ADVANCING CREDIT METHODOLOGY AND RISK MANAGEMENT IN AGRICULTURAL LENDING AMIDST THE CHALLENGES OF CLIMATE CHANGE IN PANAMA:

Lessons from a Technical Assistance Programme

GAWA CAPITAL

Co-funded by the European Union

microserfin

Frankfurt School of Finance & Management

ACKNOWLEDGEMENTS

This document is produced jointly by GAWA Capital and the Frankfurt School of Finance & Management – International Advisory Services. The document is based on published materials, data and insights from Soluciones de Microfinanzas S.A. (Microserfin) and lessons learned from the technical assistance (TA) project implemented at Microserfin, Panama. The TA project was supported by GAWA Capital and the Huruma Fund, through the financial support of the European Union under the Huruma Fund initiative, with COFIDES channeling the European Union resources for the technical assistance. The Huruma Fund is a blended-finance impact investment fund that invests in rural financial institutions and agribusinesses—alongside technical assistance—to expand access to finance for underserved smallholder farmers.

The European Union's contribution reflects its strong commitment to inclusive rural development and climate resilience, enabling Microserfin to strengthen its agricultural credit methodology, expand climate-smart lending, and build institutional capacity to better serve smallholder farmers in Panama.

We would like to express our gratitude to Microserfin's management and staff in sharing their valid experiences on the results and impacts of the technical assistance project to strengthen its agricultural lending methodologies to better serve smallholder farmers and manage agricultural credit risk.

Special mention must be made to the clients of Microserfin who benefited from the services provided by Microserfin under the project and who shared their challenges and experiences to access finance to expand and grow their agricultural activities and to address climate risks impacting their businesses and livelihoods.

Identities of clients and staff of Microserfin who have been interviewed are kept confidential.

ABOUT GAWA CAPITAL

Founded in 2010, GAWA Capital is Spain's leading impact investing firm dedicated to improving the lives of low-income communities in emerging markets. The firm manages and advises on investments in social enterprises that provide market-based solutions to critical challenges like poverty and climate change, with a focus on financial inclusion and sustainable agriculture.

GAWA Capital's (GAWA) approach goes beyond financing: it prioritizes business transformation, strengthening institutions' strategies, processes, products and people, so they can sustainably reach smallholder farmers at scale, and drive systems change by building the ecosystems that connect farmers to finance, climate solutions providers, knowledge and risk-management tools.

GAWA Capital has pioneered the impact investing asset class in Spain, managing over €300 million in cumulative assets under management. This includes the Huruma Fund (launched in 2019), Spain's first blended-finance fund. Managed by GAWA, the

fund combines public and private capital—utilizing EU-funded first-loss protections and AECID's institutional backing—alongside a dedicated technical assistance facility. This structure is designed to expand access to finance and value-added services for underserved smallholder farmers through rural financial institutions and agribusinesses, de-risking the entry of private investors into high-impact markets.

Building on Huruma's transformation model and lessons, this project is also directly relevant for Kuali, GAWA's next fund, which scales the same transformation-and-ecosystem approach toward climate adaptation and mitigation by investing in financial institutions and climate solution providers, backed by a technical assistance facility, to help smallholders and SMEs adopt effective climate solutions in Latin America and India.

ABOUT MICROSERFIN

Soluciones de Microfinanzas S.A. (Microserfin) is a leading microfinance provider in Panama, operating since 1984. With a loan portfolio of approximately €28.1 million, Microserfin serves over 18,000 clients across 27 offices in 10 provinces. It specializes in individual lending, with an average loan size of €1,500. About 41% of its portfolio is rural, and 31% is directed toward agricultural and livestock activities, reaching approximately 6.000 small farmers.

ABOUT FRANKFURT SCHOOL OF FINANCE AND MANAGEMENT

Frankfurt School of Finance & Management (Frankfurt School) is Germany's leading private business school and advisory institute with 60 years of experience in consulting and training services in all areas of banking, finance and management. Our International Advisory Services (IAS) department is committed to improving financial markets and to increasing access to finance. For this purpose, IAS structures and implements consulting and training projects in developing and emerging markets by supporting our clients and partners with tailored, sustainable solutions.

