Inclusive Digital Agriculture Experiences

List of experiences

1. AGROS

Thematic area: Commercial application.

Countries: Peru.

Technological solution: Agricultural information platform, AGROS Data Market, which reduces uncertainty about the state of crops for microfinance entities. Work is also being done on a technological solution aimed at small farmers, which provides remote and low-cost specialized advice. Producers receive weather alerts and pest prevention notifications to their cell phones.

Rural digitization tools:

- Digital identity kit – digital identity of the rural producer that allows him to access various digital services such as digital evaluations and loans, agricultural insurance based on satellite images, digital payments, electronic commerce, digital procedures, telemedicine, etc., through a phone call and without the need for internet or smartphone.
- My Panel – Personalized web platform for rural producer organizations, which allows them to manage all their information and that of their producer partners, in a simple, secure and 100% digital way.
- Identi Connect App – Mobile application that allows you to collect information through personalized forms in the field, without the need for internet, and digitize it automatically.

Previous situation: According to the INEI, by 2020 only 26% of people living in rural areas had access to internet service, versus 70% of people in urban areas who use this digital resource. To this is added that only 20% of the rural population is banked, that is, only 2 out of 10 Peruvians in these areas - mostly farmers - can access loans and other banking services.

Reasons for incorporating technology: Being able to offer rural producers the possibility of demonstrating their work digitally and being protagonists of their development. In addition, to connect rural producers with the digital economy and being the enabler of the rural digital ecosystem.

Public/private actors involved in the implementation: AGROS.

Farmers reached/impact by the project: It has more than 3,000 producers in regions such as Piura and Cajamarca.

Costs incurred: Not available.

Obstacles encountered and overcome: There are two important challenges at the level of any solution in rural areas, the first is technological if you want to scale, and the second is a challenge of trust.

On the one hand, we use blockchain technology deployed by the Inter-American Development Bank, this generates confidence that all the information that is in our system is not modified, everything is transparent and any change in the information is evident to all members. And on the other hand, we had to learn to communicate with the farmer, learn to reach them from their reality.

Quantitative and qualitative results:

DIGITALIZACIÓN RURAL ──────────

HERRAMIENTAS

KIT DE IDENTIDAD DIGITAL

Identidad digital del productor rural que le permite acceder a diversos servicios digitales como evaluaciones y préstamos digitales, seguros agrícolas basados en imágenes satelitales, pagos digitales, comercio electrónico, trámites digitales, telemedicina, entre otros, a través de una llamada telefónica y sin necesidad de internet o smartphone.

MY PANEL

Es la plataforma web personalizada de las organizaciones de productores rurales, que les permite administrar toda su información y la de sus socios productores, de manera simple, segura y 100% digital.

APP IDENTI CONNECT

Es el aplicativo móvil que te permite recoger información a través de formularios personalizados en campo, sin necesidad de internet y digitalizarla automáticamente.

Future development expectations: Democratizing access to financial services is one of the approaches that we now must push from the fintech sector. Not only you are reaching a market where there is no one, but you are not creating and retaining users because you are the first to take a service.

We have found that all rural sectors have several similarities. Although we have already positioned ourselves in regions such as Piura and Cajamarca, Huancavelica and Ayacucho that are areas where we are beginning to grow because the internet disconnection is very strong. The goal is to continue growing, we have more than 2 million producers who are waiting for us.

In addition, right now we have found another business in the connection of the productive sector with commercial opportunities for Agri-export. There are exporting companies that also seek to connect with producers. They traveled, went to see the producer, evaluated their field and closed commercial agreements, but the limitations of COVID-19 made this much more challenging, and the need still remained. This opportunity is getting stronger and stronger and that is where we are including our services, and when the user is digital you can make him part of any service, that is, he can be part of the world economy.

Recommendations: At the fintech level, there is the opportunity of the unbanked sector, of the so-called "base of the economic pyramid".

Characteristics of inclusivity: Use the power of technology to transform rural producer organizations into digital producer organizations, through a Digital Identity encrypted in Blockchain, which connects them with the multiple opportunities of the world's digital economy, through a phone call without the need for the internet. We are looking for:

- Empower rural organizations.
- Provide credibility to producers.

The project seeks to digitize organizations and producers to access traceability systems, profitable markets, credit, agricultural insurance based on satellite images, remote advice with specialized advisors 100% online. Producers are expected to be able to create their own digital identity in order to reliably and securely demonstrate their trajectory, gain access to digital services such as loans, paperwork, telemedicine, etc., ease of access to information to improve their production (climate, prices, etc.) for free, through a phone call.

Business model: Initiative developed by a Peruvian Fintech. Fintech that connects farmers with their customers without the need for internet or a smartphone.

Currently, the company is working on a technological solution aimed at small farmers, which provides specialized advice remotely and at low cost. Producers receive weather alerts and pest prevention notifications from their cell phones. In addition, it is possible to create a digital identity to reliably and securely demonstrate the producer's trajectory. In addition, access to digital services (loans, procedures, telemedicine, etc.) and information to improve your production (climate, prices, etc.) for free, through a simple phone call.

2. AGROJUSTO. CONNECTING THE FOOD MARKET INTELLIGENTLY

Thematic area: Commercial application – Tool that connects, through technology, producers, merchants and consumers with solutions designed for each stage of the commercialization process.

Countries: Argentina.

Technological solution: Platform where primary producers and food processors can connect with buyers, minimizing intermediation costs. In addition, the site offers an exclusive social network for users, where they can connect and generate business links. Agrojusto works as a "platform of platforms", since those who sign up get the tools to open their own e-commerce website.

Agrojusto is a virtual agricultural market that connects rural producers with the market in an agile and innovative way. Our solution covers three key edges. First, the development of an application for rural producers where they can load the crops with a series of parameters that allow them to efficiently know the available crops and upcoming harvests, a series of parameterized characteristics and in this way all the products have a specific market, those which have standard features and those which not. Second, an intelligent logistics service, directly connecting producers with buyers, through the development of a mobile website that works as an e-commerce and strategically distributed delivery centers. Finally, a value-added center where producers can rent the service of a cold room and sustainable biomass dehydration oven to lengthen the products, without having to dispose of the product.

Previous situation: The electronic commerce of agricultural products was strengthened during the pandemic, until now in Argentina there were few platforms that focused exclusively on family farming producers. It was in this context that Agrojusto was born, which seeks to connect small farmers and cooperatives with consumers without going through an intermediary.

One of the great problems that the commercialization of small producers has had is that it has always been an exogenous role to rural activity. This has generated many problems and incompatibilities where the one who sells earns more than the one who produces, so marketing must be carried out with a fair-trade perspective.

There are a series of factors that define the failures of agricultural markets (these failures are a common denominator throughout Latin America) thus generating a rigid, inefficient and unfair market, causing high levels of waste that affect the profitability of small rural producers and the prices paid by the consumer. These failures in the primary phase of production, transfer and marketing can be summarized in:

1-Asymmetric information in the market, the producers do not know the preferences of the consumers and at the same time the consumers cannot communicate what they want, at the same time the buyers do not have an efficient systematized record where the crops and quantity to be harvested are known. While sectors such as tourism and transportation have been democratized thanks to the incorporation of technology, the marketing of fruits and vegetables is due to an outdated mechanism that is more than 100 years old.

2-Impossibility of accessing logistics at scale, generating waste since merchandise is moved unnecessarily because delivery areas and production areas are not considered efficiently, lengthening the delivery process and thus producing waste.

3- Lack of infrastructure to generate added value to crops to lengthen food marketing time, since infrastructure is a delivery barrier for small rural producers.

Reasons for incorporating technology: Facilitate the marketing process by uniting the chain from end to end, building a fairer and more efficient food market. The pillars of the project are 2: fair trade and efficiency. Agrojusto places special emphasis on the training of entrepreneurs and producers, who are the first link, while also focusing on rural education and the second and third links.

Public/private actors participating in the implementation: Agrojusto has been able to establish links with different organizations and institutions such as INTA, the Mendoza Rural Development Institute (IDR) and the National University of Cuyo (UNCuyo). In addition, they work with more than 20 public and private organizations related to agriculture.

Farmers reached/impact by the project: More than 1,200 users, more than 440 producers and more than 800 organizations.

Costs incurred: Not available.

Obstacles encountered and overcome: Existing digital barriers to market entry for family farming producers.

Quantitative and qualitative results: Agrojusto improves the income of small producers by 20% and reduces intermediation costs by 30%.

- Social Network intelligently connects the different actors in the production chain.
- Offering a quick and easy digital presence through an online sales channel designed for the food market. Online stores can be generated in minutes and fully customizable.
- We offer productive and commercial planning: cooperatives quickly visualize the consolidated offer of the linked producers.
- Distribution module allows the management of sales with lower operating costs.
- Online sales support and advice. It is transmitted from our experience and knowledge of our pilot test.

Future development expectations: It is expected that in 10 years Agrojusto will play a key role in the sustainable development of humanity in Latin America. They want to generate shorter marketing circuits, with less waste, less pollution, and more quality, which can be achieved with the incorporation of technology.

Short Term: i- Reach 10,000 families permanently; ii- Obtain financing to scale to the national level; iii- Continue with the dissemination process in rural schools so that producers reduce their waste by using our app to schedule their harvests.

Medium Term: Positioning at the national level and becoming a benchmark in agricultural e-commerce.

Long Term: Expanding in Latin America.

Characteristics of Inclusivity: Agrojusto links family farming with technology, through a platform that unites small and medium-scale producers and consumers through digitalization. Users, primary producers and food processors can connect with buyers, minimizing intermediation costs, facilitating the marketing process, linking the chain from end to end. It is intended to generate fair and efficient trade.

In Agrojusto, producers can register and obtain the tools to open their own e-commerce store, be part of an exclusive social network for users, where they can connect and generate business links. In addition, producers can manage home deliveries and add payment methods.

Due to the existing digital barriers, Agrojusto emphasizes the training of entrepreneurs and producers, who represent the first link, while emphasizing rural education, focusing on the second and third links, this in joint work with the Federation of Agrotechnical Schools (FEDIAP).

Agrojusto bets on a new model: modern, digital and with another more responsible look.

It is a platform with multiple solutions:

Tiendas

Vende tus productos mediante una tienda online con la plataforma de alimentos mas importante y completa. Facil de configurar y de gestionar.

Mercado mayorista

Es como el mercado de tu ciudad, pero online. Podras dar a conocer tus productos y comerciar con miles de compradores, productores y organizaciones. Gestiona toda tu producción desde cualquier dispositivo.

Red social de alimentos

Conectate con miles de productores y emprendedores. Es ideal para generar nuevos contactos comerciales. Tendras a mano un listado de productores y tiendas del rubro con quienes puedas comunicarte para seguir creciendo.

¡Capacitate en digital!

Creamos diversos materiales y tutoriales online para que puedas aprender habilidades digitales que te permitan gestionar tu tienda y crecer sin parar. ¡Aproovecha todas las funcionalidades de nuestra plataforma!

Who can use Agrojusto?

Productores

✓ Publica tus productos en el mercado mayorista y dalos a conocer a toda la comunidad. Sin límites.

✓ Vincúlate con otros productores y organizaciones mediante nuestra red social y comercial.

✓ Crea tu tienda online para vender al por menor, directo al público.

Comerciantes y emprendedores

✓ Configura y administra tu tienda online: Zonas de entrega, logística en general, métodos de pago y productos disponibles... ¡Todo desde una sola plataforma!

✓ Encuentra esos productos que necesitas y compra directo a los productores en nuestro mercado mayorista.

✓ Crece digitalmente y potencia tu negocio con nuestras capacitaciones y recursos gratuitos.

Consumidores

✓ Compra online productos de primera calidad y consigue los mejores precios. Sin intermediarios, trato directo con productores.

✓ Hay +500 tiendas de alimentos publicadas en nuestra plataforma. Explora el directorio de tiendas AgroJusto.

https://news.agrofy.com.ar/noticia/196598/quieren-transformar-mercado-alimentos-app-y-ya-cuentan-casos-exito-todos-dias-nos

https://foodsystems.community/winners-of-the-best-small-business-competition/agrojusto/

Business model: The solution is based on an alliance between the local technology company Agrojusto and organizations and institutions such as INTA, IDR (Rural Development Institute of Mendoza) and UNCuyo (National University of Cuyo). In addition to this, they are linked with more than 20 public and private agricultural organizations.

The business model is based on offering technology to agricultural producers, entrepreneurs, associations and cooperatives so that they can connect with end consumers. In addition, Agrojusto emphasizes the training of entrepreneurs and producers, who represent the first link, while emphasizing rural education, focusing on the second and third links, this in joint work with the Federation of Agrotechnical Schools.

3. KNOWLEDGE MANAGEMENT OF THE COCOA VALUE CHAIN – CACAO MÓVIL

Thematic area: Technical assistance – application that is uniting actors in the cocoa value chain in the region, through interaction and provision of information for cocoa production.

Countries: El Salvador, Honduras, Guatemala and Nicaragua.

Technological solution: The application has a cocoa toolbox that is made up of 10 practical guides with information on cocoa cultivation for producers and cooperatives in the region:

1. Guide #1: Cocoa in agroforestry systems.
2. Guide #2: Cocoa design and establishment.
3. Guide #3: Production of cocoa plants in the nursery.
4. Guide #4: Fertility management of cocoa soils.
5. Guide #5: Cocoa pruning and management of accompanying trees.
6. Guide #6: Integrated pest management of cocoa.
7. Guide #7: Floor management of cocoa plantations.
8. Guide #8: Harvest, fermentation and drying of cocoa.
9. Guide #9: Cocoa certification.
10. Guide #10: Marketing of cocoa.

The knowledge in these guides has been provided by cocoa farmers, as well as producer organizations, research centers and development agencies.

Cacao Móvil combined the Lutheran World Relief (LWR) community agricultural extension model, developed in collaboration with cooperatives and local partners, with the existing version of the methodology called the Cocoa Toolkit, the printed and digital version of it. LWR also included in this case other digital tools developed to help farmers produce better and have access to the international market at better prices.

