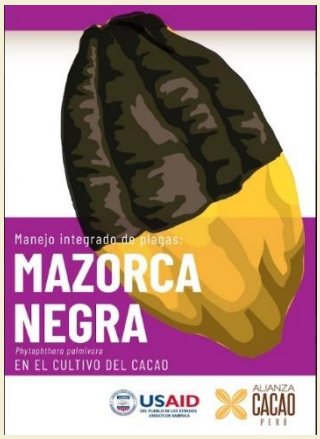
The team found that many farmers either did not think cacao required hands-on care, or were unfamiliar with the proper management techniques that would raise productivity and minimize the impacts of pests and diseases. In addition, those that did decide to invest in inputs such as fertilizers often inadvertently purchased counterfeit products, meaning they did not see a return on that investment. This reduced trust in the overall market system, and dissuaded those farmers from purchasing inputs for the next harvest. It also meant that many producers were unable to meet buyer requirements, locking them out of lucrative market opportunities.

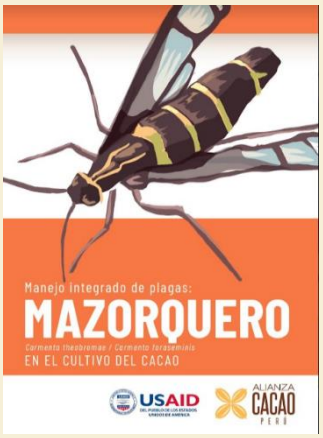
The PCA Technology Package. To address these challenges, PCA's technical experts developed a technological package of best practices for cacao production, based on two key concepts: Integrated Nutrition and Timely Pruning (INTP) and Integrated Pest Management (IPM). INTP messages focused on the development and implementation of fertilization plans, detailing when farmers should fertilize and what kinds of nutrients should be applied, as well as the proper times, equipment, and methods for pruning their cacao trees. PCA's approach to IPM included physical, cultural, and biological control methods, with the objective of demonstrating how to effectively control pest and disease infestations without resorting to use of damaging pesticides. Such chemicals not only endanger organic certification and prevent access to key markets such as the European Union, but can also cause adverse health impacts among farm workers and kill the beneficial insects and pollinators that are crucial to the long-term health and productivity of the crop. These two core practices were the basis of all efforts to boost productivity and quality throughout the value chain, with the aim of increasing Peru's competitiveness in the global market.

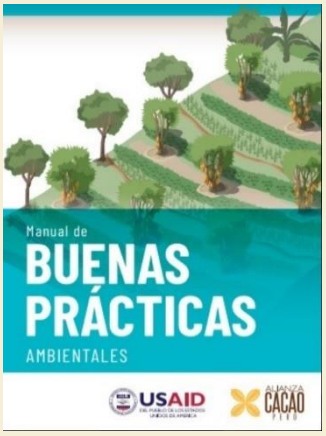
Aldo Sanchez, technical facilitator in IPM training in the community of Paraíso, Huánuco region.











INTP and IPM

Central to PCA's efforts to boost productivity was the widespread promotion of integrated nutrition and timely pruning. PCA agricultural technicians worked to spread and regularly reinforce key messages related to these two practices.

Information provided to farmers included the specific nutritional needs of cacao plants both before and after they reach productive age. PCA delivered detailed information regarding the ideal timing for fertilization and pruning throughout the year, which parts of the tree to remove during pruning, what tools to use, and cacao's specific nutritional needs at each stage of the year. **Over the life of the project, the percentage of farmers applying INTP methods grew from 33 grew from 33 to 50%.**

PCA also published a series of manuals describing effective ways to prevent and mitigate infestations of common pests such as witch's broom, black pod, monilia, and cocoa pod borer. Recommended techniques included physical control (i.e. removal of infected pods), cultural control (pruning, fertilizing, removing debris from field) and biological control (use of biocontrol agents).

PCA agricultural technicians used these resources to introduce standardized techniques to farmers, and the manuals were also made available on PCA's website and Facebook page. The percentage of farmers applying IPM methods grew from 51 to 92% over the life of the project.

Providing Technical Assistance to Farmers. Once this package of best practices and recommended inputs and equipment had been developed and validated with the members of the Alliance, PCA then focused efforts on promoting its uptake among tens of thousands of cacao farmers in the target regions. The team developed a field-based outreach strategy in which a network of agricultural technicians held regular group trainings in their communities, supplemented by technical visits to individual farmers to reinforce key messages and ensure proper application of the recommended inputs and practices. PCA not only encouraged uptake of specific practices and inputs, but also showed producers the right way to apply them, increasing their effectiveness.

> **"Our productivity was declining, but it has since stabilized thanks to PCA's trainings and the technical information they shared with us."**
>
> – Representative from ACOPAGRO, PCA partner

NIPO Mega-event: 270 members of the ACOPAGRO and COOPALGSA cooperatives participate in the NIPO Mega-event, province of Huallaga, San Martín region.

PCA employed about 60 agricultural technicians across 23 microcorridors, each charged with serving an average of 100-120 producers. These technicians also trained their counterparts in local cooperatives and other SCMs, to ensure that producers were receiving the same key messages no matter the messenger.

PCA also brought in renowned experts such as Jose Sanchez Escalante to both inform the development of its technical package and conduct trainings with producers directly, boosting the credibility of PCA's efforts. A brief description of each type of outreach approach use across the project can be found in the table below.

Types of Outreach.

Field Days	Held in cacao plots, organized around a series of 5-6 stations of 20-30 minutes each to introduce farmers to a series of practices related to productivity and quality. Always included partner SCMs and at least one financial institution and one technology partner, to teach farmers about their products and services and how they related to productivity and quality.
Mega-events	Larger talks held with external consultants on more theoretical concepts related to INTP and IPM. All members of the local community invited, not just PCA members. Typically, 100+ people in attendance, pre-pandemic. Financial and technology partners also invited to highlight how their products contribute to PCA's technological package.
Schools of Excellence	Smaller, more in-depth trainings on topics related to productivity and quality for those willing to make a longer-term commitment to building their expertise. Participants completing the programs received a certification from the Peruvian Association of Cacao Producers (APPCACAO).
Group Trainings	Trainings held on a cacao plot focused on a single topic related to production and/or quality.
CacaoTech Fairs	Events specifically meant to highlight the benefits of using the products of PCA's technology and financial partners.
Technical Visits	Individual visits from PCA agricultural technicians to producers to provide follow-up advice and guidance on INTP, IPM, and other recommended practices.
Remote Technical Assistance	When pandemic-related restrictions prevented in-person gatherings and/or travel to the target regions, PCA developed text messages, radio shows, virtual events, and a Whatsapp chatbot to enable the team to continue delivering technical information remotely.

Technological Agents meeting in the San Martin region.

While PCA's technical facilitators were key to ensuring that these messages reached over 26,600 producers, the Alliance also recognized that changing long- held behaviors and practices is challenging for many producers, particularly if it involves investing additional time and effort without being certain of the pay-off. To promote behavior change, PCA used a peer-to-peer approach, as farmers are typically more likely to accept and implement new ways of working from trusted neighbors in their communities. This led to the development of two additional activities: the **Cacao Leadership Academy, and a training program for Technology Agents.**

The Cacao Leadership Academy trained and certified "lead farmers," peer champions who had been early adopters of PCA's technology package and who were eager to advocate for its use among their neighbors and communities. Many of them agreed to host demonstration plots, or areas of lead farmers' land where they could show other farmers how to properly apply INTP and IPM practices and technologies, and point to the higher productivity generated via their use. At its peak, the Alliance and its lead farmers managed a network of over 4,300 demonstration plots covering more than 6,400 hectares to promote the PCA technology package.

A representative from technology partner Vida al Suelo points out the impact of organic fertilizer on soil pH on a demonstration plot in San Martin.

Demonstration Plots

Demonstration plots were an important component of PCA's behavior change approach to encourage uptake of improved production practices. Plot owners – lead farmers and Technology Agents – would welcome farmers to visit their plots to explain the benefits of adopting PCA's technology package, and also provide advice on how to correctly apply INTP, IPM, and other recommended practices.

In addition, demonstration plots fostered partnerships across the cacao market system. Technology partners used demonstration plots as natural places to conduct on-site product demonstrations for potential customers, and host pilot projects to experiment with various changes to the PCA technology package over time. The plots also served as useful training venues for PCA's Schools of Excellence, and as natural locations for studies to build the evidence base for PCA's technology package and also on the impacts of climate change.

A portion of these lead farmers continued to engage with PCA training programs to become certified Technology Agents. Technology Agents are influential producers in their communities that not only provide advice and assistance on effective use of INTP and IPM to their neighbors, but have also become entrepreneurs selling goods and services from PCA's technology package in their communities. PCA provided these agents with additional technical training to build their capacity in running a successful business. Working with subcontractor Central Café & Cacao, PCA helped Technology Agents develop business plans and cultivate skills in financial management, marketing, and use of digital technology. For more details, see Sustainability section below.

Collaborating with Technology Partners. Importantly, PCA recognized that providing producers will all this technical knowledge would have limited impacts if it did not also connect them with the suppliers of the inputs and technologies needed to put it into practice. PCA therefore partnered with six agricultural supply companies to ensure that farmers had awareness of and access to proven, high-quality products that would boost their productivity. These partners included Equilibra (fertilizers), Netafim (irrigation & fertigation systems), Tabsac (biological control agents), Branica (irrigation systems), Husqvarna (agricultural machinery), and Vida al Suelo (fertilizers). These partnerships were meant to rebuild trust among farmers that investing in PCA-endorsed inputs would result in higher productivity, while helping connect technology partners with new potential clients.