ABOUT HURUMA FUND

Fund Huruma

The Huruma Fund is a blended finance impact investment fund that aims to improve access to finance for underserved smallholder farmers and rural communities in developing countries. The Fund invests in financial institutions and agribusinesses that provide inclusive financial services and value-chain solutions, complemented by a dedicated Technical Assistance Facility.

Through its blended finance structure, combining public and private capital, the Huruma Fund seeks to reduce investment risks, strengthen institutional capacity, and promote sustainable rural development, food security, and climate resilience in Latin America, Sub-Saharan Africa and Asia.

ABOUT THE EUROPEAN UNION

The European Union manages the Investment Facility for Latin America and the Caribbean (known by its acronym LACIF), which is a regional blended finance mechanism. LACIF promotes the mobilization of funds from European and regional financial institutions, governments, and the private sector to implement sustainable development projects in Latin America and the Caribbean.

The objective of LACIF is to support countries in Latin America and the Caribbean in financing projects in key sectors for the achievement of the Sustainable Development Goals, such as renewable energy, environment, water and sanitation, urban and rural transport, and the promotion of small and medium-sized enterprises.

DISCLAIMER

This document is not intended for distribution to or use by any person or entity in any jurisdiction or country where such distribution or use would be contrary to local law or regulation. This document is for discussion purposes only.

The views expressed in this report do not necessarily represent those of Frankfurt School, GAWA Capital, the European Union, or their stakeholder, nor does citing of trade name or commercial process constitute endorsement. Frankfurt School and GAWA Capital do not make any representation or warranty, express or implied, in respect of the report's contents (including its completeness or accuracy) and shall not be responsible for any use of, or reliance on the report.

The information and opinions in this document constitute the judgement of GAWA Capital Partners SGEIC, S.A. at the time specified and may be subject to change without notice. They are not to be relied upon as authoritative or taken in substitution for the exercise of judgement by any recipient. Under no circumstances are they to be used or considered as an offer to sell, or solicitation of any offer to buy, nor shall they form the basis of or be relied upon in connection with any contract or commitment whatsoever or be taken as investment advice.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF BOXES

ABBREVIATIONS AND ACRONYMS

CSA	Climate-Smart Agriculture
GDP	Gross Domestic Product
INEC	Instituto Nacional de Estadística y Censo
IT	Information Technology
MEF	Ministerio de Economía y Finanzas
MIDA	Ministerio de Desarrollo Agropecuario
ND-GAIN Index	Notre Dame Global Adaptation Initiative Index
NDCs	Nationally Determined Contributors
NDVI	Normalised Difference Vegetation Index
SFSCs	Short Food Supply Chains
TA	Technical Assistance
TS	Technical Sheet

EXECUTIVE SUMMARY

Smallholder farmers are central to Panama's food security and rural economy, yet they remain highly vulnerable to climate change, market volatility, and limited access to suitable financial services. Strict collateral requirements, low financial literacy, and limited institutional presence in rural regions continue to constrain access to finance. As climate risks intensify, there is an urgent need for solutions that help rural households sustain their livelihoods and adapt with confidence.

To address these challenges in practice, Soluciones de Microfinanzas S.A. (Microserfin), a leading microfinance institution serving micro and small entrepreneurs across Panama, partnered with GAWA Capital and Huruma Fund, which has invested a total of EUR 3.2 million in the institution to date.

Microserfin was already keen to deepen its outreach to smallholder farmers and had launched a dedicated agricultural loan as early as 2015, adapted to harvest-linked cash flows, however, it recognized that reaching farmers at scale, and serving them well, required going beyond an initial product to validate needs and refine its approach.

With over 30% of its portfolio linked to agriculture and a large base of rural clients, many of them smallholders farming less than two hectares with limited technology and market integration, the partnership therefore pairs Huruma's financing with technical assistance to strengthen agricultural lending practices and risk management so Microserfin can better meet smallholders' needs.