Previous situation: Not available.

Reasons for incorporating technology: It is based on achieving an understanding and the construction of a common vision among the actors of the cocoa chain at the regional level to generate trust. The project aims to generate sustainable changes through the co-construction of knowledge in a multi-stakeholder environment. The issues and coherence of the process that is developed have a support in the interests of the actors and the expectations of the region, to that extent there will be willingness of the actors to participate and continue to stimulate these processes.

Public/private actors involved in implementation: Lutheran World Relief (LWR), US Department of State through the World Environment Center (WEC) and its partners, Context Partners, Baastel, Earthshift Global and Swiss Development Cooperation in Central America.

Farmers reached/impact by the project: The project managed to train more than 1,300 Honduran cocoa SMEs. At the beginning of 2020, there were about 750 new users who downloaded the app.

Costs incurred: Financial support of half a million dollars from the United States Department of State. In addition, the Swiss Cooperation for Development in Central America has provided LWR with a financing

of 535 thousand dollars to strengthen execution in the area of access to markets and promotion of good production practices.

Obstacles encountered and overcome: Among the obstacles encountered, the objective is making the project sustainable, and one of the ways to do it is that the community take ownership of the project, that is, to transform a static technology into a collaborative one.

Quantitative and qualitative results: The Cacao Móvil platform allows anyone who is interested in modifying, copying, or improving the technological tool to do so under the free software modality and adapt it to their own needs.

Characteristics of Inclusivity: Its purpose is to contribute to the improvement of competitiveness and inclusivity in the cocoa value chain at the regional level, through the construction of a common vision facilitated by the processes of knowledge management in technologies, markets and business. The countries involved promote the strengthening of multi-stakeholder spaces (platforms, prototypes or working groups), which affect the improvement of the understanding of the dynamics, opportunities and limitations of the cocoa value chain, poverty reduction of the rural population, food security and environmental conservation.

The project aims to generate sustainable changes through the co-construction of knowledge in a multi-stakeholder environment, considering the interests of the actors and expectations of the region. The project is expected to contribute to:

- The participation of small producers in national markets increases.
- More small producers are organized for collective marketing.
- Private sector procurement policies/practices are more inclusive of small producers.
- A better institutional environment that stimulates the inclusion of small producers.

In practice, the company has learned to align the intervention framework with the efforts made by the actors in the cocoa sector to be more competitive and sustainable.

Business model: The project is promoted by the alliance between the private Swiss company Rikolto with the support of the Swiss Agency for Development and Cooperation (COSUDE).

The tool unites actors of the value chain in the region, through interaction and provision of information for cocoa production. In addition, the strengthening of multi-stakeholder spaces is promoted through platforms, prototypes and/or working groups, which affects the improvement of the dynamics, opportunities and limitations of the cocoa value chain, food security and poverty reduction.

4. EMILPA – THE SMS PLATFORM FOR VULNERABLE FARMERS

Thematic area: Technical assistance.

Countries: Guatemala.

Technological solution: Virtual platform that allows to offer, via mobile, information of interest to agricultural producers who live in a situation of vulnerability. Through the sending of SMS, producers receive information and/or alerts on weather, production and nutrition that allows them to adapt their crops to have the highest yield. In addition, this platform allows these producers to have contact with the different market agents.

The farmer periodically receives information adapted to his reality and needs through SMS. Through the platform we provide solutions in 4 areas:

1. Agricultural practices – answers to technical questions about production.
2. Nutrition – information about what are the most nutritious foods for your children or how to make better use of harvests and reduce food insecurity.
3. Hygiene and health – raise awareness of healthy practices that reduce illness among families.
4. Market access – helps farmers sell their crops on fair terms. Information on market prices and it represents a means of contact with the different buyers and distributors in the market.

Services that best suit your needs

Previous situation: In the Dry Corridor, where the families involved in the project come from, periods of severe drought and plagues in their communities are very recurrent.

The main limitations of rural extension presented by the National Rural Extension System are:

- Lack of resources.
- Knowledge.
- Little relevance.

Reasons for incorporating technology: It arises as a response to the information and training needs of agricultural producers in Guatemala. Without access to anticipation and adaptation mechanisms, the losses for farmers are devastating. In addition, when producers try to make improvements to their plots, they do not have sufficient knowledge or technical assistance adapted to their reality.

Fifty (50%) of the population in Guatemala lives in rural areas, 82% of agricultural units are small family farmers, 75% of small farmers live in poverty. The difficulties of access and their isolation mean that most of them do not have access to information or support services that allow them to improve their agriculture and increase their income.

Public/private actors involved in the implementation: The project was born from the joint work of CODESPA and Sic4change. It is an adaptation of the Spanish agricultural technology platform for the exchange and processing of information from the company CROPTI.
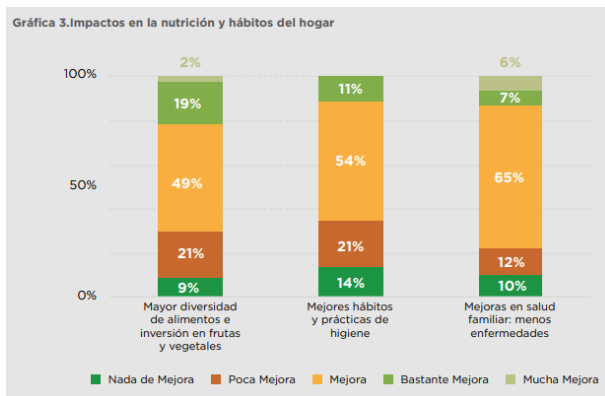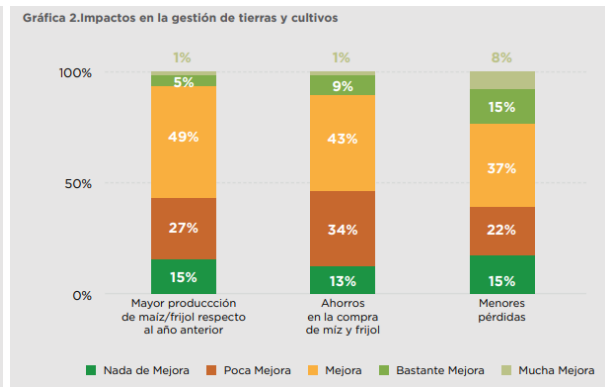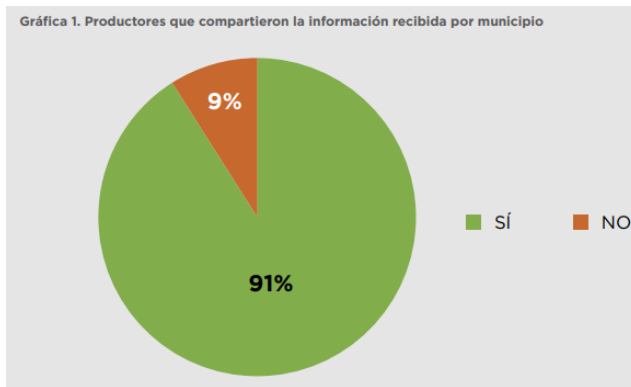
Farmers reached/impact by the project: 750 vulnerable farmers.

Costs incurred: Not available.

Obstacles encountered and overcome: The first step was the constitution of the computer platform and its corresponding software. Subsequently, socioeconomic diagnoses were carried out in the study areas, in order to later prepare scheduled information packages based on the identified needs. Once the farmer is registered in the system, he periodically receives information based on his reality and needs through SMS.

Quantitative and qualitative results: It has been possible to increase crop productivity and facilitate access to the market under fair conditions. Also manage to optimize the use of food that is grown to improve the nutrition of families. With the platform, it was possible to establish a two-way communication channel between farmers and the rural extension system of Guatemala that will offer climatological information for the prevention of possible emergencies.

The location of the farmers in rural areas has been identified, the specific support needs of each of the producer families are determined, depending on the area where they are located, what they cultivate and the agrarian system they have, technical assistance is provided and personalized training for each producer remotely with MAGA.

Gráfica 1. Productores que compartieron la información recibida por municipio

Gráfica 2.Impactos en la gestión de tierras y cultivos

Gráfica 3.Impactos en la nutrición y hábitos del hogar

Future development expectations: It will offer free services to the most vulnerable families, achieving its sustainability from the financing of governments, NGOs and entities with social purposes. It is intended to make the tool available to other organizations to ensure rapid and effective communication with its beneficiaries, avoiding the displacement of its personnel to the field. In addition, it is currently only available for the Guatemalan population, but it is intended to extend its reach to other countries where necessary.

Figura 3. Estrategia expansiva de emilpa

1 EXPANSIÓN — Expansión de la base de productores que reciben información de E-Milpa y mejora de los paquetes de información que estos reciben

2 CONSOLIDACIÓN — Consolidación de E-Milpa como un emprendimiento comercial autónomo, para asegurar la continuidad del servicio gratuito prestado a la base de familias vulnerables asociadas a la plataforma

3 MEJORA DE HERRAMIENTA — Incorporación de nuevas herramientas y funcionalidades que permita expandir el valor y cobertura de la plataforma: conexiones de mercado y empleo, formación audiovisual, etc.

Characteristics of Inclusivity: It arises as a response to the information and training needs of agricultural producers in Guatemala. In the Dry Corridor, where the families involved in EMILPA come from, periods of severe drought and plagues in their communities are very recurrent. Without access to anticipation and adaptation mechanisms, the losses for farmers are devastating. When producers try to make

improvements to their plots, they do not have sufficient knowledge or technical assistance adapted to their reality.

They have increased crop productivity and facilitated access to the market under fair conditions. It also makes it possible to optimize the use of the food that is grown to improve the nutrition of families. Through the platform, a two-way communication channel is created between farmers and the Guatemalan rural extension system that will offer climatological information for the prevention of possible emergencies. The ultimate goal is to improve the food security of families and increase their income.

One of the advantages is its flexibility to adapt the information to the conditions of each place or need, which allows it to be used in other contexts to respond to other challenges.

Emilpa allows the mass and adapted sending of SMS to producers, potential clients or any group in remote areas. The information sent can be directed to specific profiles (distinguishing location, type of crop, production system, etc.) according to the characteristics desired by each client.

COMUNICACIÓN INMEDIATA
Una comunicación inmediata, económica y eficaz, adaptada a las condiciones de la población receptora.

SEGMENTACIÓN DE RECEPTORES
Segmentar a los receptores de los mensajes, de acuerdo a sus necesidades específicas.

PROGRAMACIÓN DE ENVÍOS
Programar el envío de acuerdo con las necesidades a lo largo del año.

ASISTENCIA TÉCNICA
Un sistema de asistencia técnica remota que refuerza el trabajo que cada organización desarrolla en campo.

Business model: It was created as an alliance between the non-governmental organization Fundación CODESPA and a social innovation cluster called Sic4change.

It arises as a response to the information and training needs of agricultural producers in Guatemala. In the so-called Dry Corridor, where the families involved in EMILPA come from, periods of severe drought and plagues in their communities are very recurrent. Without access to anticipation and adaptation mechanisms, the losses for farmers are devastating. Thanks to Emilpa, we are increasing crop productivity and facilitating access to the market under fair conditions. It also allows us to optimize the use of the food that is grown to improve the nutrition of families. In addition, through the platform, we will create a two-way communication channel between farmers and the Guatemalan rural extension system that will offer climatological information for the prevention of possible emergencies. The ultimate goal is to improve the food security of families and increase their income.

https://emilpa.com/

5. COFFEE CLOUD – EARLY WARNING SYSTEM FOR THE COFFEE SECTOR IN GUATEMALA

Thematic area: Technical assistance – Confront the plague of coffee rust, helping people involved in the regional coffee sector to make better decisions about their farms and businesses.

Countries: Guatemala, Honduras and Costa Rica.