In addition to having technology partners present at CacaoTech fairs and field days, PCA also organized multiple pilot projects on the demonstration plots of lead farmers and Technology Agents. Members of the community could then come see the results of the use of these products, and decide whether to invest in their use themselves. In some cases, PCA technology partners engaged Technology Agents to serve as their local sales representatives, forming part of their last-mile distribution networks in exchange for commission payments. These Technology Agents created their own stores to serve customers in their communities. This way, interested farmers could come inspect a particular demonstration plot, and then buy inputs and equipment directly from the owner of that plot if persuaded by the results.

Equilibra and Netafim, PCA's technology partners, participating in the Cacaotech fair in the district of Chazuta, San Martin region.

Partner Profiles: Husqvarna and Netafim

Husqvarna and PCA have formed a robust partnership over the past five years, with mutually beneficial results. Husqvarna's presence at PCA trainings helped entice farmer attendance, and their sponsorship of PCA radio spots and (during COVID-19) the Hablemos de Cacao radio show helped build credibility for PCA's key messages and drive engagement. Farmers who adopted their tillers and other equipment in order to implement PCA-endorsed management practices saw significant reductions in on-farm labor time and cost. PCA also helped boost sales for Husqvarna – in Tocache, their sales increased by 30% after their collaboration with PCA began.

Before PCA approached Netafim for a potential partnership, they had only ever worked in the coastal areas of Peru. They had not looked at the Amazon due to the difficulty of reaching small producers. Now they are a major player in PCA's target regions, and are helping cacao producers boost yields by moving away from rainfed agriculture. This is increasingly key to counteract the impacts of climate change on the sector, particularly more frequent droughts. Their fertigation systems – promoted via multiple demonstration plots – also help farmers quickly implement INTP practices in their plots.

Results: Maintained yields in the face of pests, diseases, droughts, and excessive rainfall; Increased fertilizer use from 19 to 31%, and regular pruning from 71% to 81%.

Belinda Saldaña, cacao producer, who manages her own cacao plot with a production of 1,500 to 2,000 kg/ha.

Partner Profile: Belinda Saldaña

Belinda Saldaña lives in the community of Piscoyacu, Huallaga Province in San Martin and belongs to the Cooperativa Agraria de Saposoa (COPALSA). She manages 4 hectares of cacao planted in an agroforestry system, and was a lead farmer for PCA. She also hosts a demonstration plot on her land, which is part of a pilot project with NETAFIM demonstrating the benefits of fertigation systems for cacao production.

Belinda originally got into contact with the Alliance to learn more about the possible causes of low yields on her plots. A PCA agricultural technician visited her plot and explained that over-pruning was causing stress and damage to her trees. They showed her the proper way to prune to allow the right amounts of light and shade, and the right times to prune so that flowering and fruiting was not affected. This, combined with the NETAFIM fertigation system that allows her to produce year-round, have resulted in higher yields (typically between 1500-2500 kg/ha). PCA technicians also showed her how to reduce outbreaks of pests through identifying and removing infected cacao pods from the plot.

> **"Belinda continues to look for additional ways to boost productivity, including experimenting with composting to boost the organic matter in her soils."**

Despite these successes, Belinda continues to look for additional ways to boost productivity, including experimenting with composting to boost the organic matter in her soil. In the future, she hopes to expand her cacao onto additional acres of the agricultural land she owns, using all the knowledge and connections she has gained through her association with PCA.

INCREASING ACCESS TO CREDIT

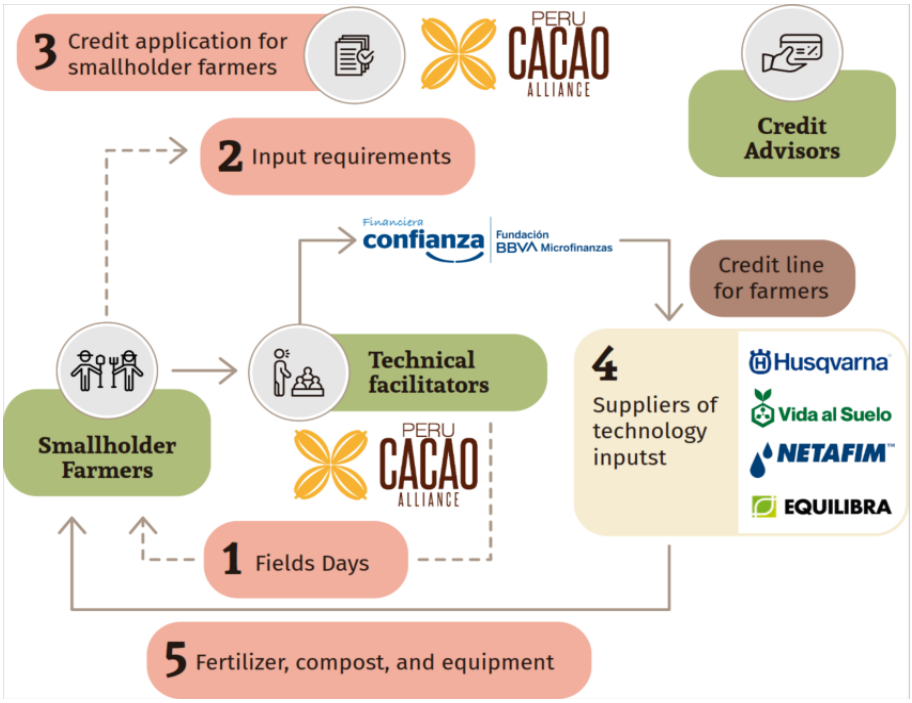
During Phase I of the Alliance, it became clear that limited access to credit among farmers and producer organizations was a significant barrier to improved cacao productivity and quality in the target regions. Without access to loans, farmers were unable to invest in fertilizers, irrigation systems, or improved equipment. SCMs, meanwhile, needed working capital not only to provide inputs to their producers, but also to buy cacao from their members to fulfill purchase agreements with buyers.

Caja Los Andes advisor participating in a field day in the community of Yanajanca, Huanuco region.

The PCA team found that three key areas were preventing credit from getting to where it was needed in the sector. First, while there are 20 FIs offering rural credit in Peru, demand for credit among producers is low, as most believe they do not need it, or that their applications will be rejected if they do seek it out. Second, average interest rates are prohibitively high, due primarily to the elevated operating costs of working in the Amazon region. The population in the region is remote and dispersed, and it takes time and effort for FIs to reach and build a customer base from a relatively low number of clients requesting mostly small ticket sizes. Third, many financial institutions (FIs) do not have analysts who have been trained to evaluate agricultural loans, let alone loans in the cacao sector. Without a working knowledge of business models typical of the sector, analysts may be overly risk-averse and reject well-qualified applications or set excessively high risk premiums for those they approve.

To address these constraints and unlock financing at scale, PCA partnered with 13 financial institutions active in the Amazon - three microfinance institutions, four credit and savings unions, one caja municipal, one caja rural, one international FI, and three fintech companies. The team worked with these FIs to boost demand for credit, reduce the cost of credit, and improve understanding of the sector.

Figure 04: Technological assistance and access to credit



Key Areas Preventing Access to Credit

- Low demand for credit among producers due to belief of immediate rejection.
- Prohibitively high interest rates due to elevated operating costs in the Amazon.
- Lack of financial analysts with experience evaluating agricultural loans.

PCA's work to promote the use of fertilizers, biocontrol agents, irrigation systems, and other inputs was already generating increased demand for credit among producers. To help meet that demand, PCA agricultural technicians regularly convened groups of farmers to meet with FI representatives to learn more about relevant financial products and services. This approach lowered FI's transaction costs associated with reaching new clients, allowing them to better identify and meet the latent demand in the region.

And as producers saw that investing in inputs and proper management practices would generate the extra income needed to repay the loans, they became more comfortable with the idea of taking on those loans in the first place, further increasing demand.

More recently, PCA has complemented this work with efforts to build financial literacy among producers, including developing the FinanFácil online course with Innova Funding (see text box).

FinanFácil Virtual Course on Financial Literacy

In 2022, PCA and financial partner Innova Funding collaborated to create an online course on financial literacy for cacao farmers and entrepreneurs called "FinanFácil". The course was made up of an eight-part series of videos, released on Facebook and Youtube, in which experts discussed a series of topics including financial liquidity, common financial products, financial management during the pandemic, the challenges of rural finance, the benefits of factoring, and the fintech landscape in Peru.

These videos helped take the place of in-person financial trainings when COVID-related restrictions prohibited group gatherings, helping PCA farmer and SCM partners navigate the resulting financial shocks and raising the profile of fintech and factoring in the target regions. The video courses were complemented by a guidebook containing summaries of the content.

As implementation proceeded, PCA worked to further lower the cost of credit through the promotion of emerging financial technology (fintech) options in Peru. By allowing producers, SCMs, and FIs to conduct transactions online, fintech vastly reduces the time and cost needed to travel to physical branches, or make in-person visits to remote communities. PCA decided to focus on three fintech partnerships: Pagos Digitales Peruanos (PDP), Innova Funding, and 4Told Fintech. The collaboration with PDP focused on promoting use of their Billetera Móvil (Bim) electronic wallet platform, which allows users to send and receive money digitally.

Work with Innova Funding focused on digital factoring as a way to improve the flow of working capital through the supply chain. Finally, 4Told Fintech offers a plug-and-play digital credit platform to quickly evaluate credit risk of applicants, reducing lending fees. See the Digital Innovation section below for more details.

In parallel, PCA worked directly with financial institutions to improve their understanding of - and confidence in - the cacao sector. The Alliance shared information from its extensive M&E database

with FIs, and worked with FIs to develop loan products and services aligned with cacao production cycles and producer and SCM needs. As PCA's work with FIs proceeded, they also began to see how PCA's technical assistance to farmers helped lower risk of default by showing them how to put their investments to good use, resulting in higher productivity, higher prices and incomes, and higher rates of repayment. Finally, PCA developed an "Escuela de Asesores en Financiamiento Agrícola" (School of Agricultural Finance Credit Analysts) curriculum that built the capacity of 21 credit analysts at four partner FIs to evaluate agricultural loans (see text box).