Huruma Fund was created to tackle a critical financing gap in smallholder agriculture: smallholders remain chronically underserved because the sector is perceived as high risk and many financial products are not designed around the realities of farming. To help unlock private capital for these markets, GAWA Capital launched the Huruma Fund as a pioneering blended-finance vehicle, combining first- loss protection from the European Union with concessional debt from AECID to reduce risk for private investors. But the model goes beyond deploying capital: transformation at investee level is essential to strengthen capabilities and enable institutions to design and deliver fit-for-purpose financial solutions that match farmers' seasonal cash flows use and evolving climate risks. Importantly, GAWA aims to extend this value beyond its portfolio by sharing insights and evidence openly, through a dedicated knowledge platform, so other market actors and stakeholders can replicate best practices and accelerate impact across the wider development ecosystem. In line with this commitment to transparency and learning, Huruma is also undertaking an independent external impact evaluation conducted by Dalberg and 60 Decibels to validate results and systematically capture, and share, both successes and lessons from the Fund's structure and its implementation.

To translate this thesis into measurable improvements in smallholder livelihoods, Huruma Fund deliberately combines investment with a dedicated Technical Assistance Facility, so impact ambitions are pursued with partner institutions, not left for them to

deliver on their own. Through targeted, grant-funded TA, we support institutions in building the "agricultural readiness" needed to reach and serve smallholder farmers at scale: developing and rolling out fit-for-purpose agri-finance products, strengthening delivery channels in hard-to-reach rural areas, and upgrading risk management approaches so lending can withstand agricultural and climate volatility. In doing so, the Facility is designed to increase the developmental impact of Huruma's investments and, ultimately, improve the lives of excluded rural communities by facilitating access to finance.

This knowledge brief presents the results and lessons learned from the technical assistance project "Consultancy for improving credit methodology and agricultural risk management at Soluciones de Microfinanzas S.A. (Microserfin)." The main objective is to **demonstrate the importance of technical assistance support to strengthening agricultural credit assessment, expanding climate-smart lending, and reinforcing institutional capacity** to improve the financial resilience of rural households, while positioning financial institutions to better manage risk and scale inclusive agri-finance sustainably. It also **provides actionable guidance for donors, governments, and financial institutions on capacity building and similar programme design.**

Key achievements of the Technical Assistance Project

1 Strengthened agricultural credit assessment

A standardized agricultural credit assessment methodology - combining technical production sheets for crops and livestock with projected cash flows - improved the quality of lending decision making and supported more efficient credit processes in rural branches.

2 Customer-centric agricultural product offering with climate-smart features

Effective segmentation enabled Microserfin to tailor agricultural loans to smallholder farmers' needs, aligning repayment schedules with production cycles.

3 Developed climate-smart agricultural products and structured partnership models for suppliers of "green solutions" to foster resilience and sustainable growth, empowering farmers to adapt to climate challenges, optimize resource use, and enhance productivity as well as reduce environmental impact.

4 Strengthened capacity of staff and management in agricultural lending and risk management as well as build awareness and knowledge on climate risk and climate smart solutions across all rural branches of Microserfin.

5 Institutional strengthening and organizational development to support sustainable scale

Significant progress was made in embedding agricultural finance within Microserfin's operations. This includes adopting the updated credit policy, the integration of the credit assessment tools into the core banking system and development of a mobile application to enhance in-field efficiency. In parallel, the proposed structural reorganization to ensure a more agile, skilled and sustainable organizational structure—focused on strengthening capacity for agri-finance development and reducing staff turnover in rural branches—is being reviewed by Microserfin's management.

Lessons learned and determinants of success to drive transformation in agricultural lending

Technical Assistance is a critical enabler of innovation and transformation. It accelerates the adoption of new processes, products, policies, and methodologies that strengthen risk management, enhance operational efficiency, and expand access to inclusive financial solutions. By fostering collaboration across the ecosystem, technical assistance builds institutional capacity, drives systemic change, and creates measurable, shared value—delivering sustainable impact for all stakeholders.