Technological solution: Application that allows coffee growers and technical advisors to make decisions about pest and disease management, based on field data generated by sampling tools. It allows coffee producers to carry out tests of the incidence and severity of the disease on crops without the need for internet in the field, according to methods approved by the regional ministries of agriculture. In addition, they receive immediate recommendations on how to combat the proliferation of the fungus according to current incidence levels and weather conditions. The app tracks disease levels and displays behavioral graphs. With this information, the specialists send regional recommendations and specific interventions to prevent the spread of the disease at the national level.
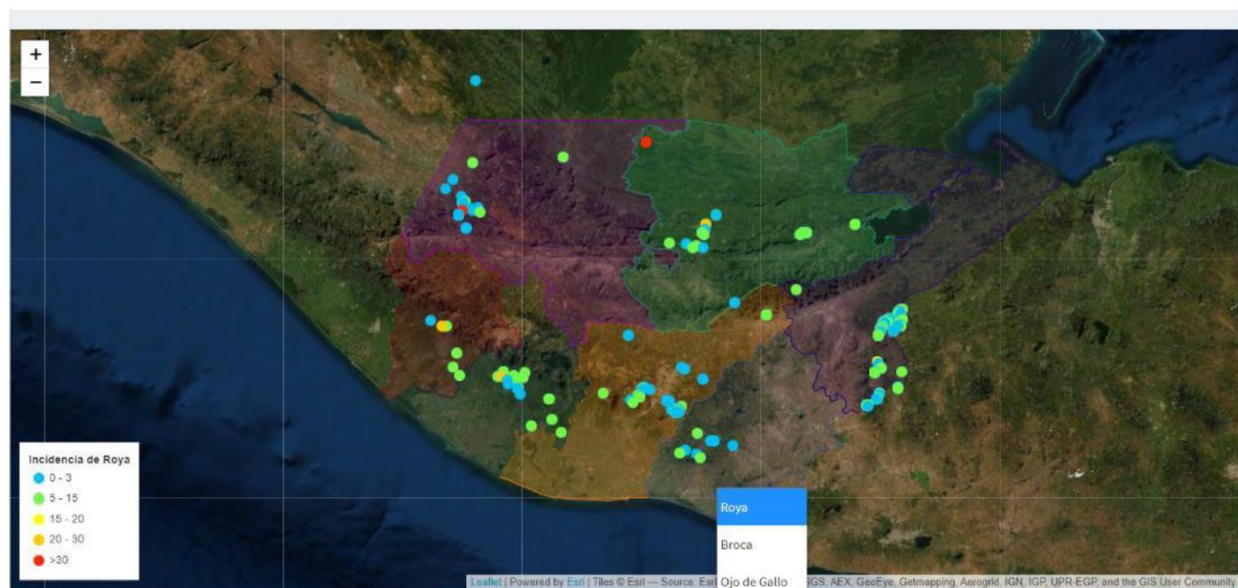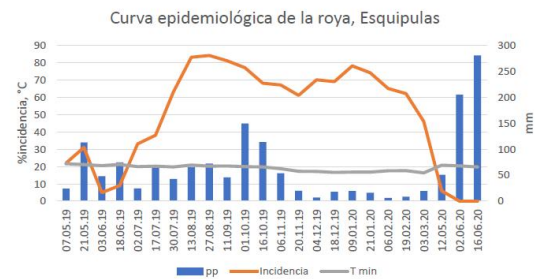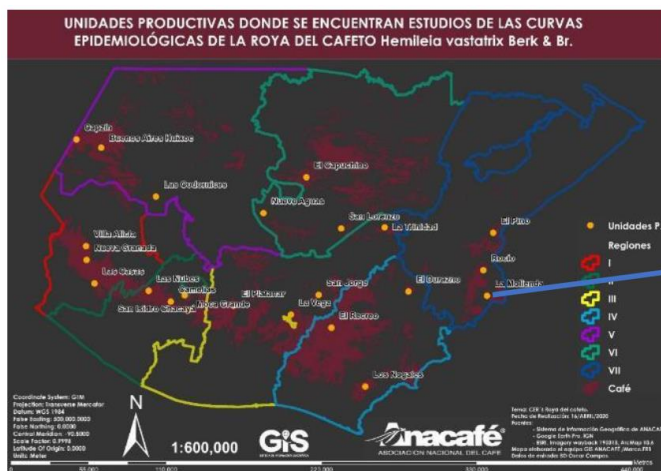
Previous situation: From 2010 to 2014, the Central American coffee bean suffered a disease that shook the economies of the region. Exports decreased by 55%. From 2012 to 2013, 374,000 jobs were lost, corresponding to 17% of the workforce. La Roya, or coffee rust , threatened the livelihoods of nearly 2 million .

Coffee rust is a fungal disease that covers the leaves and prevents photosynthesis, slowly limiting the ability of plants to process sunlight, reducing grain yield and ultimately starving the plant. The warmer and wetter conditions caused by climate change create a better ecosystem for the fungus to grow. Its impact on Central American economies is significant as coffee exports are the region's largest source of income and coffee benefits a vast supply chain that supports dozens of adjacent industries.

Reasons for incorporating technology: At the regional level, there are different tools that provide solutions to improve the conditions for growing coffee, but none of them were designed with farmers in mind. In Guatemala, DAI chose to create a new tool—Coffee Cloud—using a fully human-centered design (HCD) approach.

Public/private actors involved in the implementation: Development Alternatives Incorporated (DAI), PROMECAFE, ANACAFE (Guatemala), ICAFE (Costa Rica), IHCAFE (Honduras).

Farmers reached/impact by the project: The objective is to scale the project to more than 5,000 users by 2019. It has more than 1,800 users in Guatemala.

Costs incurred: Not available.

Obstacles encountered and overcome: Given the variety of actors involved, the same recipe would not work for everyone. To solve the needs of this combination of actors, work was done at the national level and the regional implications of the process were considered. We wanted to make sure we met the needs of each institution individually and promote ownership of the product in the process.

The diversity of actors and their requirements made it difficult to quickly develop and implement a tool that could meet everyone's requirements. So, we approached the challenge through the design thinking framework, which included inviting users to attend our interaction design workshops.

Quantitative and qualitative results: Coffee Cloud allows coffee producers to perform disease incidence and severity tests on crops without the need for internet in the field, according to methods approved by the regional ministries of agriculture. In addition, they receive immediate recommendations on how to combat the proliferation of the fungus according to the incidence levels and the current climatic conditions. The application tracks the levels of the disease in the crop and shows behavior graphs. Using that information, analysts send out regional recommendations and targeted interventions to prevent the nationwide spread of the disease, which remains an ongoing threat.

Characteristics of Inclusivity: Given the blow suffered by the Central American economy due to a disease in the coffee crop, exports decreased by 55%. The rust threatened the livelihoods of almost 2 million people. To face the coffee rust plague, a tool was designed with farmers in mind, with a totally human-centered approach (DCH).

The application design process focused on the participation of regional coffee promotion institutions, national institutions, as well as cooperatives, associations and producers. To solve the needs of the different actors, work was done at the national level and the regional implications of the process were

considered. They wanted to satisfy the needs of each institution individually and promote the approval of the product in the process.

The challenge was addressed through the design thinking framework, which included inviting users to attend interaction design workshops. These workshops provide a number of valuable insights:

- Collect data detailed enough to be useful to an individual farmer, leaving this task to the farmers themselves.
- Make sure that each farmer has smartphones to use the tool.
- Generate a timely response to quickly correct the progression of the disease, generating confidence and motivation in users.
- The tool must be scalable, determining a series of important features such as an agrochemical dosage calculator, rooster's eye test, harvest calculator, climate and communication module.
- Use of open-source data and programming language, as well as cloud servers.
- Design of an intuitive and easy-to-use tool that does not depend on a specific sophisticated language, to cover people from all areas at an educational level.

Business model: The project is a cooperative alliance between a coffee research and cooperation network, the national coffee institutions of the countries involved (Guatemala, Costa Rica and Honduras) and the private development company DAI.

The objective was to help people linked to the regional coffee sector to make better decisions about their farms and businesses by providing climate information and technological tools for decision making. At the regional level, there are different tools that provide solutions to improve coffee growing conditions, but none of them were designed with farmers in mind. In Guatemala, DAI chose to create the Coffee Cloud tool using a fully human-centered (HRC) design approach.

Coffee Cloud allows coffee producers to test crops for incidence and severity of the disease without the need for internet in the field, according to methods approved by the regional ministries of agriculture. In addition to receive immediate recommendations on how to combat the proliferation of the virus and fungus according to incidence levels and current weather conditions. The application tracks the levels of the disease in the crop and shows behavior graphs. Using that information, analysts send out regional recommendations and targeted interventions to prevent the nationwide spread of the disease, which remains an ongoing threat.

6. AGRICULTURAL AND AGROINDUSTRIAL INFORMATION SYSTEM - AGROMÓVIL

Thematic area: Technical assistance – Platform of services that allows producers and SMEs to access information to improve the activities of production and marketing of agricultural products.

Countries: El Salvador.

Technological solution: IT services platform, called Agromóvil, which is a tool created to support the agricultural and agro-industrial sector, using mobile phone services (voice and SMS) so that producers and SMEs can access up-to-date and reliable information on market prices, prices of inputs, machinery and services, weather information, access to new markets, information and agricultural technical advice.

The solution allows managing two types of services:

1. Text message services (SMS): users can subscribe to periodically receive information on prices of agricultural products and supplies, weather information, post offers and requests in a virtual stock market and be aware of business opportunities.
2. Voice call services: users call a telephone number (hotline) to request and receive information and technical advice on issues related to agricultural production.

The sources of information on the platform come from official sources in the public sector and private sector institutions.

Previous situation: Agricultural producers and SMEs in El Salvador are affected by 3 major problems: (i) lack of free access to knowledge and information, (ii) lack of agricultural technical assistance that allows them to improve profit margins production and quality of the products and (iii) the high costs of intermediation in the marketing scheme for agricultural products. It has been investigated that the commercialization activity is the one that faces the greatest problems for producers, mainly due to the difficult access to markets, the lack of information and the participation of intermediaries within the value chain. Producers lack the necessary information to market their products at better prices and to new buyers.

SMEs also use agricultural products as raw materials and intermediaries manipulate the market by hoarding products in times of scarcity, to raise prices, negatively impacting the profitability of these small businesses.

Reasons for incorporating technology: The platform seeks to support the agricultural and agro-industrial sectors, through mobile telephony services (voice and SMS) so that producers and SMEs can access updated, reliable and timely information on:

- Market prices of the main agricultural products.
- Information on the prices of inputs, machinery and services to support purchasing decisions and strengthen purchasing power.
- Climatological information that allows producers to make better decisions regarding the production activities of their crops.
- Access to new markets with the creation of a virtual exchange of offers and demands of agricultural products.

- Agricultural information and technical advice, which provides the necessary information resources to improve production activities and the use of inputs.

Public/private actors involved in the implementation: Foundation for Agricultural Technological Innovation (FIAGRO), Inter-American Development Bank (IDB) and the Multilateral Investment Fund (MIF).

Farmers reached/impact by the project: More than 2,000 beneficiaries have access to Agromóvil's information and technical advisory services.

Costs incurred: Not available.

Quantitative and qualitative results:

- More than 2,000 beneficiaries have access to information services and technical advice.
- Implementation of the first tool in El Salvador that provides access to information and technical advice to producers and SMEs through mobile telephony.
- Implementation of an operations center that provides specialized information and advisory services for the agricultural sector.
- Creation of a technological platform for the administration of beneficiary information.
- Creation of a Support Network made up of different institutions from the public and private sectors.

Characteristics of Inclusivity: The solution seeks to mitigate the barriers to access to information by producers and SMEs through the use of technology such as cell phones and SMS that have had a high degree of adoption. It seeks to provide up-to-date and timely strategic information, at an accessible cost for users and without the need to invest in training resources in the use of the tool.

The only requirement to use the platform is that people register in Agromóvil by calling a Call Center, where an agent collects the necessary information to register people on the platform.

Project beneficiaries' experiences:
https://www.youtube.com/watch?v=jmndI5a_ktk&ab_channel=FIAGRO

Business model: The project was developed in an effort by a private non-profit organization dedicated to promoting technological innovation in the agricultural and agro-industrial sectors of El Salvador. In addition, it received support from the IDB and the Multilateral Investment Fund (MIF).

The main beneficiaries of the project are: (i) producers, (ii) associations and cooperatives of producers, (iii) SMEs, (iv) suppliers of inputs and machinery, (v) merchants, (vi) service providers, (vii) field technicians and specialists, (viii) public and private sector institutions, etc.

To guarantee access to the platform by the beneficiaries, an evaluation and selection of the technologies was carried out according to various factors, such as ease of use, level of adoption and economic accessibility, for which various field trips were carried out, surveys, interviews about the reality of the producers.

7. TECHNICAL AGROCLIMATIC COMMITTEES

Thematic area: Technical Assistance – Small intelligent and sustainable agriculture adapted to the climate from the transformation of productive practices in response to climate variability.

Countries: Regional action taking place in Colombia, Guatemala, Honduras, Nicaragua.

Technological solution: It seeks to make the climatic information produced by the national meteorological institutes in conjunction with local meteorological stations accessible to small producer families. Based on data and monthly climatic variability at the level of small territories, recommendations are made for productive transformations incorporating traditional and ancestral knowledge with technical knowledge and agronomic professionals. The information is transmitted through bulletins that circulate in SMS and WhatsApp.

Previous situation: The producer families did not have access to local weather information. Farm families did not understand the weather information. The producing families did not have the possibility of reacting in time to mitigate the effects of climate change by modifying productive practices that often imply returning to traditional practices.

Reasons for incorporating technology: Reduce the effects of climate change on small producer families through real-time information adjusted to the language and means accessible to them.

Public/private actors involved in the implementation: Alliance between local and national governments, producer organizations and producers from different industries and international organizations (mainly CCAFS-CGIAR).

Farmers reached/impact by the project: 240,000 producer families in 4 Latin America countries.

Costs incurred: Not reported.

Public policies: Public policies have been generated that convert the strategy of the Technical Agroclimatic Committees into the national response to climate variability, this is the case of Honduras, for example. In Nicaragua this is developed as part of the Ministry of Agronomy and in Guatemala and Colombia they have been supported by national governments and have been incorporated as a strategy in some local governments.

Obstacles encountered and overcome: Little use of agroclimatic data by small producers – transformation of agricultural practices adjusted to climate variability.

Quantitative and qualitative results: 4 countries, 20 Technical Agroclimatic Committees in operation, 240,000 producer families with monthly agroclimatic bulletins and recommendations for changing practices. Reduction of crop losses due to modification of practices adjusted to climatic variability.

Future development expectations: Transform the Technical Agroclimatic Committees into national strategies.

Characteristics of Inclusivity: Inclusion of multiple actors, integrating diversity of knowledge horizontally to prepare recommendations that are transmitted through simple bulletins with recommendations for the transformation of productive practices adapted to climate variability. Popularization of science, mainly for access to climate data and the consequences of climate variability on specific crops. The elaborated

recommendations are developed with the integration of multiple knowledge: that of the peasants, the original knowledge, that of the field technicians, that of the academy, that of public policy.

Business model: Multi-stakeholder alliances in equal participation and decision.

8. UNION OF COOPERATIVES – TOSEPAN

Thematic area: Community networks – own communication networks (TOSEPAN as an example of several community networks in rural and indigenous areas that are dedicated to agricultural production).

Countries: Mexico.

Technological solution: Due to the limited connectivity options available to the rural population and the interest in autonomy in managing their own communication options, autonomous connectivity solutions are developed in different Latin American regions. Community networks are telecommunications networks (Internet, Intranet or Mobile Telephony) owned and collectively managed by communities, non-profit and for community purposes. They join the community fabric and seek to contribute to educational, economic, health, political processes in accordance with a strategy of what they want to communicate (https://www.internetsociety.org/action-plan/2022/community-networks /).

In the case of TOSEPAN, a community cell phone solution, Intranet, virtual mobile operator and its own radio is developed.