PCA worked directly with financial institutions to improve their understanding of - and confidence in - the cacao sector.

School of Agricultural Finance Credit Analysts

Providing training to the staff of PCA's financial partners was not originally a part of the program's planned design. However, within a few months, it became clear that lack of familiarity with the sector was a major bottleneck to unlocking access to credit for farmers and SCMs. The FIs' analysts were not comfortable with evaluating loan applications from producers who might require up to a year to repay, once the harvest season was over. As a result, many just avoided lending to the sector altogether.

To address this, for the first few years of the program, PCA trained analysts in the production and harvest cycle for cacao, while also helping FIs design new financial products that aligned with those realities. In Year 4, four partner FIs - Financiera Confianza, Prisma, Coopac Tocache, and Cooperativa de Ahorro and Crédito Norandina – expressed desire to design a more formal training program for their analysts. So PCA worked with them to design the Escuela de Asesores en Financiamiento Agrícola. Overall, this school contributed to the formation of a new generation of analysts with the knowledge and skills needed to serve the sector for years to come.

Flyer for the School of Agricultural Finance Advisors.

Facilitating additional investment. Beyond its work to unlock finance for farmers, PCA also worked to facilitate additional private investment into the Amazon region. The team created an online investment portal to facilitate use of its database on the farmers, organizations, companies, and business advisory service providers located in each region. PCA also worked closely with the regional governments of San Martin and Huánuco to structure and launch guarantee funds meant to improve the competitiveness and sustainability of agricultural products in the region. While the trusts are still in the process of being established – in part due to competing priorities during the COVID-19 crisis - PCA assisted government officials to navigate the legal and regulatory complexities of setting up such vehicles.

PCA also stood ready to help additional donors, including UNDP's Sustainable Productive Landscapes project and others, to connect with cacao value chain actors to understand the state of the industry and better design future interventions so that they aligned with and complemented USAID's ongoing investments. The team also generated a pipeline of $6.2M in opportunities for interested investors, including Incofin and Impact Finance, and in some cases provided support to potential investees to meet investor credit evaluation and paperwork requirements. Finally, PCA worked with FOGAPI to develop a new financial product for the agricultural sector that would standardize evaluation criteria with those of international financial institutions, so that IFIs would not have to reevaluate each farmer looking to take advantage of FOGAPI guarantees.

The number of financial partners engaged through the Alliance allowed the program to increase access to finance among a range of different market segments. Each FI partner had a particular client profile and approach to lending to the sector. For example, Mi Banco issued loans with an average size of $4,579, while loans issued by PRISMA were only $1,223 on average. The other FIs all fell somewhere within this range. This allowed PCA to help producers across all income quintiles to invest in their farms, productivity, and quality.

As a result of PCA's work, FIs now see cacao as a sustainable and viable part of their portfolio, while producers are more comfortable and willing to engage with the financial system and apply for loans to start an upward cycle of productivity, incomes, and investment.

Mi Banco credit advisor explaining its financial products to a group of cacao leaders in the San Martin region.

Results:

40%

of PCA farmers accessed credit at least once over the past five years.

$31M

in financing went to 10,649 producers (2,446 women).

13,454

people using mobile money

VI THE PRIVATE SECTOR AS CO-INVESTORS

PCA's success hinged on the active involvement of a wide range of private sector partners. Through its 38 members and dozens of additional private sector actors that requested PCA assistance over the course of implementation, PCA was able to reach many different market segments and geographies. This diversification was the key to reaching over 26,600 farmers across income quintiles.

As a GDA, the Peru Cacao Alliance was structured so that USAID investments would crowd in additional private sector financing, or leverage. Leverage refers to resources a nontraditional USAID partner brings to a public-private partnership. It can be a variety of forms—anything of value that is measured, including financial contributions, third-party contributions, donated services or property, or intellectual property. USAID agreed that for PCA's purposes, leverage could include both resources that private partners contributed to the project, or investments they made themselves as a result of PCA's support to the sector. This way, the GDA meant that USAID was just one of many interested investors all working together to collectively transform the cacao sector.

PCA created a guidebook on how to count and report leverage, which it disseminated to all partners. The program also had a dedicated staff member assigned to compiling and verifying all the leverage reports submitted by partners. For example, if a partner reported building a new storage facility for cacao beans, PCA would visit the facility to verify that it was finished and operational.

Private sector leverage under PCA fell into six categories: FI contributions, capital raise, working capital, labor contributions, operating and administrative costs, and infrastructure, equipment, and related expenses. Leverage contributions from FIs – totaling $6M – were calculated as 20% of the total value of credit issued by each institution to PCA farmers. This definition was established at the GDA level, and then embedded into the individual agreements with each FI. These contributions mostly took the form of working capital loans, as well as personnel time. The $12M categorized as capital raise refers to an investment into Caja Rural de Ahorro y Credito los Andes S.A. from Creation Investments Andes LLC, an investment fund. This infusion of capital is directed at catalyzing the FI's growth in Peru's rural sector as well as its digital transformation, funding investments in analytics and technology to better provide services to rural MSMEs. Finally, the $1M in working capital contributions came from major coffee and cacao exporter Romex to finance direct purchases of cacao from producers, bypassing value chain intermediaries resulting in better prices for producers.

FI Contributions	6,065,694
Capital Raise	12,000,000
Working Capital	1,015,333
Labor Contributions	15,649,947
Operating & Administrative Costs	1,620,116
Infrastructure, Equipment & Other	20,624,773
TOTAL	56,975,863

Investments in infrastructure and equipment represented the largest portion of the private sector leverage generated as a result of the project - $20.6M, or 36% of the total. These included new cacao installations, processing plants, storage centers, vehicles for transport, quality control laboratories, and more that were unlocked by PCA's consistent promotion and strengthening of the cacao sector. For example, AGROSUN decided to invest $836,287 into 585 hectares of cacao after consulting with PCA about the right varieties, location, and other considerations needed to make the investment worthwhile. Villa Andina invested $766,435 into the construction and outfitting of a cacao processing plant in Neshuya, including 2 hectares of

land; design, labor, and construction costs; processing equipment; and software and licensing purchases. Romex invested $2M into a plantation in Yarina, San Martin, including 200 hectares of cacao and plantain, 15 hectares of timber, a meteorological station, and lodging. ACOPAGRO invested $1.2M into land, a quality control laboratory, humidity detectors, fermentation and quality modules, repair and maintenance of aggregation centers, a new storage facility, and a fertilizer plant. Colpa de Loros invested $1.1M into a centralized processing plant, drying equipment, biogas plan, organic fertilizer plant, fermentation and drying infrastructure, and wells, and expanded their storage facilities for cacao and fertilizers. And Inka Crops invested $5M into their processing plant in the Lima region to process, package, and store a new line of fried plantains, a testament to the new volumes of high- quality plantain supply that PCA helped to generate as part of its encouragement of agroforestry systems. Private sector partners have also dedicated $15.6M worth of staff time and effort to PCA.

Drying area of the Colpa de Loros Cooperative, in the district of Neshuya, San Martin region.

Villa Andina's cacao bean processing plant located in the district of Neshuya, Ucayali region.

Many producer organizations and other SCMs assigned their agricultural technicians for several months at a time to work with PCA staff on efforts to improve cacao productivity and quality from member farmers in their supply chains. Finally, about $1.6M in leverage came from operating and administrative costs associated with implementing the above activities.

The private sector's contributions to the program went beyond this $56.98M in leverage. They were essential to PCA's success, filling complementary roles in the market system and contributing to the strategic direction of PCA initiatives throughout the life of the program. A core group of private sector partners formed a Comite de Socios, which met regularly to review progress, inform annual work plans, and make recommendations on future priorities and any needed shifts in focus or approach.

As discussed above, anchor firms, SCMs, technology companies, and financial institutions all played key roles in PCA's efforts to boost farmer productivity, quality, and incomes. Anchor firms committed to new purchase agreements with SCMs; SCMs invested in developing and promoting quality products, technology companies collaborated on provided improved services to members and training events and pilot programs on demonstration plots; and financial institutions invested in learning how to serve a new sector and client base.

Over the life of the program, a total of 84 private sector partners contributed cash and/or in-kind resources to the program. While leverage amounts from many of the smaller cooperatives were relatively minor in absolute terms, the fact that such organizations running on thin margins would dedicate scarce resources to such efforts reflects the high level of trust in the ideas and practices that PCA introduced, as well as the value of PCA-organized trainings and TA. By identifying and capitalizing on opportunities for win-win investments with all these private actors, PCA was able to generate tangible benefits for farmers and its other private partners simultaneously. PCA deliberately designed these initiatives as true partnerships, incentivizing active private sector participation to achieve sustainability of impact. More cacao at higher quality translated into higher incomes for farmers, more and better supply for SCMs and processors (requiring new investments to accommodate), and more demand for credit and inputs for FIs and technology partners.

VII STRATEGIC COMMUNICATIONS TO GENERATE RESULTS

PCA's communications efforts were central to building a "culture of cacao" in the Peruvian Amazon, and to ensuring that the program's messages consistently reached large numbers of farmers living in dozens of communities spread across the four target regions. Just as importantly, PCA used communications and knowledge management to establish itself as a facilitator for actors throughout the value chain, aligning different interests and providing information where needed to construct a common vision and present a unified face for Peruvian cacao to the rest of the world. PCA built up a unique repository of information gathered and validated from 11 years operating in the sector, and its communications strategy enabled it to transmit that information effectively to actors throughout the system. **This approach became the main way that PCA fostered the lasting behavior change needed to fuel widespread adoption of recommended practices and transform the sector.**

The PCA brand was established under Phase I, but really took off under Phase II. This was due in large part to USAID's support, allowing the team to go beyond the typical communications deliverables and develop the platforms and recognizable brand needed for communications to become a true enabler of all the project's components. PCA had an approved logo and consistent visual identity (styles, color pallets) that made it easy for producers and other sector actors to recognize the source of relevant information, and establish brand trust and loyalty that helped drive uptake of recommended practices.