Strong leadership commitment has proven to be a critical driver of successful transformation in agricultural lending. Senior management's active support ensured that agricultural finance remained a strategic priority, enabling effective decision-making, resource allocation, and motivation across departments. This engagement helped overcome internal resistance and positioned the initiative as a core element of Microserfin's long-term growth strategy.

Organizational adaptability and openness to innovation
The willingness to refine internal structures, update processes, and integrate technology helped ensure that improvements were institutionalized.

Staff development is a key enabler for achieving effective change and sustainable impact.
Ongoing technical and operational training fostered adoption of new tools and a shared understanding of agricultural lending priorities, which was particularly important given staff turnover challenges in rural areas. Training programme strengthened confidence, aligned credit practices across regions, and fostered a culture of continuous learning and improvement.

Building partnerships to expand climate-smart solutions

Strategic alliances are essential to offer sustainable technologies that increase farmers'resilience. Initial successes include Microserfin's first partnership with a local supplier of solar-powered agricultural equipment, and engagement with an insurer interested in parametric insurance for climate hazards.

Pilot testing as a key enabler for scale

Testing new tools, products, and processes in selected branches allowed Microserfin to incorporate frontline feedback, improve usability, and enhance client experience before scaling. This was essential for ensuring that changes are practical, embraced by staff, and responsive to farmer needs.

External technical assistance plays a pivotal role in building collaborative ecosystems.

Targeted external support accelerates innovation, enhances coordination, and drives collective action — serving as a catalyst for transformation and sustainable change. **Building strategic partnerships within the ecosystem is central to fostering synergies, driving growth, and promoting innovation.** These partnerships with players from the private and public sector (e.g. suppliers of diverse inputs and climate smart technologies, Business development providers, local government, donor and others) create mutual value, expand market reach for both suppliers and Microserfin. They are also essential to scaling agricultural finance, promoting inclusion, and enhancing sector-wide capacity.

Looking Ahead

The progress achieved underscores the importance of developing a robust agricultural credit assessment methodology to strengthen agricultural credit risk management. It also demonstrates that climate-resilient agricultural finance is both attainable and transformative. With the right investments and collaboration, these solutions can extend their reach to many more rural families, safeguard livelihoods against a changing climate, and help build a stronger, more sustainable economy for Panama.

1 | CONTEXT

1.1 OBJECTIVES

This publication presents the key learnings and findings from the technical assistance project "Consultancy for Improving Credit Methodology and Agricultural Risk Management at Soluciones de Microfinanzas S.A. (Microserfin)", financed by GAWA Capital and the Huruma Fund.

Huruma Fund was created to tackle a persistent financing gap in smallholder agriculture: farmers remain chronically underserved because the sector is perceived as high risk and because many financial products are not designed around the seasonality and volatility of agricultural livelihoods.

GAWA Capital launched the Huruma to help unlock private capital for these markets through a blended-finance structure, while recognizing that capital alone is not enough, investee transformation is essential for financial institutions to build the capabilities, methodologies, and risk management needed to serve smallholders effectively and at scale. From the outset, Huruma was also designed to make these learnings useful beyond its portfolio, sharing evidence and practical insights openly so other institutions and stakeholders can replicate what works. This commitment is reinforced through an independent external impact evaluation led by Dalberg and 60 Decibels to validate results and capture lessons from the Fund's design and implementation.

This approach is reflected in Huruma's partnership with Soluciones de Microfinanzas S.A. (Microserfin): alongside a total investment of EUR 3.2 million, Huruma's integrated "investment + technical assistance" offer created a clear pathway for Microserfin to complement financing with targeted support, identified through the investment dialogue and due diligence, and then formalized as a TA project, to refine its credit methodology and agricultural risk management in a way that better matches smallholder needs.

The project spanned 18 months (March 2023 to September 2024) and draws on insights and lessons learned by members of Microserfin, the Technical Assistance (TA) team and GAWA Capital, throughout the implementation and post project completion.

The primary objective of this knowledge brief is to share insights and lessons learned on strengthening agricultural lending and highlighting how more inclusive credit practices can improve livelihoods, reduce vulnerability and build resilience to climate risks.