Previous situation: The connectivity options in Cuetzalan, where TOSEPAN is located, are not available to all the people of the cooperatives that are members of the union, either due to access or costs.

Reasons for incorporating technology: The local media do not respond to the needs of TOSEPAN's associativity. Autonomous communication is essential for all cooperatives associated with TOSEPAN and for the union as well. The incorporation of proprietary technology strengthens the chaining processes between cooperatives, marketing within the same region and to other regions, technical assistance processes and governance of productive cooperatives and TOSEPAN.

Public/private actors involved in the implementation: Autonomous initiative of TOSEPAN and its 46,000 families and 460 local cooperatives.

Farmers reached/impact by the project: 46,000 families associated with the 460 local cooperatives.

Costs incurred: Not indicated.

Public policies: There is no public policy for community networks in Mexico.

Obstacles encountered and overcome: Strengthening of local capacities for the technical, content and communication strategy development of TOSEPAN. It has been based on young people from families associated with cooperatives.

Quantitative and qualitative results: The autonomous communication networks have had an impact on the production processes (due to technical assistance), the chaining and marketing processes (due to the management of contacts, clients, suppliers, etc.) and in the governance of the organization. (communication, calls, agreements, etc.).

Future development expectations: Strengthen community networks with infrastructure and content. Continue developing local capacities.

Characteristics of Inclusivity: Technological autonomy administered and developed by the union of cooperatives itself.

Business model: Union of cooperatives https://www.facebook.com/tosepan.titataniske.1/

9. COOPETARRAZÚ

Thematic area: Productive application.

Countries: Costa Rica.

Technological solution: Two years ago, work began on incorporating digital tools for real-time monitoring. For this, the paid version of ARCGIS has been used, a geographic information system that is fed by technicians in the field and personnel in charge of production processes. The data is taken on tablets and enters directly into the application that releases information in real time. This has made it possible to use much of the data that was previously collected on paper and then unusable.
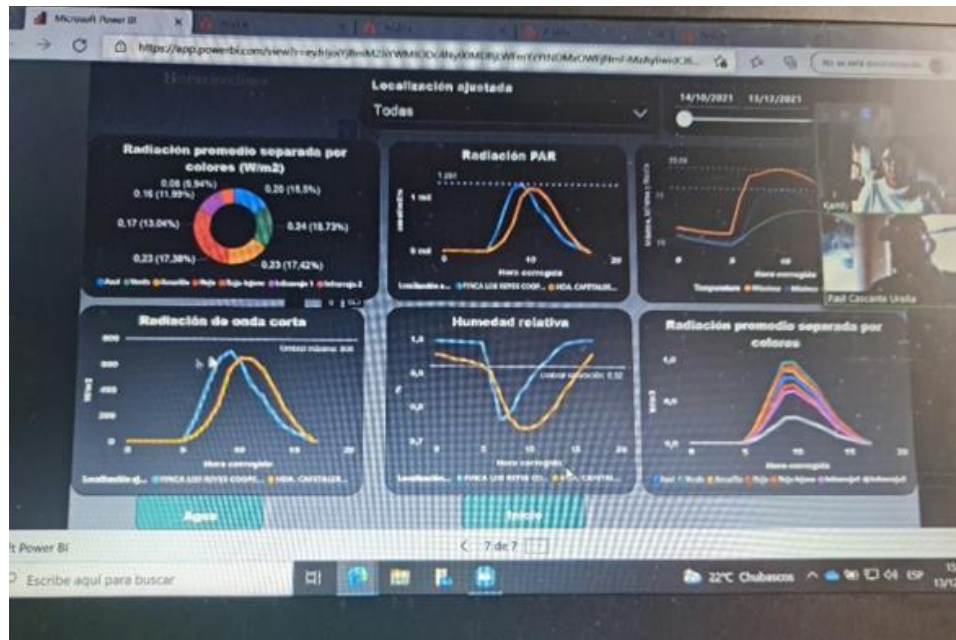
With the support of real-time monitoring using GIS, it generates different *dashboards* for processes such as:

- Data for the necessary audits for fairtrade certifications.
- Data of associates.
- Photographs of the farms and GPS locations.
- Field calculations.
- Soil data.
- All mills also collect real-time data on temperature, pulping ("crushing"), cupping, floor tests.

This, among many other data that allow in turn to have productive statistics, predictions, projected bushels by quality of coffee and by associate. It also allows information on farms by area and type of crop (coffee, mountains, forest, etc.) and coffee varieties.

It is also possible to identify farms in real time according to category and type of infrastructure, use of agrochemicals, fertilizers, herbicides to maintain certifications. Bodies of water, quality and quantity are also detected.

This among many other digital applications that have been developed in the cooperative's department of innovation, research and development with the support of a geographer who works on the implementation of these processes.

One of the data screens generated by 2 sensors installed in CoopeTarrazú
Source: CoopeTarrazú work sessions (agricultural cooperatives and digitization project, IICA)

On the other hand, CoopeTarrazú have been working on a pilot with sensors in the last 2 months. This has been done in partnership with the INNOVATECH company that has installed them in 2 regions. The CoopeTarrazú work team has been analyzing the data that is generated, learning with the support of the company's technicians about the potential that can be obtained from this type of digital technology.

Previous situation: The cooperative has had computer systems for a long time, they are a fundamental support for its administrative, financial and marketing processes. They are also essential for its export processes, since 80% of its coffee is exported, so the monitoring of the coffee markets has been done for more than 10 years with computer systems.

Reasons for incorporating technology: The cooperative has a research and development area that was born in 2011 and is currently working on the development of bio-inputs, animal nutrition products, human consumption products for the use of coffee by-products and digital agriculture.

For CoopeTarrazú digitization is of vital importance. They consider it vitally important to reduce the digital gap and especially the generation gap. Digital technologies are seen as an opportunity to attract young people to agricultural processes.

They have an IT department made up of 9 people who are dedicated to technical support and the development of systems adjusted to the needs of the cooperative. Data administration is outsourced. Computer systems have been developed for 4 areas; internal and export marketing, processing, commercial area including points of sale, administrative area.

All locations of the cooperative are managed with an internal network with fiber optic links. More than half of the 330 permanent employees have digital devices for their work, including those in the 60 benefits that are 90% online.

There are multiple systems that have been developed internally, including associate databases, sales credit management, coffee deliveries, supplies, relationship between associates; voting by assemblies and others, public relations, handling of clients, especially international ones, quality assurement. Just to mention a few.

Public/private actors involved in the implementation: CoopeTarrazú, as well as Coopeagri, have an important network of alliances with academia, the public sector, and the private sector. For the sensor project, for example, they have an alliance with the private company that has provided the 2 sensors and offers them technical support so that tests can be carried out during this period for a possible future acquisition.

Farmers reached/impact by the project: CoopeTarrazú was founded in 1960 at the initiative of 228 coffee producers in the Los Santos area with the purpose of confronting the unfair market conditions in which each producer found himself individually. They were also moved by the interest of owning the entire process and collectively solving different needs that they faced with growing coffee.

There are currently 5,000 associates, with a capital of 3,149 million and 13 commercial businesses (4 supermarkets, 1 wholesale warehouse, 4 agricultural supplies and hardware stores, 1 automotive, 1 fuel station and 1 coffee marketing space). It has a network of 60 coffee receivers. They currently process 300,000 fanegas of coffee annually, have revenues of 75 million dollars and credits of 9,000 million colones.

Seventy-eight percent (78%) of the associated producers own less than 4 hectares, defining themselves as a cooperative of small producers. Additionally, they generate 400 temporary and 310 permanent jobs. They spend more than $2.3 million annually in salaries and benefits, more than $46 million in coffee payments, and inject more than $48 million into the local economy. They receive 15,000 seasonal migrants of Gnobe and Nicaraguan nationalities.

They produce with a focus on social and economic development, environmental protection and the best conditions for working people. Within this framework, the indicators of environmentally responsible practices such as the consumption of water, energy, firewood and the use of production residues have substantially improved. They have recycling programs, support for the young population, residences and space for the care of the migrant population, promotion of the participation of women, environmental education and support for pandemic care. Carbon footprint and water footprint measurements are maintained to control clean production.

Costs incurred: Undisclosed.

Public policies: No public policies are reported to support this process.

Obstacles encountered and overcome: A very important aspect highlighted by the cooperative is the need to strengthen the capacities of its members on digital issues. In this sense, connectivity and the basic

knowledge to manage them are mentioned, but also the capacities to understand data and use them for their own farm management.

Quantitative and qualitative results: Among many other data that allow in turn to have productive statistics, predictions, projected bushels by quality of coffee and by associate. It also allows information on farms by area and type of crop (coffee, mountains, forest, etc.) and coffee varieties.

It is also possible to identify farms in real time according to category and type of infrastructure, use of agrochemicals, fertilizers, herbicides to maintain certifications. Bodies of water, quality and quantity are also detected.

This among many other digital applications that have been developed in the cooperative's department of innovation, research and development with the support of a geographer who works on the implementation of these processes.

Future development expectations: Continue strengthening the area of research and development for the use of digital technologies in all fields where the cooperative and its associates can benefit. A solid IT department will also continue to be maintained, allowing the development of its own information systems, maintaining good technical support and ensuring that the cooperative's staff and its associates have the necessary conditions to take advantage of digital tools.

Characteristics of Inclusivity: Guarantee that digital tools have a positive impact on production processes and generate better living conditions for associations and their families.

Business model: This is an associative initiative of more than 5,000 producers who, by joining together, can – thanks to the success of their production process – collectively have digital tools for production, marketing, communication and business administration. They may also collectively have a high-level research and development department. It would be impossible for each producer of less than 4 ha of coffee to have these tools if they were producing in isolation.

10.DIGITALIZATION OF SMALL-SCALE AGRICULTURE

Thematic area: Productive application – Use of technology to improve soil management and optimize water use.

Countries: Honduras, Nicaragua and Colombia.

Technological solution: Development of a low-cost sensor to measure soil moisture, in order to maximize production, improve food quality and optimize water use. It consists of an encapsulated, economical, robust and highly usable sensor.

Previous situation: Small and medium producers in Latin America and the Caribbean do not have irrigation systems, since they use rainfed systems. In addition to this, climate change causes significant changes in the usual rainfall patterns, making agricultural planning difficult. These irrigation systems present a high risk, since the crops depend highly on the water storage capacity of the soils, which makes it ideal to know in detail the characteristics and behavior of the soils.

Reasons for incorporating technology: To evaluate the water behavior of soils, a water balance is carried out, considering different climatic and soil variables, obtaining an estimate of the amount of water that the soil can retain. This estimate presents an associated error, which is possible to remove with the use of direct measurements of soil moisture, with the use of moisture sensors.

Public/private actors involved in the implementation:

- Zamorano University – Honduras.
- International Center for Tropical Agriculture (CIAT).
- VISUALITI SAS – Colombia.
- Directorate of Agricultural Science and Technology (DICTA) – Honduras.
- International Cooperation and Development Fund (ICDF) – Nicaragua.
- ECOHABITATS – Colombia.

Legal representatives:

Institución /País	Representante Legal	Responsable del Proyecto	Rol	Dedicación en % al proyecto	Tareas principales a realizar
Universidad Zamorano/Honduras	Jeffrey Lansdale	Luis Sandoval	Investigador y Administrador	30	Ejecución y seguimiento del proyecto en Honduras y Nicaragua.
CIAT/Colombia	Rubén Echeverría	Daniel Jimenez	Científico	30	Ejecución y seguimiento proyecto en Colombia
Visualiti SAS	Oriana Gomez	Brian Caro	Director I+D+i	40	Desarrollo y multiplicación de tecnología (sensor de suelo)

Farmers reached/impact by the project: The direct beneficiaries will reach 1,500 people, including producers, technical personnel, students, researchers and field workers. To the extent that the actors share information with other producers, technicians and operators and in the long term optimize their agronomic practices, there is an indirect estimate of impacting at least 70,000 producers.

In addition, the project allows the development of 4 Sustainable Development Goals:

Costs incurred:

Consolidated budget (US$):

Recursos financiados por:	FONTAGRO			CONTRAPARTIDA (en especie)				TOTAL
	U. Zamorano	Visualiti (Colombia)	Subtotal	U. Zamorano	CIAT	Visualiti	Subtotal	
01. Consultores (1)	27,440	7,290	34,730	74,800	72,900	15,696	163,396	198,126.00
02. Bienes y servicios	15,900	580	16,480	-	-	2,990	2,990	19,470.00
03. Materiales e insumos	9,200	22,190	31,390	-	-	-	-	31,390.00
04. Viajes y viáticos (2)	50,600	7,900	58,500	-	-	-	-	58,500.00
05. Capacitación (3)	13,500	300	13,800	3,000	-	4,200	7,200	21,000.00
06. Gestión del conocimiento y Comunicaciones (3)	10,600	600	11,200	-	-	1,200	1,200	12,400.00
07. Gastos Administrativos	18,000	1,900	19,900	17,000	10,000	1,900	28,900	48,800.00
08. Imprevistos	8,000	-	8,000	-	-	-	-	8,000.00
09. Auditoria Externa (4)	6,000	-	6,000	-	-	-	-	6,000.00
Total	159,240	40,760	200,000	94,800	82,900	25,986	203,686	403,686.00

Financing by country (US$):
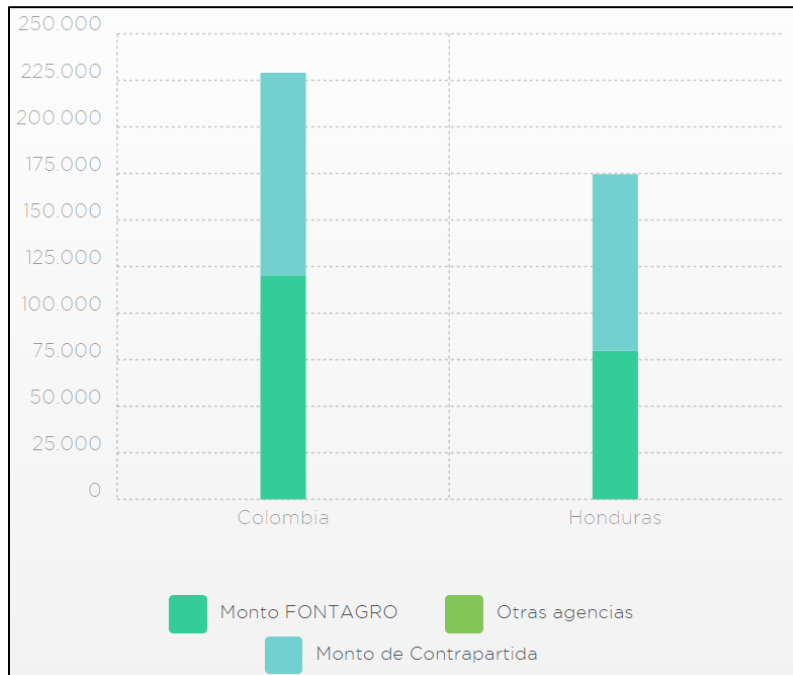
Public politics: The project is directly related to three of the four strategic lines of the FONTAGRO PMP 2015-2020.