Communications products spanned in-person and virtual events, trainings, and conferences (including the flagship Salon de Cacao discussed above); written materials (infographics, manuals, invitations, certificates); and audiovisual mediums (radio shows, online videos). The team focused on making these materials simple and accessible, emphasizing use of images and graphics in written materials and integrating regional music, slang, and other nuances into the audiovisual content to make it more attractive, relatable and memorable. PCA also coordinated the release of communications materials with specific periods of the production cycle – reminding farmers when they should be fertilizing, and when they should be particularly vigilant against pests and diseases. The team also helped various partners produce printed materials for specific events, helped smaller organizations design their logos and branding, and even co-created certain communications campaigns with partners, such as the "campeones organicos" campaign with ACOPAGRO encouraging organic production practices. Due to the consistently high-quality content of PCA's communications materials, actors from across the market system came to trust PCA as the go-to organization for reliable, tested information to help make informed decisions.

Diptych on NIPO shown to cacao producer in the district of Nuevo Progreso, San Martín region.

PCA's approach to communications evolved throughout the five years of implementation, particularly in response to COVID-19. The team continually tested different formats, timing, approaches, and materials, and monitored impacts in the field to keep refining as needed. For example, when the program started, smartphones were less prevalent in the target regions and many farmers did not have regular access to mobile or internet connectivity. By 2022, however, 73% of PCA-supported farmers reported using the internet at home, the vast majority through mobile connections (although connectivity still lagged at only 38% on farmers' cacao plots). As a result, PCA put increasing emphasis on engaging farmers, organizations, and others through digital channels, including Whatsapp and social media.

In addition to maintaining a robust and regularly updated website - which includes a partner directory, investment portal, and library of technical materials - PCA ran active Youtube and Facebook accounts and also experimented with other platforms such as Flickr. These online resources have not only been popular among stakeholders in Peru, but are also regularly visited by people in Colombia, Ecuador, Brazil, and Guatemala. PCA used its Facebook page – which has over 25,000 followers as of this writing - to publicize events and trainings, promote technical manuals and videos, and even host "Choco-Entrevista" talks on Facebook Live with experts on topics such as INTP, IPM, post-harvest handling and quality, and traceability. Meanwhile, PCA's Youtube channel (with over 1,000 subscribers and a cumulative 103,350 views on all videos as of this writing) serves as a central repository for expert interviews, recorded webinars and radio shows, infographic videos, success stories and more.

Chocointerview "Let's Talk About Cacao" about integral nutrition in the cultivation of cacao. Flyer prepared for social networks.

Together, these two social media channels have been essential to promoting PCA's key messages and shifting behaviors and practices in the target regions.

Eduar Castillo, cacao producer, utilizing a smartphone, Neshuya district, Ucayali region.

ADAPTING TO THE COVID-19 CRISIS

Christian Chambilla, Business Manager of the Pasco Regional Office, recording the radio program "Let's Talk About Cacao", Constitución district, Pasco region.

The COVID-19 pandemic required the PCA team to make drastic changes to its operating model during the last two years of the project. Up until that point, it relied heavily on regular, face-to-face interactions with farmers through individual visits and group events. But with lockdowns and travel restrictions preventing such in-person technical assistance, PCA's communications team had to find new ways to reach its target audiences.

PCA therefore pivoted to using radio, mobile, and social media channels to reach farmers, involving Alliance partners wherever possible (for more information, see Digital Innovation section below). The communications and technical teams had already used radio as a way to reinforce the program's key messages, including through a "Mazorquero no te quiero" campaign to remind farmers how to control outbreaks of cacao pod borer. These radio spots were sponsored by PCA technology partners, whose products and services complemented the recommended practices communicated through the radio spots.

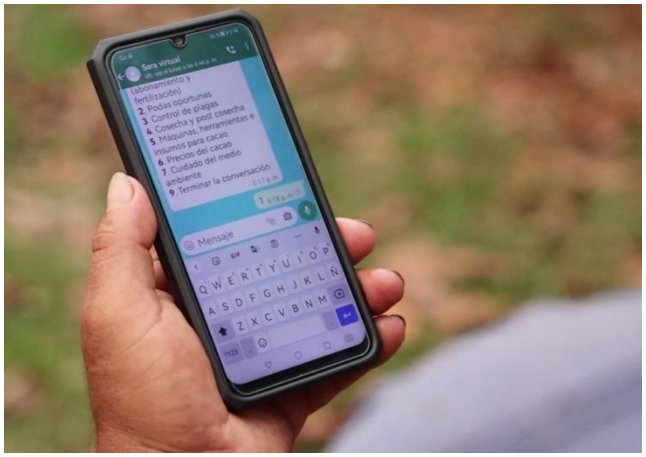
When the pandemic started, PCA built on this model, developing two radio programs that would entertain and educate at the same time. The first, *Pasión por el Cacao*, was a radio soap opera with dramatized dialogues between cacao farmers and PCA agricultural technicians.

The farmer would ask questions regarding an issue they were facing on their plots, and the technician would provide information to help solve the problem. This format proved popular and inspired a similar DEVIDA-produced radio program, as well as other initiatives such as Rainforest Alliance Radio.

The team used lessons learned from *Pasion por el Cacao* to then develop the Hablamos del Cacao radio program. This program, sponsored by technology partner Husqvarna, followed a similar interview format but also incorporated a raffle feature in which winners received Husqvarna equipment. PCA's partnership with Husqvarna on this program helped build credibility, encouraged listeners to tune in regularly, and connected farmers with the information and tools needed to boost productivity. PCA's communications team trained technical staff in how to effectively showcase their own knowledge on the program as well. These radio programs also always set aside time for listeners to call in to ask questions that PCA technical staff could answer, and provided information on how to get in direct contact with the PCA agricultural technicians based in each community to get additional details on recommended practices.

Promotion campaign for the radio program "Let's Talk about Cacao" in the San Martín region.

Finally, PCA tapped into the growing popularity and easy accessibility of Whatsapp (used by 41% of farmers or their children) to transmit information to farmer partners at scale. When the travel restrictions were first implemented, the PCA team experimented with using SMS messaging to reach farmers, sending 2-3 messages per month. However, they quickly found that mobile connectivity issues were limiting the effectiveness of this approach. Whatsapp, on the other hand, functions using wifi, which more farmers can easily access. The team therefore relied on Whatsapp to send messages to its farmer partners, and worked with the M&E team to develop a Whatsapp chatbot named SARA (see text box) for incoming queries (see Digital Innovation section below for details).



Cacao farmer requesting technical assistance from Sara, virtual assistant.

Overall, significant investments in communications were essential to PCA's success in delivering technical information in an accessible and appealing way to all the actors in the sector, and for strengthening the overall cohesiveness and identity of the Peruvian cacao market system. This allowed PCA to position itself as a valuable central node within that system, improving uptake of recommended practices and promoting the program as a one-stop shop for any information, advice, or connections anyone in the sector might need.

VIII ADVANCING GENDER EQUALITY AND SOCIAL INCLUSION IN CACAO

EMPOWERING WOMEN IN THE CACAO SECTOR

Women play an important role throughout the cacao value chain, but their contributions in production, marketing, and processing are often overlooked or diminished. In addition, many women are less able to take advantage of leadership and training opportunities due to traditional gender roles and the double burden of on-farm and household labor.

From the beginning, PCA has worked to help women overcome these barriers both on and off the farm. The program had a dedicated Gender team charged with integrating a gender lens across all technical activities. The team first held focus groups with women across the target regions to understand common needs and priorities, and used this information to inform PCA's work.

Neli Liberato, technology agent of the Huanuco region, conducting a technical training on cacao cultivation.

One of the first steps to generating change in the target regions was raising awareness of basic gender-related concepts among farmers and other partners. PCA included gender-related workshops in its Schools of Excellence, teaching participants about gender roles in the division of labor and highlighting the value of women's unpaid labor and the benefits of a more equitable division of labor. The curriculum also included human development themes such as ethics and values, financial management, respect between individuals to prevent domestic violence, and resources for those experiencing violence.

The Technology Agent curriculum incorporated similar themes as well, including an "agents of change against violence" course. Throughout, the team always took into account potential sensitivities, religious or otherwise, that their target audiences might associate with gender topics, and designed trainings that proactively addressed those concerns.

PCA also encouraged participation of women in workshops and trainings by providing childcare and entertainment materials at each event, and by creating and airing radio spots that encouraged men to provide childcare while women attended. The team also designed certain courses specifically for women, focusing on soft skills such as self-esteem, leadership skills, and negotiation strategies.

Lorenzo Romero, technical facilitator in charge of child care, in a training session held in the Ucayali region.

PCA worked with the members of the women's committees to build their confidence and leadership skills, and understand how best to serve female members of the cooperative.

Technical team of the Huanuco Regional Office in workshop for the "Day of Non- Violence against Women".

In addition, PCA prioritized gender sensitization among its technical staff, some of whom were unused to incorporating a gender lens into their work. This included gender sensitivity training for staff, as well as a gender manual to guide fieldwork with female farmers and heads of households. The team also hosted internal events and regular discussions on gender stereotypes, inclusive language, sexual harassment, and gender-based violence, often coinciding with major events such as International Women's Day, International Day of Rural Women, and the International Day for the Elimination of Violence Against Women. During COVID, the team held internal reflection sessions on the gender-specific impacts of the pandemic (i.e. challenges working from home while caring for children).

PCA also emphasized women's empowerment in its work with partners, including cooperatives and FIs. The team encouraged the formation of gender or women's committees in partner producer organizations, and fostered discussions on gender-related challenges and possible solutions. These ideas were then included in organizational strengthening plans for these organizations, improving regulations, statutes, and operating procedures related to gender. PCA also worked with the members of the women's committees to build their confidence and leadership skills, and understand how best to serve female members of the cooperative.