The brief also seeks to provide to donors, national governments and financial institutions by offering actionable learnings on capacity building and the design of agricultural lending programme targeted towards smallholder farmers.

Specific objectives include

- **Highlighting the importance of a robust and appropriate agricultural credit methodology** to effectively monitor and manage agricultural risk, that enables stronger risk mitigation, improved portfolio quality, and customer-centric lending.

- Promoting innovation in Climate-Smart Agricultural Finance by exploring opportunities and addressing challenges in financing climate-resilient agricultural practices to smallholder farmers.

- Underscoring the Value of Customer Segmentation to better understand and serve farmers' needs and support more strategic business decisions.

1.2 METHODOLOGY

The findings are based on a mixed-methods approach, combining quantitative portfolio data analysis with qualitative insights gathered through interviews with staff, management and clients of Microserfin.

This methodology provides both data-driven evidence and real-world perspectives, enabling a comprehensive understanding of the outcomes achieved, operational and strategic challenges encountered, and key lessons that can inform future TA initiatives aimed at strengthening agricultural lending.

1.3 PANAMA: OVERVIEW AND OUTLOOK

Panama has been one of the fastest growing countries in the Latin America and Caribbean region over the last 30 years, becoming an important centre for global trade, transportation and finance in Central America, anchored by the strategic Panama Canal.

In 2023, Panama's Gross Domestic Product (GDP) grew by 7.4%. Growth slowed to 2.9% in 2024 due to challenges in the mining sector and recurring droughts affecting the transit though the Panama Canal. Despite these challenges, growth is projected to accelerate to 4.3% by 2027, driven by the dynamic service sector and increased non-mining activities (World Bank, 2025). With an average GDP per capita of USD 17,000 (2023), Panama is categorised as a middle-class income country. However, 49% of Panama's economic activity remains informal, limiting tax revenue and access to formal financial services.

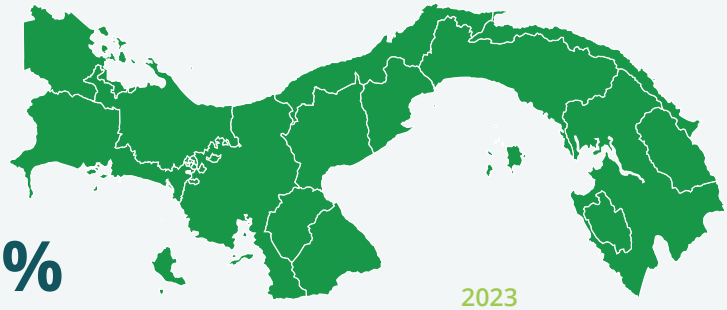
Despite economic progress, Panama remains among the countries with the highest inequality globally, with rural, indigenous, and Afro-descent communities facing the greatest poverty and exclusion. Main drivers for this inequality include unequal access to basic services, human capital, skills development and uneven labour market opportunities.

Limited agricultural growth and a shortage of high-quality jobs - particularly in rural areas where 67.3% of the poor reside - are expected to keep national poverty levels at 20.8% in 2025. Rural poverty remains significantly higher, with an estimated 544,879 people (41.5%), living below the poverty line (Iniciativa Panama, 2025). According to the World Bank the poverty rate is expected to fall to 18.6% by 2025, but rural disparities will persist (World Bank, 2025c).

5.8%

Unemployment rate (2023)
40.3% of urban population is employed in low productivity sector[1]

4.5 million
Population 2025.