Obstacles encountered and overcome: One of the obstacles encountered by small and medium farmers is access to digital technologies, given that costs are high and remote connections in rural areas are limited. In the case of soil sensors, due to their precision and robustness, they are expensive measurement

equipment. This is how the development of low-cost sensors can create an opportunity to scale their use in the field.

One of the challenges is to scale the technology in the regions, in addition to being able to expand to other countries.

Regarding connectivity in the field, it will be omitted in order to reduce costs, and the data will be collected manually once the crop cycle is finished.

With these features and simplifications, it is intended to reduce the cost by at least $180, to make it accessible to small and medium-scale producers.

Quantitative and qualitative results:

3 sensor prototypes have been designed, considering the initial ideas of the researchers and farmers who participated in the co-design process. An autonomy of 6 months in the field is expected. The sensors will be tested throughout 2021, and will serve as the basis for the final design for field deployment in early 2022.

Future development expectations: Directly benefit 1,500 people including producers, technical staff, students, researchers, and field workers, and indirectly benefit a minimum of 70,000 producers. It is also hoped that the conditions will be created so that entrepreneurs from other countries can take advantage of the developed concept and replicate it, increasing the coverage and impact of the project.

In the long term, the creation of humidity monitoring data in remote sites is expected, and to be able to open new opportunities for remote sensing, with the use of satellite information.

Characteristics of Inclusivity: The sensor was designed and used in pilot tests in the field together with farmers to determine that it meets the desired characteristics, in addition to determining the probability of adopting the technology. In addition, it is intended to write a business plan to guarantee the scalability and sustainability of the solution and keep the technology updated and accessible to small farmers in the regions.

The characteristics of the sensor were selected in such a way as to overcome the barriers that limit the acceptance of digital technologies by small-scale farmers. Creative visualization activities were carried out to understand the expectations and needs of the farmers. The solution allows generating useful information for farmers for the decision-making process.

Education on climate-smart practices, soil moisture management, and decision-making based on data analysis will be promoted.

In general, the cost of soil sensors is usually expensive due to their very precise and robust infrastructure. For this reason, the development of a low-cost device can create an opportunity for small and medium producers in rural areas and open the way to scale its use.

The technological solution has the purpose of providing information to efficiently manage tasks associated with planting planning and agronomic management, generating collateral impacts such as:

- Maximize production.
- Improve quality.
- Optimize water resources.
- Promote the use of technologies in agriculture.

Business model: This is an initiative based on an academic project where an alliance is made between higher education institutions, government institutions and international development institutions, together with small farmers, in such a way that it allows adjusting, adapting and contextualizing the technology to the real needs of small farmers. In addition, as one of the pillars of the project, it is intended to be a low-cost technology, so that it is accessible to low-income family farmers.

11. CHOCOLATE 4ALL (CHOCOLATE FOR ALL)

Thematic area: Productive application - Registration of cocoa producers via GPS in different municipalities of Honduras, using cartographic data that is stored in a database for subsequent analysis, study and decision-making on agronomic management, all with the objective of improving the quality of cocoa and the living conditions of the benefited producers.

Countries: Honduras.

Technological solution: The project will have a digital cartographic database that will allow different types of studies and analyzes to be carried out, as well as achieving access processes to cocoa quality certifications. Advanced platforms such as IBM Food Trust, Blockchain and Watson for Agriculture were used for mapping, analysis and decision making for agronomic management. Through blockchain technology it is possible to manage traceability to offer open access to the data of the cocoa chain.

In addition, producers will learn to use blockchain systems to manage data from the cocoa chain, as well as drones and sensors to monitor farms. ShadeMotion simulation software will enable more precise crop management and help optimize yields in the field.

Previous situation: Cocoa producers face various challenges such as inadequate management practices and low levels of technology, resulting in low productivity, limited quality, low volume of production and low prices, factors that together increase the economic vulnerability of farming families.

Reasons for incorporating technology: With the digitalization of the cocoa value chain, it is intended to help agricultural cooperatives and producers to produce evidence for the certification of origin, reports of compliance with quality standards, transparency and tracking of the origin of the product that will facilitate access to the market of the new digital economy. In addition, they will be able to receive technical assistance based on the information collected from the farm.

Public/private actors involved in the implementation: Heifer International, Inter-American Development Bank, Chocolats Halba.

Farmers reached/impact by the project: It began with 500 farms in the municipalities of Catacamas, Dulce Nombre de Culmí and Patuca. It is intended to benefit around 1,000 small cocoa farmers.

Costs incurred: Not available.

Public policies: The government of Honduras has identified this sector as part of its development plan, in the Strategic Plan for the Agri Sector 2014-2018.

Quantitative and qualitative results: Registration of more than 500 farms via GPS. With this digital cartographic database, it will be possible to carry out different types of study and analysis, as well as to achieve access processes to cocoa quality certifications.

In order to map, analyze and make the right decisions, advanced technological platforms such as IBM Food Trust, Blockchain and Watson for Agriculture were used.

Processes have been carried out aimed at strengthening beneficiary producers, organized groups, financial and commercial allies through technical and business advice using blockchain, developing a

series of workshops and meetings with producer organizations so that they learn more about it, value its usefulness and implementation, identify the facilities that are available and those that are needed to maximize the available resources. Technical advice is being provided to beneficiaries for quality production, making visits to cocoa collection centers, identifying the beneficiary capacities of each one of them, identifying the conditions of the centers, the equipment requirements to be able to carry out efficiently the management of cocoa and the respective quality controls, in order to be able to offer the trading companies, cocoa according to the requested specifications.

Workshops were held for the elaboration of the business diagnosis of the 8 producer organizations, where it was possible to collect information in the areas of organization, administration and finance, production, processing and market, framed in a SWOT; which served as input to define the strategic axes to which the organization should invest to improve the income and well-being in general of the organizations. Additionally, the type of organizational structure, vision and mission were defined; to promote the entrepreneurial approach and greater governance in its field of development.

Characteristics of Inclusivity: The project is committed to the producer families to support them with technical assistance, business advice and infrastructure improvement. Producer groups have been supported to rehabilitate and build solar dryers, installations of great importance to achieve a high-quality product.

The project includes activities aimed at preparing and coordinating together with the implementing partners and stakeholders of the cocoa value chain, identification of producer organizations, signing of cooperation agreements and hiring of personnel. With the digitization of the cocoa value chain, it is intended to help agricultural cooperatives and producers to produce evidence for certification of origin, reports of compliance with quality standards, transparency and tracking of the origin of the product that will facilitate access to market of the new digital economy. In addition, it will be possible to receive technical assistance based on the information collected from the farm.

Meetings have been held to define coordination mechanisms to be able to socialize the land titling process, identify producers with an interest in starting a titling process and start the work of collecting the information required in this process.

Technical advice is provided to beneficiaries for quality production by carrying out:

- Visits to cocoa collection centers.
- Identifying the beneficiary capacities of each one of them.
- Identifying the conditions of the collection centers, the equipment requirements to be able to efficiently handle the cocoa and the respective quality controls, in order to be able to offer the cocoa trading companies according to the requested specifications.

Workshops were held for the elaboration of the business diagnosis of the 8 producer organizations, where it was possible to collect information in the areas of organization, administration and finance, production, processing and market, all framed in a SWOT. Additionally, the type of organizational structure, vision and mission were defined, to promote the business approach and greater governance in its field of development. Efforts are being made to allow the linking of financial markets to the transactional process,

identifying the gaps and opportunities that cocoa producers have to access better technologies, financial and non-financial service providers and markets.

Business model: It is an alliance between Heifer International, a global non-profit institution, the Inter-American Development Bank and the private company Chocolats Halba, based in Honduras.

With the digitization of the cocoa value chain, it is intended to help agricultural cooperatives and producers to produce evidence for the certification of origin, reports of compliance with quality standards, transparency and tracking of the origin of the product that will facilitate access to market of the new digital economy. In addition, they will be able to receive technical assistance based on the information collected from the farm.

12.AgriNeTT

Thematic area: Productive application – understanding the characteristics of the soil and crops.

Countries: Trinidad & Tobago.

Technological solution: Series of mobile applications that help the farmer with geospatial data to understand the characteristics of his farm and the crops that are best suited for his production, in addition to tracking expenses and profitability of production, and knowing the prices of crops in real time.

AgriNeTT Objective: *"The primary focus of AgriNeTT is to build Information and Communications Technology (ICT) applications around Agriculture data. The approach that is being used is to capitalize on the growing global phenomenon of Open Data and Open Access and build an Agriculture Open Data Repository. This repository will house different data sets from institutions and associations, including farm level production data, commodity prices and volumes, farmland spatial data, soils, weather and pest and diseases tracking data. A prime objective in building this platform is to create a central repository for agriculture data in which the data sets can be visualized in different ways and where local developers can build applications that are useful to the national community."* (https://sta.uwi.edu/rdifund/projects/agrinett/about.asp).

Previous situation: Green Market (initiative of organization of sellers that work together with producers to create awareness in consumers) is focused on changing existing production and consumption patterns, linking farmers directly with consumers, in a way that helps producers to improve their agricultural production practices.

Reasons for incorporating technology: Improve the information and technology tools available to farmers, in addition to offering mechanisms to inform policies related to agricultural planning and food security.

Public/private actors involved in the implementation: The applications were created at The University of the West Indies (UWI).

Farmers reached/impact by the project: Collectively, there have been 2,000 downloads of the apps, but only a few have sustained consistent use.

Costs incurred: The costs were covered by the Research and Development Impact Fund of the University of the West Indies.

Obstacles encountered and overcome: In T&T, as in the rest of the Caribbean, many farmers are small family farmers. The challenge of the initiative to become a changing entity must be that the applications can be adopted by farmers. However, the adoption of these tools is a real challenge and has been a slow process. The developers of the applications recognize that there are many barriers in the adoption of the technology, such as the use of cell phones only to make phone calls and being able to give recognition to the applications by the producers.

Quantitative and qualitative results: The Green Market initiative taught farmers how to use 3 applications: AgriExpense App, AgriPrice App and AgriMaps App. The applications were developed in such a way that they are easy to use and can help farmers improve the management of their farms.

- AgriExpense App: it offers farmers the ability to administer and manage their crops throughout their production cycle, in a way that allows them to identify and store data on production costs and profitability.
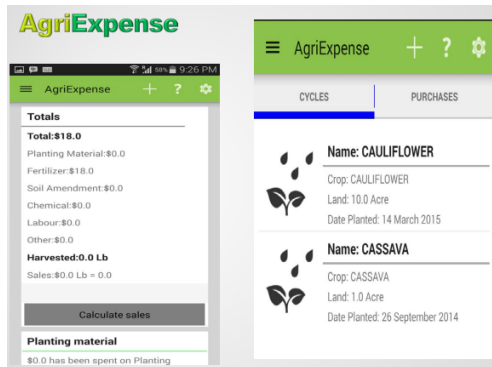
- AgriPrice App: it offers the prices of daily agricultural products, and allows the farmer to select the crop of interest and create an alert to changes in the price of the product. Data are obtained from The National Agricultural Marketing and Development Corporation (NAMDEVCO) of Trinidad & Tobago.
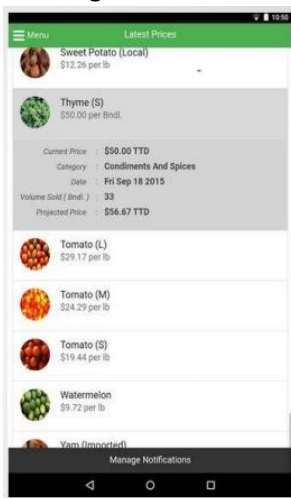
- AgriMaps App: The app provides details of geographic features such as contours, soil properties, and land use. It also generates recommendations on the crops that are best adapted depending on the characteristics of the soil, as well as recommendations on soil management, considering the soil profile.
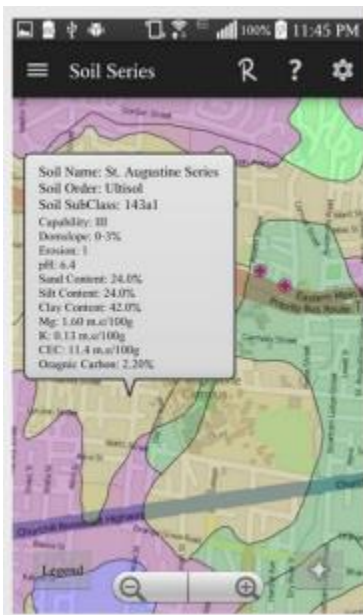
All 3 apps are free to download for Android.

The project has been achieved by young people, who see the technological future in the field of agriculture with better eyes and have a higher level of education.

Future development expectations: The next phase of the project is the adoption of the tools and the system. However, it is necessary to obtain financing.

Other applications are being developed, including AgriDiagnose, as well as the promotion of open data platforms.