PCA connected cooperatives with buyers through a series of workshops to discuss priority actions and challenges related to achieving gender equity in the value chain.

These workshops involved the cooperatives Agroindustrial Cacao Alto Huallaga, Colpa de Loros, Allima Cacao, and Cetnral Curimana, as well as representatives from Tcho, kaoka, Uncommon Cocoa, Equator Coffee Roasters, Barrie House, Equal Exchange, Cocoa Latitudes, Phila Coffee, Starbucks, Portland Roasting, Dunkin Brands, Mr. Espresso, and Lush Cosmetics. Finally, PCA worked with Financiera Confianza to attract potential clients for their Palabra de la Mujer financial product, which offers small loans, paired with financial education training and other technical assistance, to groups of 12-25 women from the same community looking to start or grow their businesses.

PCA also sponsored four cooperatives - Cooperativa Agroindustrial Cacao Alto Huallaga, Cooperativa Colpa de Loros, Cooperativa Agraria Allima Cacao, and Cooperativa Central Curimana – to take part in an online "Let's talk about gender" course from the Partnership for Gender Equity. Finally, PCA conducted gender trainings with the boards of directors for the SANCORE and CAI BELLA cooperatives, and worked with Collpa de Loros to develop a formal gender and violence prevention policy, which are often required as part of Fair Trade certification.

PCA also consistently highlighted women as visible and important actors throughout the sector. We proactively enlisted women as Technology Agents, lead farmers, and technical experts in trainings and webinars, and featured photos of female farmers and business owners in communications materials. We even designed the SARA chatbot with gender considerations in mind. We fostered networking opportunities for women in the sector, hosting a "Protagonists of Change" group of women entrepreneurs and also a meeting of 11 female cacao farmers from all across the four areas of intervention at the 2021 Salon de Cacao.

Overall, PCA has provided 15,893 women with training on cacao crop management, good environmental practices, quality control, gender workshops, and access to agricultural financing to strengthen their capacities and generate more opportunities for them within the cacao sector.

Norma Sangama, cacao producer, technology agent and partner of the Allima Cacao cooperative, San Martín region.

Overall, PCA assisted

15,893

women over the life of the project.

SUPPORTING YOUTH

While PCA did not include a specific focus on youth, young people were still an important beneficiary group across PCA activities. Youth often do not see a future for themselves "on the farm", and migrate from rural to urban areas for better employment opportunities. However, they are often more interested in off-farm jobs in the sector, such as selling inputs and equipment, providing related services such as soil analysis or repairs, and operating processing plants.

PCA's Technology Agent approach taps into this interest by connecting entrepreneurs to suppliers, FIs, and local producers, creating job opportunities to sell goods and services to others in the system. Many of the 124 Technology Agents are between the ages of 18 and 29. In addition, the significant investments that private sector actors have made in processing plants and other value-addition activities have resulted in additional employment opportunities for youth.

Elmer Villegas and Mirtha Flores in their agricultural supplies store called "Agroservicios Villegas", Saposoa district, San Martin region.

WORKING IN INDIGENOUS COMMUNITIES

Indigenous communities are also active participants in the sector, but are disproportionately impacted by a lack of access to markets, inputs, and finance. In addition, many are wary of outside assistance due to centuries of marginalization and exploitation. When PCA operations expanded to Puerto Bermudez and Ciudad Constitución in 2020, the team began to work directly with producers from two native communities – the Yanesha and the Ashaninka.

To ensure that PCA's work with these groups was both effective and respectful of traditional knowledge and practices, the team collaborated with community associations and local apus (leaders), as well as DRIS, a local NGO with a long history of working successfully in the area. Once these groups understood the purposes and benefits of the project, they then accompanied PCA to meet with native producers and gain their trust and interest in working with the program. This early coordination with local actors was the key to PCA's success working in these communities.

Once work with the Yanesha and Ashaninka began in earnest, PCA tailored its approach to the local cultures in several ways. The team hired and trained agricultural technicians directly from these communities, so that they could deliver TA and training in the native languages and according to local customs. When the COVID-19 pandemic forced PCA to pivot to virtual TA, the team translated all Hablamos del Cacao radio programs into the Yanesha and Ashaninka languages for the stations operating in those communities.

Finally, PCA adapted its technology package to align with these communities' philosophies and traditional approaches towards cacao cultivation, boosting productivity and quality in ways aligned with the unique cultures of these groups.

Finally, PCA sought out buyers and connected them directly with the communities, reducing the number of intermediaries and allowing buyers to understand the value in promoting the environmental and sociocultural uniqueness of these products.

Cacao producing family from the indigenous Yanesha community (left) and a Flyer for the radio program "Añawentero kemito", Let's Talk About Cacao in the Ashaninka native language (right).

IX ALTERNATIVE DEVELOPMENT AS ENVIRONMENTAL PROTECTION

The 70,000 cacao farmers in PCA's target areas cumulatively control 750,000 hectares of land in the region, 54% of which still contains primary or secondary forest. Preventing deforestation in these geographies, therefore, means ensuring that farmers are producing enough on their existing agricultural land to make a living without expanding into standing forest.

PCA found that its farmer partners were eager to be better stewards of natural resources, but that the economic realities of cacao production meant that any additional environmental protection efforts also had to contribute to higher incomes. PCA threaded this needle, connecting farmers with the practices and tools needed to boost profits while reducing environmental impacts.

PCA designed its technology package for farmers in response to the dramatic shift that the global cacao market has undergone in the past decade regarding environmental and social sustainability. Responding to rising consumer demand for ethical, sustainable chocolate products, chocolate companies have been seeking out ways to guarantee that their supply chains are free of child labor, do not drive deforestation, and pay fair prices to farmers. In addition, many importing countries are ramping up their regulations around agricultural commodities from tropical countries. The EU has been the most stringent, including Directive 2009/128/EC on the sustainable use of pesticides as well as the recently proposed regulation that would require certain agricultural imports, including cacao, to be provably deforestation-free.

Many companies have traditionally attempted to solve these issues through sustainability initiatives focused on farmer training and certification. However, these were generally unable to generate the systemic change needed to bring an order of magnitude more income and profitability to farmers, and in some cases imposed additional costs on farmers without any resulting economic benefit. PCA's approach was designed with these lessons in mind.

David Herrera, technology agent, with his protective equipment, applying biological controllers in his cacao plot, Neshuya district, Ucayali region.

CLIMATE CHANGE MITIGATION & ADAPTATION

Phase I of the Alliance had already co-invested with farmers and other partners to plant 29,088 hectares of cacao in the target regions, 56% under an agroforestry model that installed an additional 2 million capirona (Calycophyllum spruceanum) and bolaina (Guazuma crinita) trees, as well as 14 million plantain trees. An independent analysis from USAID's Office of Global Change in Washington, together with the Climate Change Agriculture and Food Security Program (CCAFS) of CGIAR, found that the new cacao trees alone (not including the plantain or other trees planted) resulted in projected carbon sequestration of 211,467 tCO2e, more than offsetting expected greenhouse gas (GHG) emissions from increased use of inputs (10,286 tCO2e). During Phase II, PCA focused on increasing yields on existing agricultural land as a way to reduce and avoid deforestation. In addition, we promoted the uptake of lower-emissions equipment, such as battery-powered Husqvarna equipment, to reduce fossil fuel use and related emissions on the farm.

PCA also built the resilience of PCA farmer partners to climate-related shocks and stressors. With Bioversity, the team first conducted a study on the impacts of climate change on PCA's target regions. The analysis found that temperature increases were contributing to more erratic rainfall (i.e. extended droughts followed by unusually intense periods of rainfall), as well as to increased prevalence of pests and diseases. Overall, the study found that climate change was negatively impacting yields in all regions.

With the results of this study in mind, PCA then engaged its partners and technical staff to explore possible solutions. In addition to promoting techniques to reduce soil erosion and run-off (composting, intercropping, river buffers, infiltration ditches and contour barriers), PCA encouraged the use of rain barrels to store rainfall until it is needed. As mentioned above, PCA also worked with technology partners such as Netafim to pilot the use of irrigation and fertigation systems on cacao plots to help mitigate the effects of droughts.

Fred Rivera, representative of Netafim, conducting a training on the benefits of the fertigation system in the district of Barranquita, San Martin region.

SOIL, WATER, AND BIODIVERSITY CONSERVATION

PCA's technology package included a major focus on promoting organic production, including non-chemical pest control methods such as physical, cultural, and biological control. This allowed farmers to maintain access to European markets, while also protecting local pollinator biodiversity and reducing impacts on local water quality from runoff. PCA's promotion of soil conservation techniques further improved soil quality and prevented soil erosion, while its encouragement of organic fertilizer use via partners such as La Calera and Equilibra helped restore the organic matter in the soil.

PCA also worked with producers and producer associations to improve management of the drainage waste, or "honey waters", left over from the drying and fermentation process. By facilitating installation of drainage channels and compost pits, PCA helped preserve soil quality across the target regions. Finally, PCA played an important role in studying emerging environmental issues, partnering with Bioversity to study possible solutions for reducing cadmium levels in the soil and in the cacao plant (see text box).

Responding to the Cadmium Crisis

EU Regulation 488/2014 established new maximum levels of cadmium content in cacao and chocolate products. There was significant concern throughout the industry that this would drastically limit Peruvian exports to European markets. PCA led the way in analyzing the regulation's expected impacts, and investigating potential solutions. The team found that the regulation would drastically lower the price of exported beans, make it unprofitable to produce cacao liquor or butter, and essentially prohibit the exportation of Peruvian cacao powder. PCA supported the Peruvian government to propose revised limits to the EU in line with CODEX's regulations regarding cadmium levels, and also worked with Bioversity to test cadmium's distribution within the plant, as well as various methods for lowering cadmium levels in the soil and in the plant. The team incorporated the practices shown to be most effective in reducing cadmium levels into technology packages and trainings.

Flyer of the cadmium study carried out in agreement with the Universidad Nacimiento Agraria La Molina and the Peru Cacao Alliance.

Overall, PCA's activities resulted in a significant reduction in crop emissions intensity (GHG emissions per unit of production) driven by increases in carbon sequestration per hectare and increased yields. It also preserved biodiversity, soil and water quality both on- and off-farm. While PCA was not an environmental program, it generated a wide range of environmental benefits as a part of responding to what the sector needed to succeed and thrive in the current market.

X DIGITAL INNOVATION IN THE AMAZON

Due to the Peruvian Amazon's vast size and dispersed population, the introduction of digital solutions into both the market and the operations of donor-funded programs has significant potential to reduce travel time and costs related to market transactions and project functions such as M&E and communications. PCA recognized the potential of digital approaches to development early on, and worked to support digital innovations both through direct project activities and through its partners in the system. As discussed in the communications section above, this focus, investment, and mentality became vitally important during the pandemic, when travel and in-person assistance became impossible.

MONITORING AND EVALUATION

PCA embraced the possibilities of digital data collection and management from Day One. Phase I of the Alliance had already developed the most comprehensive database of fine flavor cacao farmers and extension services in the world. This data set and satellite imagery allowed the team to generate reports for investors so they could identify clusters of fine flavor cacao production, appropriate locations for investments in post-harvest handling, and the best sites for new input providers, production facilities, or irrigation systems. During Phase II, PCA continued to actively manage and expand this database, using it to help monitor not only the program's 16 indicators, but also collect the information needed to track progress on Alliance member priorities.

The team also developed new digital tools to facilitate data collection and accelerate people's use of digital channels to access technical and market information. For example, PCA created the SARA Whatsapp chatbot, an artificial intelligence-based tool built to reach farmers through a personified identity and intercultural focus (see textbox).

La Ingeniera SARA

As part of its pivot to virtual TA during COVID, PCA developed an AI-enabled virtual assistant, La Ingeniera SARA, to respond to farmer inquiries via WhatsApp with on-demand access to technical information. Farmers are able to submit questions 24/7, and SARA will either provide an answer or – for more complicated queries – forward the question to a PCA technician for follow-up. Since SARA became operational in 2021, the chatbot has completed more than 4,000 consultations.

In addition, PCA's Cacao 2 Go mobile application allowed staff to enter in baseline data on each farmer, and register TA visits and attendance at group trainings. The application functions offline, and uploads the data to a server once it connects to the internet. PCA is now working with FI partner Financiera Confianza to use the app to generate information for a rapid credit evaluation on farmer loan applicants, facilitating access to finance (see text box). Technology Agents are also able to use the application to track sales and profits and apply for loans as well.

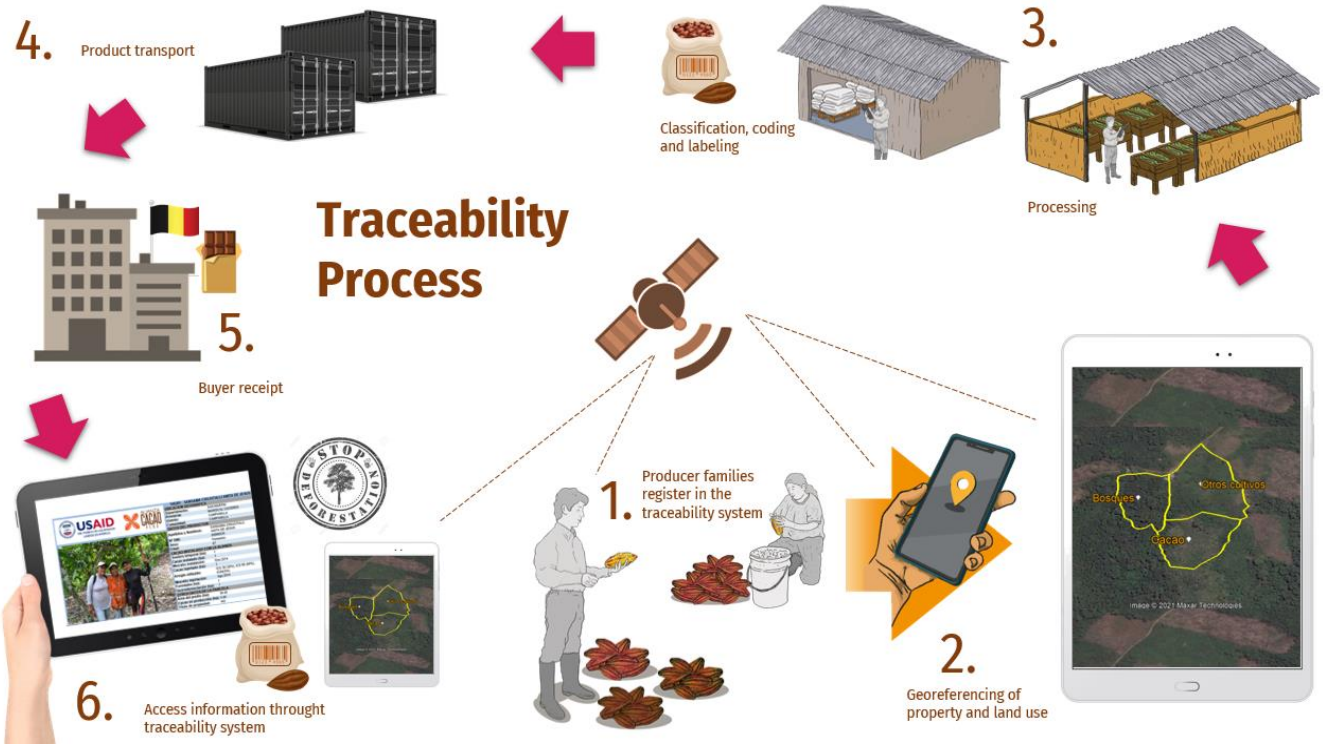
Cacao 2 Go Mobile Application

PCA leveraged its CacaoToGo smartphone application as a tool to help FIs evaluate loan applications. Farmers (with the help of PCA staff or Technology Agents) fill in information related to their property title and size, the amount of cacao under production, their main buyers, and their typical revenues and costs. They also enter a brief description of the amount and purpose of the desired loan. The farmer can then provide a signature directly in the app to certify the information. Meanwhile, PCA staff use the application to capture the coordinates of the property and take photos as needed. All data is then uploaded to PCA's database for the FI to access. Data collected through the application is also the basis of the traceability system being developed, described below.

TRACEABILITY SYSTEMS

Traceability is one of the biggest challenges facing the cacao industry as it seeks to respond to regulatory and market requirements that products do not contribute to child labor, deforestation, or biodiversity loss. Many innovators are developing potential solutions to this challenge, including PCA, which piloted the development of a geolocation system with SCM partner Collpa de Loros that would use a mixture of satellite and in-person data to track forest cover on individual cacao plots over time. Building on the Cacao 2 Go application and farmer database described above, **PCA's traceability system would ensure that Peruvian cacao meets even the most stringent market requirements regarding deforestation, and also could be leveraged by carbon credit programs to help connect smallholder farmers with an extra source of income for protecting and restoring their forests.**

Figure 05: PCA's Proposed Traceability System



FINTECH

As mentioned above, as PCA's work on access to finance evolved, the team increased its focus on supporting fintech solutions that could help farmers, FIs, SCMs, and buyers exchange money in a cost- and time- effective way. Fintech allows financial transactions to take place online, avoiding the need to travel long distances with cash, which brings security risks and higher transaction costs.

PCA's work with the fintech ecosystem ranged from teaching farmers how to use smartphones and mobile applications, to connecting fintech companies with potential customers within the Alliance, to designing pilots with other Alliance members. The program's efforts centered on partnerships with three fintech companies:

Pagos Digitales Peruanos

PCA supported PDP to promote the use of its "BIM" digital wallet in the target regions. BIM allows users to send and receive money, add minutes and data to their cell phones, and (for businesses) accept electronic payments. PCA hosted trainings where PDP demonstrated the possible uses of the digital wallet, and helped connect the program with "BIMers", or BIM users in the local community who were willing to disseminate promotional materials and answer questions from neighbors.

Innova Funding

PCA has worked with Innova Funding to onboard cacao farmers and cooperatives on to their factoring platform. Factoring improves the liquidity of such enterprises by offering certified invoices to 3rd-party investors. These investors get paid once the end buyer pays off the invoice, but in the meantime the small farmer or enterprise does not have to wait 30, 60, or even 90 days for the payment they are owed. In addition, interest rates are often lower than those of local FIs – businesses can specify a particular interest rate when uploading their invoices to the platform, and investors can make competing interest offers for attractive invoices.

PCA organized talks to introduce Innova's product to its farmer and SCM partners, helping the Innova team to overcome barriers such as fear of taking on credit and lack of financial literacy (see also FinanFácil description above). Innova's association with PCA encouraged farmers and cooperatives to trust that the service was valid and valuable. PCA also developed a sello, or certification stamp, which demonstrated to investors which invoices were backstopped by our technical assistance. Thanks to PCA's reputation in the country, this was effective in lowering the perceived risk around such invoices, increasing investor confidence in the sector.

4Told Fintech

A more recent PCA partner, 4Told Fintech offers FIs a digital platform that automates the loan evaluation process. Using machine learning, the platform analyses information provided by the applicant and provides a recommendation based on each FI's particular policies and risk tolerance. The company charges FIs a 1.5% fee on each loan disbursed using the platform. PCA brokered a partnership between 4Told and Financiera Confianza to develop a prototype for analyzing producer financing applications that would eventually replace Financiera Confianza's current evaluation system.

With PCA's support, cacao farmer uptake of fintech options has improved. 13,454 people started using electronic wallets as a result of PCA's promotional activities, and over $4M worth of transactions have been conducted by PCA partners on Innova Funding's platform since the partnership began in 2020.