Characteristics of Inclusivity: From the beginning, the project was oriented towards collaborating with producers through applications that are easy to use and access, and that provide support to farmers in their field work. In addition, it represents an information platform for political decision makers and planning activities in the field.

With AgriPrice, a communication channel is opened to the producer about information on variations in the price of various products, facilitating marketing and fair trade.

In addition to this, data is managed in an open repository, capable of storing data sets from institutions and associations.

Business model: This is an initiative based on an academic project and an alliance with Green Market, which is an organization of vendors who work together with producers to raise awareness among consumers.

13.FARMVUE – RECORD AND SUMMARY PRODUCTION DATA FOR TRACKING AND MAXIMIZING PROFITABILITY

Thematic area: Productive, financial assistance.

Countries: Trinidad & Tobago.

Technological solution: The mobile application performs calculations, records data, tracks trends over time and it is capable of working without an internet connection. The tool facilitates the traceability and registration of its productive and financial practices, contributing to a more efficient and sustainable management. It allows farmers to access electronic platforms where they can document and record their plantings, harvests, inputs used, costs and sales. It also enables producer organizations, which can analyze data to drive evidence-based decisions, facilitating higher productivity and sustainability.
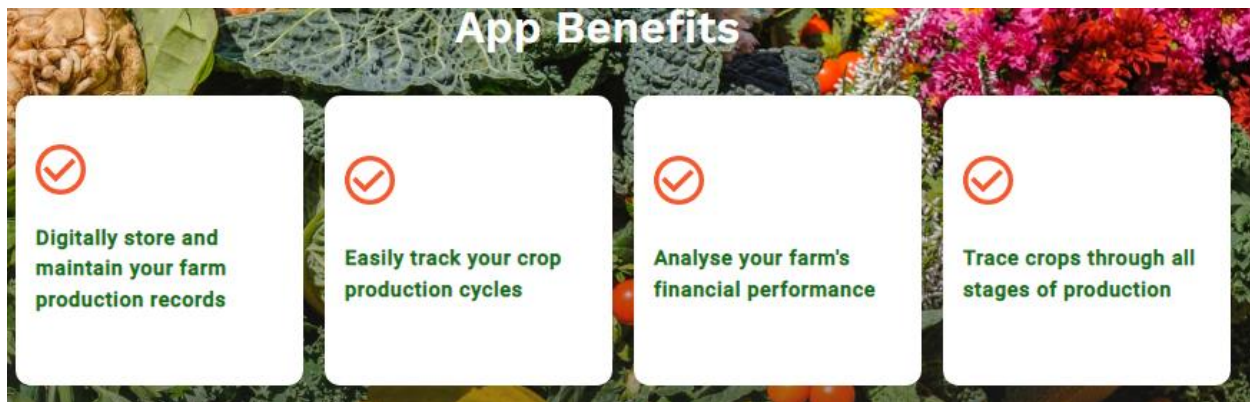
Previous situation: According to Minister Rambharat, technology is key in agriculture, for example, to face the effects of climate change. We are convinced that only with training and greater digital resources for our producers will our agriculture be able to grow.

Reasons for incorporating technology: This tool is presented as an effort to improve the lives of T&T farmers, using digital technology. It focuses on small farmers to provide resources and build capacity to increase the profitability, environmental sustainability and socioeconomic equity of agricultural activity.

Public/private actors involved in the implementation: Inter-American Institute for Cooperation on Agriculture (IICA), Cropper Foundation, National Agricultural Development and Marketing Corporation (NAMDEVCO), Agricultural Development Bank (ADB) of Trinidad & Tobago.

Farmers reached/impact by the project: Farmers from Trinidad & Tobago.

Costs incurred: Not available.

Obstacles encountered and overcome: Farmers in the country participated in the technology tests and reported the advantages it brought to their daily tasks.

Quantitative and qualitative results: Application allows documenting and recording plantings, harvests, inputs used, costs and sales.

Future development expectations: The application also aims to be a source for producer organizations to analyze data and drive evidence-based decisions that facilitate greater productivity and sustainability.

Characteristics of Inclusivity: The focus is oriented on small producers, and that they are benefited with resources and capacities to increase the profitability, environmental sustainability and socioeconomic equity of agricultural activity.

The utility, functionality and ease of use of the application was extensively tested and fine-tuned in 2021, with the participation of T&T farmers.

Business model: Project promoted by a cooperation alliance between different technical cooperation and agricultural development organizations.

FarmVue allows farmers to access electronic platforms where they can document and record their plantings, harvests, inputs used, costs and sales. It is very useful for producer organizations, which can use it to analyze data and thus drive evidence-based decisions that facilitate greater productivity and sustainability.

14.Mi LOTE

Thematic area: Technical assistance – Digital platform that helps farmers manage their resources.

Countries: Mexico.

Technological solution: Free web platform developed by Corteva Agriscience, which connects the farmer with his plot in real time, using digital tools to deliver data that will help him make strategic decisions, optimize resources and obtain better results in his harvest, by having all the information from your field at the reach of a click anytime, anywhere.

Functions available in the first stage:

- Weather monitoring: The platform can deliver reports based on weather forecasts taken via satellite and radar in a given region. Here you will find the climatic information for each plot, with data on current conditions and a forecast adjusted to 5 days (temperature, precipitation, humidity, wind).

- Activity log: An activity log will be available which can be fed with personalized information, record step by step the activities carried out on the plot and thus have better season planning and management of your lot. This information record is saved in "the cloud" to consult the history of activities anywhere and at any time.

- Satellite images: Through satellite image and with the use of colorimetry, 4 indices can be identified for monitoring your plot: Normalized Green Index (NDVI), Improved Green Index (EVI), Chlorophyll Index and Surface Water Index. With this, it will be possible to correlate and monitor elements such as plant health, nutritional deficiencies and surface water. A great benefit is that you can have historical information on the plots to make year-to-year comparisons.

- Collaborative Notes: Mi Lote provides the possibility of creating, with all users registered on the platform, a community that shares specific and important information alerts for all users, such as the presence of pests in different states, doubts and recommendations.

- Economic planner: In this section you can calculate the profit margin for the activity carried out in each plot; cost control, profitability estimates, harvested profits per hectare and downloadable pdf reports.

- Detection of pests and diseases: If it is suspected that the crop has some type of disease or pest attack, images of the crop can be uploaded to the platform and the algorithm on which the platform is based will predict what pest and fungus it is.

Reasons for incorporating technology: Farmers are under pressure to adopt more sustainable practices without affecting the efficiency and profitability of their farms. To move towards the transformation of agriculture, the experience of farmers, the use of science, technical knowledge and the incorporation of

digital tools must be combined so that producers manage their land more effectively, better manage their crops and ensure sustainability and efficiency of food production.

Public/private actors involved in the implementation: Corteva Agriscience, Inc., a global and agricultural company, generating preference in the market through its unique distribution strategy.

Farmers reached/impact by the project: The application has already exceeded 1.2 million hectares that are connected to the platform.

Costs incurred: Not available.

Quantitative and qualitative results: Achieve real-time connection between the farmer and his plot, using digital tools to deliver data for strategic decision-making, optimizing resources and obtaining better results.

A constant and open communication channel is maintained with the users of the platform, allowing their feedback to be heard and the tool to be strengthened according to the needs of the Mexican market.

Free and easily accessible application.

Future development expectations: Currently, it is a web app-type tool, which is expected to develop a version for mobile devices.

Characteristics of Inclusivity: The tool has been designed for all grain and cereal farmers (corn, sorghum, wheat, barley, sunflower, etc.) in Mexico who seek to make agile decisions based on first-hand information to optimize productivity in their farm crops, minimize risks and optimize the use of resources.

The first stage is implemented under the "prosumer" model, that is, the Corteva company is in constant communication with platform users to listen to their feedback and constantly strengthen the tool according to the needs of the Mexican market.

It seeks to combine the experience of farmers, the use of science, technical knowledge and incorporate digital tools so that producers manage their land more effectively, manage their crops better and ensure sustainability and efficiency in food production. Farmers, large and small, are supported to meet demand using software, hardware and data analytics to make farming more profitable and efficient.

Business model: Project developed by the company Corteva Agriscience, a global company focused on the development of technologies and solutions for agriculture.

This platform will provide the farmer with information that will help him make more precise decisions, optimize resources and obtain better results by having all the information on his field. It is a tool that has been designed for all grain and cereal farmers (corn, sorghum, wheat, barley, sunflower, etc.) in Mexico who seek to make agile decisions based on first-hand information to optimize the productivity of their crops, minimize risks and optimize the use of resources.

15. ALDEA GLOBAL 2.0 STRATEGY

Thematic area: Technical assistance – use of mobile applications for technical assistance and business management.

Countries: Nicaragua.

Technological solution: Two applications: 1) Aldea Móvil – carry out business transactions, and 2) Aldea Tech – receive technical assistance on crops.

The Aldea Global 2.0 Strategic Plan is oriented towards the use of Machine Learning as an opportunity for growth, differentiation and sustainability for the coming years. Strengthen systems internally to channel innovations through the use of technology and analytical solutions, smart business and data science.

Public/private actors involved in the implementation: Asociación Aldea Global Jinotega.

Farmers reached/impact by the project: Some 20,000 agricultural producers are expected to benefit.

Costs incurred: Not available.

Obstacles encountered and overcome: One of the biggest barriers faced in the northern part of the country is connectivity. Also, another obstacle is the migration from the traditional to the digital, since the producers were afraid of using touch screen phones and surfing the internet.

Quantitative and qualitative results: Two mobile applications that help Nicaraguan producers in various tasks. Aldea Tech provides agronomic information on the coffee plantation with multimedia content to identify and treat crop pests and diseases. Site-specific agrometeorological alerts are also received in order to better organize activities according to the phenological cycle and weather conditions in the area. There are 4 climatic stations located in the northern zone of Nicaragua.

The Aldea Móvil application allows you to manage credit solutions, view contributions, account statements, payment plans, payments made and the status of applications.

To overcome fears of using digital devices, training was given on the use of these tools, which have been key to adapting to the new work process.

Characteristics of Inclusivity: In rural areas, accessibility and quality of connection is still a pending issue, which is why Aldea Global is promoting, through the Technology and Information team and specialized advice, two applications for members to carry out business transactions and receive technical assistance.

Plataforma Mercado

Crear Apps en base al mercado local

Comprar en Línea - Precio (oferta, subasta, o fijo) & Estándar de entrega (Cantidad y Calidad)

Ranking de compradores y vendedores tipo A, B o C

Pronosticar demanda y planificación

Planificación Siembra hasta Mercado

Colección de datos primarios y secundarios

Consultaciones profesionales: selección cultivar, tipo insumos, compras insumos, cosecha y mercado

Validación y evaluación de resultados.

The application called "My Technology" is mentioned as a technological solution apart from the two mentioned above, however, it is important to clarify if it is another solution or if it is part of the same program. It is mentioned that this application opens an opportunity for the use of tools that allow interaction with business information, development and innovative technical assistance. The developers consider it opportune to make synergy, considering big data, Site-Specific Agriculture (AEPS), etc.

Business model: The project is developed by the Asociación Aldea Global Jinotega.

The Association, through the development and implementation of two mobile applications, intends that the producers of the different regions have access and facility to carry out business negotiations and also obtain technical assistance on their crops, all this in a way that allows improving the quality of life of rural families.

16.THE FARMER BOX

Thematic area: Technical assistance.

Countries: Mexico, Peru.

Technological solution: The Farmer Box is a platform for handling and managing data generated in the field, capable of performing 3 main functions: i) Online and offline data collection; ii) Build portals to integrate new field information with previously stored information and also with data from public databases; iii) Standardize the information, in such a way that it allows the use of data in territories for monitoring.

Previous situation: Together with associations and cooperatives, a large amount of data is generated from credit granting processes, much of which is recorded manually. In addition, there is specific data on the farm and the producing families. Given this situation, the use of this information was being almost null, given the large amount and the little digitization of the data.

Reasons for incorporating technology: Achieve incorporating all the data generated in the field in portals, which are capable of standardizing, integrating data and performing analysis of different key parameters, to help cooperatives, technicians and producers with financing, technical advice and production processes.

Public/private actors involved in the implementation: Public actors such as the International Labor Organization, the Ministry of Welfare of Mexico and the Ministry of Agriculture of Mexico have participated; as well as private entities such as Amecafé (Mexican Association of the Coffee Productive Chain), representatives of cooperatives and universities.

In the case of Peru, government sectors, coffee and cocoa unions have participated.

Farmers reached/impact by the project: So far, some 37,000 people have benefited directly and indirectly from 36 coffee and cocoa organizations.

Costs incurred: Not available.

Public policies: Interest and participation of public entities in Mexico and Peru.

Obstacles encountered and overcome: Among the obstacles encountered in the development of the project, there are 3 main ones:

- Digital literacy – an adequate model for the dissemination of information in the field must be sought, in addition to the type of technology delivered to producers. Training, capacity building and technical assistance are necessary.
- Financing – it is important to consider how to move from a subsidy model to another type of model, seeking to generate income diversification. In addition, payment for the tools developed and their implementation should be considered.
- Holistic vision - being able to consider all aspects of digitization as a whole and not as separate aspects, with an integrated model approach. Long-term periods must be considered, which are capable of allowing an adequate integration of the technology and its adequate scalability.

Another important point to consider is being able to block the migratory flow of young people from rural, agricultural areas to urban areas.

Quantitative and qualitative results: Achieving the integration of three data-based approaches in a single open-source platform, which allows the creation of customized solutions for each territory, with standardized data, creating different "data-based landscapes". In addition to the platform serving as a digital outreach tool, allowing producers access to information through "low technology" tools.

Future development expectations: It is expected to consolidate what is being done, improving the service offered. Ensure that the platform offers access to high-quality, reliable, standardized data, which would allow the search for more opportunities for producer cooperatives. On the other hand, it is expected to determine the best business model, either through investors and/or donations.

Recommendations: Among the recommendations are:

- The lessons are public and can be disseminated.
- Generation of generational change policies and strategies.
- Sustainability made simple.
- Planning based on quality data.
- Capture knowledge of the field and, above all, share it in an inclusive manner, using technology, through interactive instruments such as videos, diagrams, etc.

Characteristics of Inclusivity: Among the characteristics of inclusivity detected are:

- Solutions at the family level, considering its members, whether they are older adults, women, children, as well as the socioeconomic situation of the family group.
- Open-source solution that works online and offline.
- An individual improvement plan is generated, specific to the area under study. A regionalization is created, going from using "big data" to a "small data" approach.
- Data access solution.
- The promotion of capacity building.
- Use of open-source and "low tech" technologies.
- Promotion of the dissemination of learning, and that it be of public order.

Business model: The project is developed through different alliances between public and private entities, cooperatives and producer associations, and The Farmer Box initiative, in both countries.

17.MAGA APP

Thematic area: Commercial application – Mobile application for information on agricultural prices of the Ministry of Agriculture, Livestock and Food of Guatemala.

Countries: Guatemala.

Technological solution: The APP MAGA application allows the different producers in the country to know the prices of the different agricultural products, as well as monitoring the prices of livestock, fishing, among other products that are under the tutelage of the ministry.

Market prices are presented according to the days of the week. On Mondays, Wednesdays and Fridays basic grains, vegetables and fruits are monitored. On Tuesdays and Thursdays, livestock and fishing products. Similarly, on Tuesdays the prices of spices, condiments and others are presented. All prices are updated so that the producer can easily access them from a smartphone.

Apart from price information, the application offers product sheets, push notifications, surveys, news, newsletters and a link to the Waze application to go to the most convenient market, according to the user's needs.

Public/private actors involved in the implementation: Ministry of Agriculture, Livestock and Food of Guatemala and the Government of China.

Farmers reached/impact by the project: There are more than 5,000 downloads on the Android platform.

Costs incurred: The application was developed with the cooperation of the Taiwanese government at a cost of US$17,000.

Future development expectations: It is necessary to increase connectivity in the market, in particular through broadband access in rural sectors, which allows reaching large space coverage quickly and efficiently. There also needs to be incentives from governments to deploy new wireless broadband access technologies.

On the other hand, it is necessary to reduce the bureaucratic obstacles that exist when deploying new telecommunications networks. In addition, it is important that the authorities reduce the tax burden on smartphones, so that they become more affordable devices and allow a greater number of users to access the benefits of the application.

Characteristics of Inclusivity: The Ministry sets itself the objective of increasing service coverage by reaching a greater number of producers. Being able to count on the price of each of the products offers the possibility of easily defining the steps to follow in the market, being a tool of great value for small producers, given that many of them must accurately define the moment just to bring their products to the market, depending on this profitability and reinvestment capacity. In other words, the application provides an opportunity to generate better production conditions for the most vulnerable producers in the production chain.

This technological platform, apart from representing an opportunity for economic growth, also has the capacity to transform the opportunities of small producers, significantly improving their profits.

One of the advantages is the free access to the application, guaranteeing that the producers can access the information. The application seeks to facilitate its use, since it is possible to generate a user through the mail account, Facebook or Twitter. The app has an intuitive model, favoring the user's understanding.

https://play.google.com/store/apps/details?id=com.aumenta.taiwanmaga&hl=en&gl=US

Business model: Initiative was born from a state project of the Guatemalan government, specifically the Ministry of Agriculture, Livestock and Food (GANA) of Guatemala, with support from the Republic of China (Taiwan).

The development of the application allows the producer to access price information, product sheets, push notifications, surveys, news, newsletters and a link to the Waze application to go to the most convenient market, according to the needs of each user. The app provides an opportunity to generate better production conditions for the most vulnerable players in the production chain. In other words, its implementation not only shapes economic growth, but also has a transforming power in the opportunities of small producers, significantly improving their profits.

18. REGIONAL SYSTEM OF INTELLIGENCE AND MONITORING OF AGRICULTURAL MARKETS (SIMMAGRO)

Thematic area: Commercial application - regional virtual platform.

Countries: Costa Rica, El Salvador, Guatemala, Honduras, Panama, Nicaragua, Dominican Republic.

Technological solution: Virtual platform connected to existing national systems, whose objective is to facilitate access to standardized statistical information on wholesale market prices, foreign trade and production of the 40 agricultural products of vital interest in the region. It constitutes a tool for monitoring, analysis and decision-making in the agricultural sector. A repository of data on agricultural products is offered, distributed in 3 modules:

1. Wholesale prices – offers wholesale prices of the main agricultural products, which are compiled by the countries of each of the main markets of the countries involved. The products are classified into fruits, vegetables and basic grains. Prices are available from early 2000 to the present, in daily, weekly and monthly format.
2. Foreign trade – offers exports, imports and the balance of the trade balance, of agricultural products detailed by type of market (intra-regional or extra-regional), partner country of destination or origin, USD value and volume.
3. Production – offers indicators of harvested area in hectares, production in metric tons and yield.

Frutas 🍃	Hortalizas 🥕	Granos Básicos 🌾
Aguacate (Palta)	Ajo	Arroz
Banano (Guineo)	Apio	Frijoles (Porotos) rojos
Coco	Ayote (Auyama)	Frijoles negros
Fresa (Frutilla)	Brócoli	Maíz
Limón	Camote (Batata dulce)	
Mango	Cebolla	
Mamón Chino (Rambután)	Chayote (Güisquil, patate, tayote)	
Maracuyá (Chinola)	Chile (Ají, pimiento) dulce	
Melón (Cantalupo)	Chile (Ají, pimiento) picante	
Naranja	Cilantro (culantro)	
Ñame	Coliflor	
Papaya (Lechosa)	Lechuga	
Piñas (Ananás)	Papa (Patata)	
Plátano	Pepino	
Sandía (Patilla)	Remolacha	
	Repollo	
	Tiquisque (Otoe, Yautía)	
	Tomate	
	Vainica (Habichuela, vainitas, Ejotes)	
	Yuca	
	Zanahoria	

Platform access through: www.simmagro.sieca.int .

More information: https://www.youtube.com/watch?v=gdnMBMwmahI

Previous situation: In the last twenty years, the importance of intra-regional trade and in particular the agri-food trade of Central America has grown exponentially. The Central American region currently has an RRM made up of the SIMAs, members of SICA belonging to the MIOA, which also includes Mexico and Haiti. The RRM addresses critical issues such as: i) the situation of the prices of basic grains, fruit and vegetables markets at the regional level; ii) the regional supply situation; iii) harvest prospects, and iv) trade.

Until August 2015, the RRM did not have an institutional mandate, which was finally approved by the Council of Ministers, who asked the SECAC for its institutionalization and subsequently technical and financial support to the FAO to finalize its consolidation.

Reasons for incorporating technology: To help eliminate hunger, food insecurity and malnutrition, foster inclusive and efficient agricultural and food systems, increase the resilience of livelihoods, achieve information gathering, technical assistance and training on the development of tools for price monitoring.

Public/private actors involved in the implementation: The Central American Economic Integration Secretariat (SIECA), the Executive Secretariat of the Central American Agricultural Council (SECAC) and the Regional Market Information Network.

Farmers reached/impact by the project: An impact of improved food security is generated in the countries of Central America and Family Farming is better inserted in the commercial circuits and in the commercial policies of the subregion.

Costs incurred: US$292,000 as a contribution from FAO.

Obstacles encountered and overcome: In some countries, the information migration and system adaptation processes took longer than expected, mainly due to changes in the national institutional structures in Costa Rica and the Dominican Republic.

Quantitative and qualitative results: Regenerate a regional online platform that allows connecting existing national systems with standardized statistical information on wholesale market prices, foreign trade and production of 40 agricultural products of vital interest in the region. The platform has an interactive dashboard, a modal window to consult in detail the interactive dashboard data, a wholesale price module, a foreign trade module and a production module.

Future development expectations:

- Improvement of the tool for the regional and automatic integration of the database in relation to prices, trade and production, with daily updated information for the public.
- Complete the installation in El Salvador and the Dominican Republic of the FAO Food Price Analysis and Monitoring Tool.
- The regional supply situation, harvest prospects, trade and grain price trends require continuous technical support.
- The inclusion of early warnings and perspectives on their behavior to favor decision-making, which will require technical and financial resources.

Characteristics of Inclusivity: The target audience of the platform should be conceived as all public and private actors related to the agricultural sector, including companies, producers, input suppliers and distributors, as well as civil society organizations and academia that they work directly or indirectly with the sector.

The platform allows an improvement in the food security of the countries involved and a better insertion of family farming in the commercial circuits and policies of the subregion. The project's objective was to contribute to the reduction of rural poverty by facilitating access to information and transparency in agricultural markets for products such as basic grains, fruits and vegetables, mostly produced by family

farmers. For this, a reliable and standardized information management and handling tool was created, available to everyone and that could be linked to the design of promotion policies.

The development and opening of information for agricultural markets contributes to the satisfaction of specific needs for family farming, of both genders (gender equality). It also facilitates access and transparency of market information for the products with the greatest impact on family farming, generating better market opportunities for them.

The platform has been developed considering instruments that facilitate the presentation and understanding for the users of the system.

Business model: The initiative was born as an alliance between regional government agencies in Central America.

The SIMMAGRO virtual platform makes it possible to connect the existing national systems of the countries of the region, which facilitates access to standardized statistical information on wholesale market prices, foreign trade and production. This tool is useful for monitoring, analysis and decision-making in the agricultural sector, with the purpose of informing policy makers and farmers about trade trends and market prices of the countries' products.

The project's objective was to contribute to the reduction of rural poverty by facilitating access to information and transparency in agricultural markets for products such as basic grains, fruits and vegetables, mostly generated by family farming.

19.COCOA, A WINNING BET FOR SMALL PRODUCERS – DEVELOPMENT PROGRAM FOR COCOA SUPPLIERS

Thematic area: Technical assistance – Provide technical, social and business support in the formulation, execution and development of projects, together with the delivery of technological packages to optimize profits and produce high-quality cocoa.

Countries: Colombia.

Technological solution: Technical assistance to cocoa farmers through SMS.

The campaign sent text messages to cell phones about cultivation and marketing recommendations, reaching more than 7,800 producers in 2017.

Previous situation: In Colombia the supply of cocoa is less than the demand. Despite the appropriate conditions, cocoa production in Colombia has not historically been important and has faced phytosanitary problems, uprooting of producers, etc. The Compañía Nacional de Chocolates must import about 25% (nearly 6,000 tons in 2007) of the cocoa it requires for its production process, mainly from Ecuador, the Dominican Republic, and Indonesia, facing higher product prices due to freight, insurance, and tariffs.

Reasons for incorporating technology: The aim is to reduce dependence on imported cocoa and take advantage of Colombia's optimal agri-ecological conditions, in order to guarantee the internal supply of raw materials necessary for the company. In addition, it seeks to convert cocoa cultivation into a life project for farmers.

Public/private actors involved in implementation: The Compañía Nacional de Chocolates de Colombia participates in the project, through the Program for the *Development of Cocoa Suppliers*, which makes alliances with associations and/or cooperatives of producers and with the support of government and financial entities. The Productive Alliances project of the Ministry of Agriculture, the National Learning Service, the Colombian Agricultural Institute, the National Federation of Cocoa Growers, the United States Cooperation Agency (USAID) through its *More Investment for Sustainable Alternative Development programs (MIDAS)* and *Municipal Alternative Development Areas (ADAM)* and the European Union.

Farmers reached/impact by the project: Fourteen (14) farmer associations that bring together nearly 3,500 families from marginal areas and social conflict.

Costs incurred: An approximate investment of US$28 million was made, of which the Compañía Nacional de Chocolates has contributed US$1.5 million for the development of the sector.

Public policies: The Government of Colombia has included cocoa in its national program for the substitution of illicit crops, favoring farmers, through projects of national and international, governmental and private institutions.

Obstacles encountered and overcome: The weakness of farmers' organizations in administrative, financial, commercial, organizational and credibility aspects. Difficulty in obtaining financial resources to structure and develop projects. The shortage of suitable local operators. The low presence of specialized technicians in cocoa cultivation.

Quantitative and qualitative results:

- For the company: Expansion of the national supplier base, including farmer associations and cooperatives, mitigation of supply risk, increase in the number of hectares of cocoa, obtaining differentiated raw material under a fair trade and organic certification scheme.
- For suppliers: Direct access to the market by 14 farmer associations, ensuring the sale of their products and marketing under more favorable conditions, training, technical assistance and permanent support, in addition to attention from the State and other entities, use of the appropriate technology for the sustainable production of cocoa, increase in the quality of life due to the increase in the productive area and family income, the construction of a heritage since the cultivation of cocoa has a long useful life, the strengthening of the image and credibility of producer associations.
- For the community: Have a productive and economically viable alternative, a sustainable production of cocoa as an agroforestry crop, favoring biodiversity and conservation of natural resources.

The company's website mentions that through SMS text messaging, technological dissemination material is distributed, in a way that improves the production and quality of the processes.

⌄ Divulgación tecnológica en sistema productivo de cacao

Diseñamos y distribuimos, de manera gratuita, material de divulgación tecnológica para los diversos públicos de interés en el sistema productivo de cacao, para contribuir al mejoramiento de sus procesos agronómicos y de calidad del grano.

Estamos comprometidos
con el desarrollo sostenible del sector cacaotero
(Nuestra gestión durante el 2021)

Alianzas para el Desarrollo Rural 120	**Familias beneficiadas** 18.843	**Hectáreas impactadas** 33.718	**Cobertura en departamentos** 22
Numero de capacitaciones 340	**Número de personas capacitadas** 4.533	**Material vegetal de cacao entregado** 4.869.868	**Beneficiarios material vegetal entregado** 666
Total compras de cacao (Ton) 35.332	**Asociaciones o Cooperativas vinculadas en la comercialización** 166	**Inscritos campaña de comunicación** 16.756	**SMS informativo sobre cultivo de cacao** 1.372.641

https://chocolates.com.co/compromiso-con-el-sector-cacaotero/

Future development expectations: It is expected to reach 15,000 established hectares, in addition to achieving that 50% of its suppliers are associated producers and that the production is sufficient to supply 100% of the demand in Colombia. It is expected to expand regional coverage, improve quality and boost farmers' income.