SOCIAL MEDIA

As mentioned in the Communications section above, PCA's long-time emphasis on social media channels allowed the team to maintain connections with its thousands of farmer partners both before and during the pandemic. PCA continued to reach producers through Facebook and Youtube, hosting webinars, and producing videos on timely topics such as proper use of personal protective equipment on the farm. PCA also began to post specific sections of its technical manuals and guides on Facebook, in order to bring wider attention to those resources and lower data requirements to download the information.

While PCA's use of social media was essential in connecting its staff with farmers, just as important was its ability to connect producers with each other. Thanks to its efforts to build digital literacy – including, in some cases, conducting trainings on what an application is and how to use a smartphone – PCA farmers have used social media to create informal networks within and between communities. For example, farmers have created Whatsapp group chats and exchanges in which they send tips and advice to each other, ask questions, and serve as an organic amplifier of PCA-promoted technologies and practices. Without prompting, they are sending tutorials to each other on how to use machinery and other equipment, asking each other the best ways to approach potential clients, and sharing examples of promotional materials. These strengthened farmer-farmer linkages are an important avenue of sustainability that will continue to drive PCA's impact into the future.

While PCA's use of social media was essential in connecting its staff with farmers, just as important was its ability to connect producers with each other.

VIII A DRIVER OF COLLABORATION, LEARNING, AND ADAPTATION

Beyond its direct interventions with Alliance members, PCA has served an important role in driving learning, collaboration, and adaptation in the face of new opportunities and unexpected challenges. PCA served as a repository of best practices actors could turn to when they had a question they needed answering. The communications and technical teams worked together on conferences, trainings, events, videos, infographics, and written materials that positioned PCA as a knowledge-sharing organization ready to help anyone interested in the cacao sector to make informed decisions.

PCA also served as a builder of new connections and synergies between actors with complementary needs, the voice of the private sector in national-level discussions on relevant policies, and as a generator of new knowledge and applied research. As the central actor connecting various parts of the sector, PCA was able to flag trends and issues – such as organic and traceability requirements in end markets – and transmit them back through the value chain all the way down to the farm. PCA's work generated a demonstration effect among its partners. For example, ACOPAGRO is forming a network of bioconsultants based on our Technology Agent methodology, and Amazonas Trading is developing its own technical manuals and other materials based on PCA's programs and recommendations.

PCA used its network of demonstration plots and its relationships with academic institutions such as

Bioversity and the Universidad Agraria La Molina to conduct applied research to inform its technology package and help the sector respond to emerging trends and issues. The team helped build the evidence base for the positive impacts that INTP and IPM could have on yields in comparison to traditional production methods. PCA also experimented with potential solutions to the challenges presented by cadmium levels and climate change impacts, as described above. And the team worked with ACOPAGRO to test different mixes of biocontrol agents on PCA demonstration plots to find the optimal balance between pest control and cost of inputs.

PCA also supported the Government of Peru in several key policy issued of relevance to the sector. The team worked to inform and craft Peru's discussions with the EU and CODEX regarding maximum cadmium levels in cacao products, including conducting a research study in partnership with the Universidad Agraria La Molina. In addition, PCA contributed to the development of internal regulations for implementing Peru's Nationally Determined Contributions (NDC) for reducing greenhouse gas emissions under the Paris Agreement. For example, PCA helped develop a roadmap (see Figure 04) for the government to effectively involve the private and financial sector in these efforts.

Figure 06: Roadmap for involving the financial and private sectors in NDC implementation

IX TOWARD A SUSTAINABLE MARKET SYSTEM

PCA has spent 10 years as a successful catalyst in the transformation of Peru's cacao sector, using USAID resources as seed money to crowd in private sector investment and build competitiveness from the farm to the factory. But it has always operated with an eye towards a future where that donor investment is no longer needed. While the sector is not yet at that point, PCA's approach is accelerating that timeline.

PCA's strategic focus on building the capacity of lead farmers, Technology Agents, and Supply Chain Managers will leave behind a sustainable network of extension workers able to continue spreading and reinforcing PCA's messages over the long term. Each of the 124 Technology Agents spread across the four regions provides one or more services to customers in their community (see Figure 05). While the majority of services offered are on-farm activities, a growing percentage of agents are acting as last-mile representatives for PCA's technology partners and other suppliers, helping improve access to high-quality inputs in their areas.

Agents after this initial training course, facilitating connections between agents and suppliers, and assisting with the development of logos, flyers, banners, business cards, and other ways to promote their businesses. PCA continued to provide agents with follow-up and complementary trainings as needed, including in digital literacy and the use of ICT tools (Facebook, Whatsapp, digital wallets) to grow their businesses.

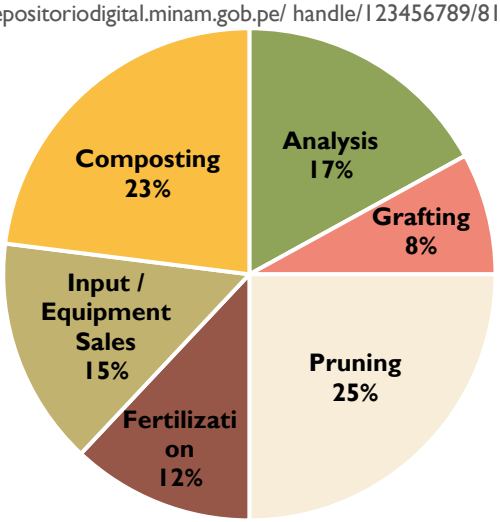
The Technology Agent model has been so successful that one of PCA's SCM partners, ACOPAGRO, is now replicating it via their new "Consultores Bio" program. PCA has contributed to this effort by

Bio Consultants of the Acopagro Cooperative, completing their training process, San Martín region.

Supporting curriculum development and the delivery of the training modules via local subcontractor Central Café y Cacao. As a result of this training, 40 member farmers and 8 agricultural technicians from ACOPAGRO participated in four training sessions covering eight topics related to agronomy, soft skills, and financial and business management.

These Technology Agents are now running a network of small businesses in communities throughout Pasco, San Martin, Ucayali, and Huánuco, providing PCA- certified technical assistance, inputs, equipment, and more to other farmers on a commercially sustainable basis. They have become essential link in the value chain connecting farmers with the tools and knowledge needed to continue accessing new markets, boosting productivity and quality, and building the licit economy.

Figure 07: Source: Peruvian Ministry of Environment, Roadmap for the involvement of the private and financial sector in Our Climate Challenge or NDC [Infographic 2021]. https://repositoriodigital.minam.gob.pe/ handle/123456789/818.



Aive Alvarado, technology agent, providing IPM training to cacao producers, Monzón district, Huánuco region.

Marten Pinedo, technology agent from the San Martin region.

Partner Profile: Marten Pinedo Pezo, PCA Technology Agent

Marten Pinedo Pezo is a cacao farmer and Technology Agent in Sangamayoc, San Martin. He owns 4 hectares of cacao, two of which are currently designated as demonstration plots for technologies from PCA partners Vida al Suelo and NETAFIM.

Marten has worked with PCA for five years, and has taken advantage of many of the trainings and opportunities provided by the project. Now, as a Technology Agent, he works to spread these learnings to the 1,000 other farmers working in the area. He conducts soil analyses, provides technical advice on INTP and IPM, and also sells high-quality inputs to producers from a small warehouse on his property. His farm also hosts demonstration plots implementing pilot projects with Vida al Suelo and NETAFIM, which are meant to show the benefits of proper use of organic fertilizers, biocontrol agents, and fertigation systems on productivity. The pilots help show his fellow farmers that these technologies are worth investing in, boosting sales for both Marten and PCA's technology partners. "How could I recommend something that I've never tried myself?" Marten reflects. "Once I see the results on my plots, then I can make my recommendations."

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"No other project has worked to train lead farmers to share new practices and knowledge with their neighbors," says Marten. "Thanks to the Alliance, I've been able to learn a lot and put those lessons into practice in the field. I'm very grateful for all the support that the PCA technicians have provided me over the years."

X CONCLUSION

Phase II of the Peru Cacao Alliance has taken Peru's cacao sector to the next level, transforming it into an engine of rural poverty reduction and green growth in the Peruvian Amazon. Thanks to the program's efforts, 26,600 farmers have improved their lives and livelihoods, and dozens of private companies have invested nearly $57M into the sector. PCA has taken Peru's fine-flavor cacao from a relatively new, risky venture to a world-renowned product that producers, processors, and buyers alike recognize is a good economic investment.

However, challenges remain that the sector must overcome if it is to become truly self-sustaining. The biggest challenge to date is that average yields are still far below the maximum potential of 2,500 kg/ha. In 2022, average productivity was 598 kg/ha. This is in part due to increasing incidence of pests and diseases, which ate away at the productivity gains that PCA initiatives spurred in the first few years of the program. PCA estimates that these outbreaks lowered yields by about 34% in 2020 alone. These outbreaks were compounded by the fact that during the pandemic, many farmers were unable to visit their cacao plots due to travel restrictions, meaning that pests and diseases were able to proliferate unchecked.

When they were finally able to return to their farms, many producers felt they had no choice but to use pesticides, which in turn caused problems accessing premium markets. Rising costs of fertilizer and equipment from global supply chain issues compounded the problem, along with shipping container shortages and still-limited access to credit, reliable technical assistance, and pre-determined buyers that are key to the entire system functioning well.

Importantly, PCA found that impacts on yields varied significantly depending on the number of hectares harvested and the income levels of the producers. PCA tracked indicators according to income quintiles, meaning data was disaggregated from the bottom 20% of producers to the top 20%, in terms of income. An analysis of the data found that between 2016 and 2020, average yields fell by 26%. However, among the lowest quintile, yields decreased by 37%, while the highest quintile's yields only fell by 1% (see table). To visualize this hypothesis, the last two years of the project were excluded from the productivity analysis because they were impacted by the COVID pandemic (2020), which affected the hiring of labor for agricultural work, and by the extreme rise in fertilizer prices (2022), both of which are used by the largest producers (quintiles 4 and 5).