Recommendations: Within the recommendations it is mentioned:

- The importance of verifying that the area meets the appropriate agroecological conditions for cocoa.
- The need to have sufficient and timely financial resources throughout the development of the program.
- The provision of permanent technical assistance in the different phases.
- The need to have a local entity that has the capacity to execute the project in an ideal way.

Characteristics of Inclusivity: With the creation of the Development Department, a long-term program for the transfer of technology and sustainability of cocoa production was initiated, in order to promote cultivation in Colombia.

Through the Cocoa Supplier Development Program, an inclusive business model is launched, which aims to reduce dependence on imported cocoa and take advantage of Colombia's optimal agroecological conditions to guarantee the supply of raw materials necessary for the company. Alliances are made with producers, based on mutual benefit. The company assures producers the purchase of their production, offers premium prices for quality, in addition to providing technical, social and business support in the formulation, execution and development of projects. The program provides producers with a technological package to optimize profits and produce high-quality cocoa.

For the development of the projects, an alliance is formed between a financial entity, an operator, an association or cooperative of producers and the Compañía Nacional de Chocolates. Company representatives make field visits to advise farmers and technicians.

Business model: Compañía Nacional de Chocolates seeks to reduce dependence on imported cocoa and take advantage of optimal agroecological conditions in Colombia, in such a way as to guarantee the internal supply of raw materials. The alliance is consolidated between a financial entity, an operator, an association or cooperative of producers and the Compañía Nacional de Chocolates. Within the phases of the project, technical, social and business support is ensured through information sent by SMS, it is also promoted that the production chain be sustainable, minimizing cocoa supply risks for the company and ensuring the sale of the farmer's product.

The objectives of the business model are: improving grain supply (marketing), increasing crop productivity and quality, working hand in hand with small farmers (promotion), and producing and transfering knowledge (research).

https://news.agrofy.com.ar/noticia/196598/quieren-transformar-mercado-alimentos-app-y-ya-cuentan-casos-exito-todos-dias-nos

Project beneficiaries' experiences:
https://www.youtube.com/watch?v=jmndI5a_ktk&ab_channel=FIAGRO

https://play.google.com/store/apps/details?id=com.aumenta.taiwanmaga&hl=en&gl=US

Platform access through: www.simmagro.sieca.int .

More information: https://www.youtube.com/watch?v=gdnMBMwmahI

20.AGRIDIGITALIZATION

Thematic area: Financial assistance – electronic commerce tool and digital solutions to overcome the increase in obstacles for producers to access markets and financing opportunities, due to the COVID-19 pandemic.

Countries: Bolivia, Guatemala, Haiti, Honduras and Peru. The lessons learned in the early stages of the project will be applied in other IFAD projects in the Latin American and Caribbean region.

Technological solution: In the first place, a diagnosis and evaluation are carried out with the organizations, through a tool called "Rapid Vulnerability Analysis", which will allow the different organizations to be analyzed in the organizational and business aspects in an integral manner. From this information collected, it is possible to develop the Recovery and Risk Management Plan and implement solutions tailored to each organization.

This "Rapid Vulnerability Analysis" collects key information from:

- The governance of the organization (statutes, internal regulations, articles of incorporation, member and board data, roles and functions).
- Administrative financial management (financial statements, accounting systems, etc.).
- Cooperative business management (strategic plan, business plan, marketing strategy, product portfolio, member services).

With the results of the analysis, opportunities to improve business processes, services and internal communication through digital tools will be identified.

The project will identify and assess existing digital platforms, applications, technical assistance and training services in the digital world. The most suitable options will be adapted and made available to small producer organizations and rural savings cooperatives to help them make the transition to digital.

Previous situation: Covid-19 increased the existing gaps in societies, where producer families do not have access to markets and financial services.

Reasons for incorporating technology: The future of the economy is seen as digital, which is a reality in global and urban companies, and which will need to be implemented in the agribusiness sector. This offers a great number of possibilities for farming families, so that they can enter the financial and commercial market, solve communication problems and receive technical assistance. As a requirement, it will be necessary to strengthen the management of organizations and train their collaborators.

Public/private actors involved in the implementation: International Fund for Agricultural Development (IFAD), Agriterra, Agros International, Foundation for Rural Business Development (Funder), Inter-American Institute for Cooperation on Agriculture (IICA).

Farmers reached/impact by the project: 86 producer organizations, 132 rural savings cooperatives and 300 farmers who will receive virtual technical assistance and training on remote communication systems. It is estimated that a total of 10,820 family producers will benefit directly from the project.

Costs incurred: Project of US$ 2.4 million, of which US$ 2.3 million were granted by IFAD and US$ 100 thousand by Agriterra.

Obstacles encountered and overcome: Mobility restrictions put in place to contain the COVID-19 pandemic have affected many supply chains and it has been difficult for small farmer organizations to access basic agricultural inputs such as tools and seeds. Technical assistance activities have been interrupted for months, and with local markets closed and transportation options minimal or non-existent, marketing smallholder produce has become more difficult and costly. The diagnostic tool, called "Rapid Vulnerability Analysis", has been developed by Agriterra for this project and will allow the organization to analyze the organizational and business aspects in a comprehensive manner.

Quantitative and qualitative results: 86 producer organizations will be able to market their products and 132 rural savings cooperatives will be able to offer their financial services through digital platforms. The project will also benefit young small and medium-sized entrepreneurs (SMEs) with a presence in rural areas.

Around 3,000 farmers will receive technical assistance and virtual training on internal remote communication systems.

Participating organizations will achieve greater efficiency thanks to better time management, lower operating and transportation costs, access to new business opportunities, financial inclusion, and better communication. They will acquire the ability to obtain agricultural products and access to raw materials through e-commerce environments.

Future development expectations: The model is expected to be applied to other IFAD projects in Latin America and the Caribbean.

Characteristics of Inclusivity: Participating organizations will benefit from the project by increasing their efficiency due to better time management, lower operating and transportation costs, access to new business opportunities, financial inclusion, and better communication. In addition, they will acquire the ability to provide agricultural products and access to agricultural raw materials in an electronic commerce environment, and to establish relationships with companies with a presence in digital value chains and have access to financial services through virtual systems.

It is mentioned that despite the great number of possibilities that exist in the digital world, in order to obtain advantages from these tools, it is necessary to strengthen the management of organizations and train their members. By strengthening cooperatives, producers can lead the transformation from agricultural countries to industrialized countries, helping to reduce unemployment, strengthening food security and avoiding social conflicts.

The project includes a biosafety component to follow international guidelines for food handling and COVID-19 prevention among partners and workers of the producer organization.

The project will enable SMEs of young Internet experts with a presence in rural areas to provide services to producer organizations and rural savings cooperatives.

Business model: AGRIdigitalization will be implemented by a consortium of organizations led by Agriterra, an organization specialized in the promotion of cooperativism founded by the Dutch agricultural sector.

Through access to digital solutions, more than 10,000 family farmers in Latin America and the Caribbean will have the opportunity to overcome part of the obstacles due to the consequences of the Covid-19 pandemic, which makes it difficult to access markets and financing.

This is how the project considers 86 producer organizations, where, with the use of digital tools, opportunities to resolve disruptions in market access, provision of technical assistance services and internal communication will be identified. With the results of the information collected, it is intended to identify opportunities to improve business processes, services and internal communication through digital tools, together with training in the use of these digital tools appropriate to each of the businesses.

The project will identify and assess existing digital platforms, applications, technical assistance and training services in the digital world. The most suitable options will be adapted and made available to small producer organizations and rural savings cooperatives to help them make the transition to digital.

21. SUMMARY OF THE BUSINESS MODELS AND INCLUSIVENESS OF THE SELECTED CASES

Nope.	Name of the selected case	Associative models / Alliances	Digital inclusivity features
1	Agros	Peruvian fintech.	• Generate a digital identity encrypted in blockchain, to connect with multiple opportunities in the digital economy. • Empowerment of rural organizations. • Provide credibility to producers. • Digitize organizations and producers to facilitate access to traceability systems, profitable markets, credits, agricultural insurance, remote advice. • With digital identity, gaining access to loans, procedures, telemedicine, easy access to information for free, through a phone call.
2	Agrojusto	Alliance between the local technology company and development and higher education organizations and institutions.	• Linking family farming with technology, through a trading platform. • Minimize intermediation costs, and facilitate the marketing process. Fair and efficient trade. • Belong to an exclusive social network to generate commercial links. • Training of entrepreneurs and producers. rural education.
3	Cacao móvil	Alliance between a private company with the support of an international agency.	• Participation of small producers in national markets. • Unite value chain actors in the region. • Strengthening of multi-stakeholder spaces through platforms, prototypes and/or working groups.
4	Emilpa	Alliance between a non-governmental organization and a social innovation cluster.	• Facilitate access to the market under fair conditions. • Two-way communication channel between farmers and the Guatemalan rural extension system. • Sending mass information and adapted to specific profiles. • Remote technical assistance system that reinforces the work of each organization in the field.

Nope.	Name of the selected case	Associative models / Alliances	Digital inclusivity features
5	Coffee Cloud	Cooperation alliance between a coffee research and cooperation network, the national coffee institutions of the countries involved and the private development company.	• Human Centered Approach (HRC). • Meet the needs of each institution individually. • Interaction design workshops. • Make sure that each farmer has smartphones to use the tool. • Scalable tool. • Use of data and open-source programming language. • Intuitive and easy to use tool, not dependent on a specific sophisticated language.
6	Agromóvil	Private non-profit organization, with support from the IDB and the MIF.	• Mitigate barriers to access to information using cell phones and SMS. • Provide up-to-date and timely information at an affordable cost. • Selection of the technology based on a previous evaluation: ease of use, level of adoption and economic accessibility.
7	Technical Agroclimatic Committees	Multi-stakeholder alliance supported by national or municipal public policies	• Popularization of science. • Increased usefulness of weather data. • Construction of recommendations integrating multiple knowledge and insights. • Use of climate variability data for productive transformation that mitigates the effects of climate change-. • Use of SMS for technical assistance. • Reduction of losses of producer families due to early reaction to climatic variability.
8	TOSEPAN	Union of Cooperatives	• Significant connectivity of producer families. • Technological autonomy. • Communication to strengthen marketing, production chain, technical assistance and associative governance.
9	CoopeTarrazú	Cooperative of small coffee producers for export	• Use of data science. • Use of geographic information systems combined with data purchase on tablets. • Strengthening process and product quality. • Predictability. • Associative strengthening.
10	Digitization of small-scale agriculture	Academic project: alliance of higher education institutions, government institutions, international development institutions and small producers.	• Moisture sensor design together with farmers. • Determine probability of technology adoption. • Up-to-date, accessible and low-cost technology.

Nope.	Name of the selected case	Associative models / Alliances	Digital inclusivity features
11	Chocolate 4All	Alliance of a global non-profit institution, IDB and a private company.	• Technical assistance, business consulting and infrastructure improvement. • Help agricultural cooperatives and producers for the certification of origin, reports of compliance with quality standards, transparency and tracking of origin of the product. • Socialize the land titling process. • Identification of gaps and opportunities for access to better technologies, financial services and markets.
12	AgriNeTT	Academic project	• Open data manipulation. • Change existing production and consumption patterns, linking farmers directly with consumers. • Improve their agricultural production practices. • Improve the information and technology tools available to farmers. • Offer mechanisms to inform about policies related to agrarian planning and food security.
13	FarmVue	Alliance of cooperation between different organizations of technical cooperation and agricultural development.	• Provide resources and capabilities to increase profitability, environmental sustainability and socioeconomic equity. • Utility, functionality and ease of use extensively tested and adjusted, with the participation of farmers. • Documentation and registration of sowings, harvests, inputs used, costs and sales.
14	Mi Lote	Private global company.	• First-hand information for agile decision making. • Use of "prosumer" model, constant communication with platform users for feedback. • Support farmers to meet the demand, using software and data analysis.
15	Aldea Global Strategy 2.0	Project developed by a single association.	• Business management and receiving technical assistance. • Credit decisions and solutions.

Nope.	Name of the selected case	Associative models / Alliances	Digital inclusivity features
16	The Farmer Box	Alliance with public and private entities, cooperatives, producer associations.	• Solutions at the family level, considering its members, whether they are older adults, women, children, as well as the socioeconomic situation of the family group. • Open-source solution that works online and offline. • An individual improvement plan is generated, specific to the area under study. • A regionalization is created, going from using "big data" to a "small data" approach. • Data access solution. • The promotion of capacity building. • Use of open-source and "low tech" technologies. • Promotion of the dissemination of learning, and that it be of public order.
17	MAGA App	State project of the Guatemalan government.	• Access to prices, product sheets, surveys, etc. • Generate better production conditions for the most vulnerable producers in the production chain. • Free access to the app for information. • Ease of use, intuitive use model.
18	SIMMAGRO	Alliance between regional government agencies in Central America.	• Insertion of family farming in the commercial circuits and policies of the subregion. • Access to information and transparency in agricultural commodity markets. • Reliable and standardized information available to everyone.
19	Cocoa supplier development program	Alliance between a financial entity, an operator, an association or cooperative of producers and the Compañía Nacional de Chocolates.	• Alliances with producers, based on mutual benefit. • The purchase of production from farmers is ensured. • Technical, social and business support. • Delivery of technological package to optimize profits and produce high quality cocoa.

Nope.	Name of the selected case	Associative models / Alliances	Digital inclusivity features
20	Agridigitalization	Alliance of cooperation between international and regional institutions.	• Access to new business opportunities, financial inclusion and better communication. • Access to agricultural raw material in an electronic commerce environment. • Access to financial services by virtual means. • Resolve disruptions in market access. • Evaluation of digital platforms, applications, technical assistance and training services.