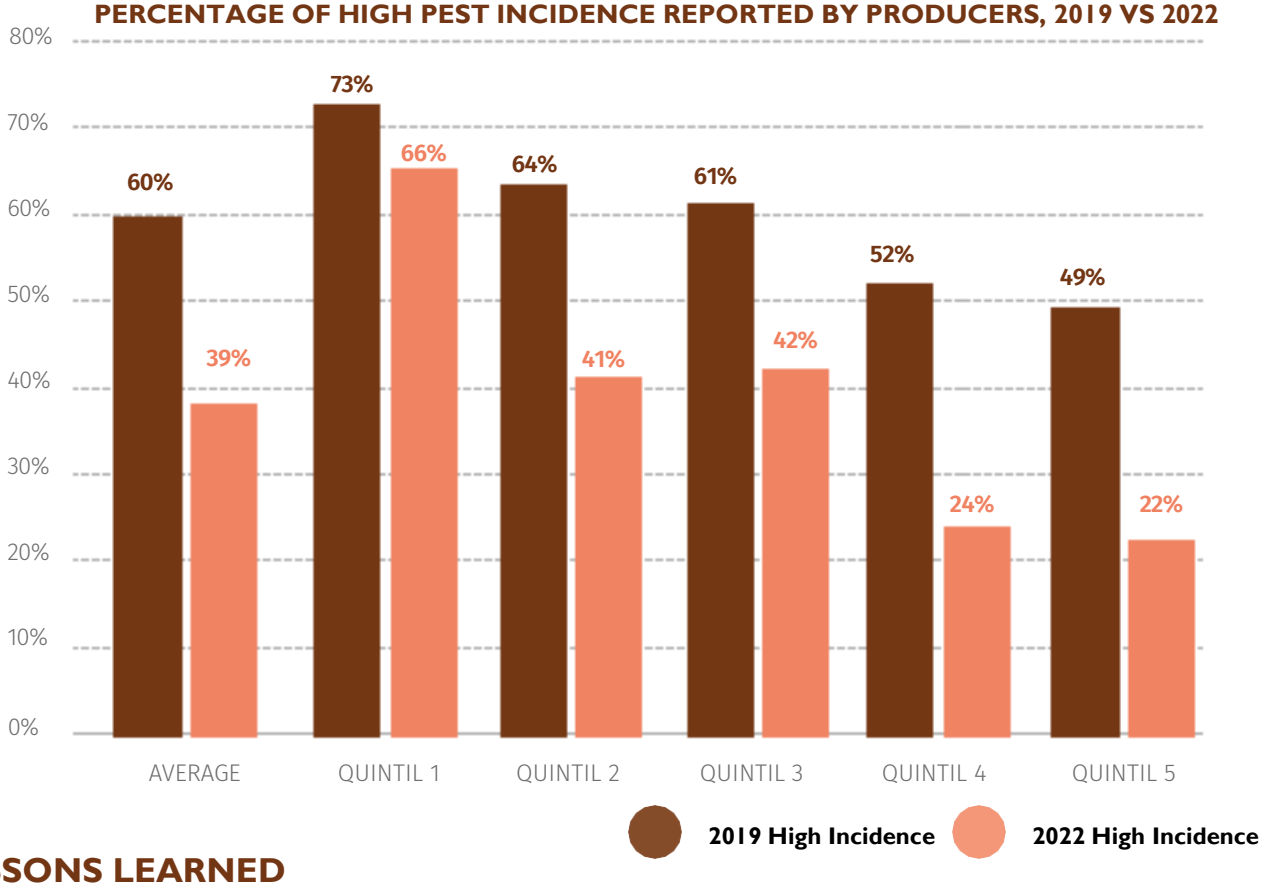
CHANGES IN YIELD PER QUINTILES 2016 - 2020 (YIELD / HECTARE OF CACAO)

QUINTILE	AVERAGE HECATERES 2020	AVERAGE YIELD YEAR 2016	AVERAGE YIELD YEAR 2020	VARIATION 2020/2016
AVERAGE	**2.65**	**776**	**572**	**-26%**
QUINTILE 1	1.4	333	208	-37%
QUINTILE 2	1.8	576	398	-31%
QUINTILE 3	2.2	693	537	-23%
QUINTILE 4	2.9	865	704	-19%
QUINTILE 5	4.9	971	957	-1%

Source: Peru Cacao Alliance - Monitoring and evaluation

These findings are confirmed when we look at the trend in pest incidence by income quintile. In 2019 quintile 1 (producers working with plots of 1 ha.) reported a high pest incidence of 73% and by 2022 this percentage was reduced to 66%. In quintiles 4 and 5 (producers working with plots of 3 and 5 ha. respectively), showed high incidence levels in 2019 of 52% and 49%, but this percent reduced by more than half to 24% and 22%, respectively, in 2022. This shows that greater dedication from relatively larger producers leads to better management of pest infestation. This differential is due to several factors. First, producers in quintiles 4 and 5 are more likely to be professional farmers dedicated to caring for their plots full-time, and are much more likely to fertilize, compost, and belong to an association or cooperative than those in the other quintiles. They also generally have 3 or more hectares of cacao under production, which is considered the minimum amount of land required to reach the level of yield needed to escape poverty. Farmers in quintiles 1-3 have significantly less land under production, and often use cacao production as just one of multiple livelihood strategies (including working on other farmers' plots). As such, they are less interested in investing significant amounts of time and money in their own cacao plots.

PERCENTAGE OF HIGH PEST INCIDENCE REPORTED BY PRODUCERS, 2019 VS 2022



LESSONS LEARNED

The Significance of a Multistakeholder Alliance. A key success factor for PCA was the number and variety of partners. While a buyer can drive the business model, a single partner cannot respond to all of the needs of a value chain, or transform a market system. Other partners are needed to play complementary roles, such as financing, agricultural technology, and information technology. Another key to success factor was understanding the motivations and business drivers of each partner to identify, pilot and scale sustainable business models that benefit each actor.

The Value of Data and Evidence. Strategic analysis and dissemination of information were critical for PCA, generating value and improving the decision-making capacity of stakeholders at every level - buyers, investors, financial institutions, input and technology providers, and farmers. PCA leveraged market information and analysis of production systems to enable producers to make informed decisions about investments in their plots, and complemented that with production information to help them overcome climate and pest-related issues. PCA also shared information with buyers and

other market actors to make the business case to private partners the many and alliance members. that This requires investment in time and money, but we believe that the benefits outweigh the costs.

The Importance of Permanent Technical Support. Permanent technical support and extension services are key to ensure that the gains achieved that increase productivity (and thus reduce pressure on forests) are not lost. Consistent advice from a technician generates producer confidence to invest in their plots and adopt productivity-enhancing practices and technologies. There is currently neither a government nor private-sector based system to completely fill this role, but there are promising solutions to reduce cost by leveraging digital technology and developing commission-based service models, which can spread the cost across technology and input providers, financial institutions, and buyers when the value proposition is clear.

The Opportunity in Tech-enabled Extension. Due to the COVID-19 pandemic, PCA had to find alternative ways to maintain contact a with producer families when our team was unable to visit them onsite. This led us to rely on digital technology, and in the context, we developed the SARA ChatBot, which enabled our team to continue

advising producers remotely, and the CacaoToGo mobile application, that allowed us to collect information from the field without the need to be connected to the Internet. While this was an effective workaround, investment in expanding fiberoptic network could be transformational for the region. Rural extension is vital, but it is also costly, and one of the most difficult functions in the value chain to make commercially sustainable. While the pandemic pushed PCA to this approach, we have learned a valuable lesson in how extension may be delivered more cost-effectively going forward. We also learned that Peruvian farmers adopted digital technology quite quickly, presenting additional opportunity. The future of rural development lies in the integration of agricultural extension activities with digital tools, and future activities may consider strategies for broader uptake and commercial sustainability.

The Potential that Comes from Genetic Variety. Peru has incredible genetic variety of cacao within the Amazon that is still relatively unknown and can be further leveraged. These varieties of cacao have not been fully utilized as their harvest process differs from that of the main cacao strain (CCN51). Cacao producers accustomed to CCN51 expect the same behavior among other varieties, but each genetic strain requires different treatment and associated agricultural practices. Producers who have been patient and consistent with finer cacao strains have achieved higher yields and better prices. There is potential for further growth in the sector leveraging these varieties, with the right support.

The Power of an Inclusive Platform for Market Linkages. The Cacao and Chocolate Fair, held every year in Lima, has become the most important event for the cacao value chain in Latin America. It serves as a catalyst for Peruvian cacao and chocolate producers to improve their quality, and a platform to discover small-scale regional artisanal chocolate makers. In fact, at the last fair, chocolatiers from Amazon regions won more awards than those from Lima. For rural producers of fine-flavor cocoa and value-added products, a platform to continue showcasing their products, gaining market exposure and recognition, and learning for continuous improvement is a powerful driver of growth.

The Challenge that Lies Ahead. We can reflect on the many successes of PCA, due in no small part to a focus on production that was responsive to market demand. As the market shifts, Peruvian producers and businesses will need to adapt as well. The most important challenge in the near future is how to move from traditional to wider adoption of climate-smart agriculture. In the Peruvian Amazon, this specifically means producing more in less space, while simultaneously mitigating and adapting to the impacts of global climate change. New European regulations requiring deforestation-free cacao present a challenge for Peru because 98% of the cacao produced and exported is produced in the Amazon. 54% of the greenhouse gas emissions that Peru generates annually are produced by the change in the use of Amazonian Forest land for agriculture and other economic activities. A massive transition is needed, and the more than 70 thousand cacao producers in alternative development zones must be part of this change.

PERU CACAO ALLIANCE PHASE II

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