4%

Projected GDP Growth for 2025
Growth is driven by key sectors: logistics, tourism, financial services and infrastructure investment

18.6%

of the population lives in poverty (estimated for 2025)

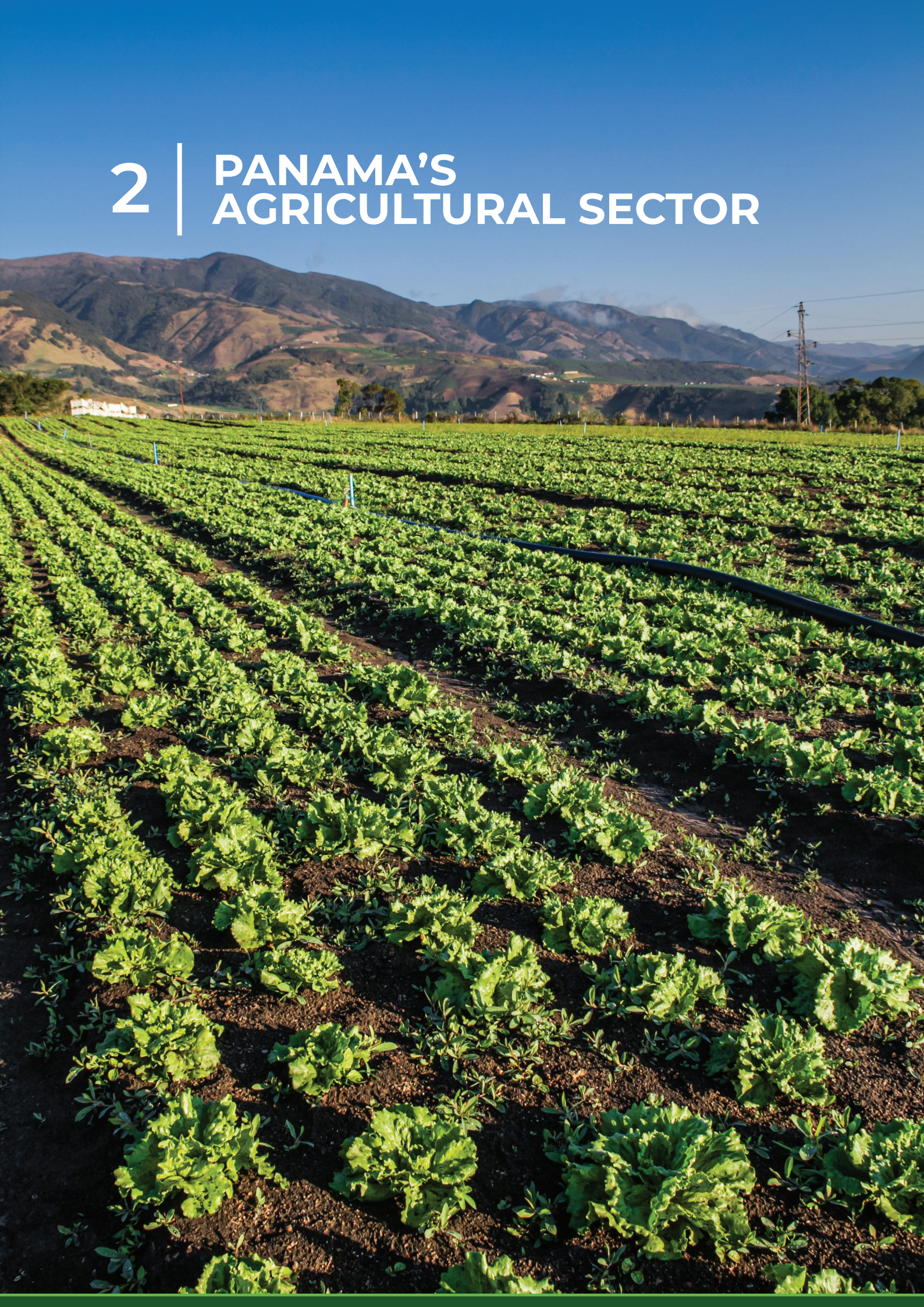
2023

48.9

Based on the Gini Index, Panama is ranked third within Latin American countries in terms of inequality

Figure 1: Panama overview – key data

2 | PANAMA'S AGRICULTURAL SECTOR



Agriculture contributes approximately 8% of Panama's GDP and employs around 15% of the national workforce including smallholder farmers and workers in agribusiness (Pallas, n.d.).

Agricultural exports account for roughly 21% of Panama's total exports, including key products such as banana, coffee, sugar and cocoa (World Bank – WITS). Although agriculture is not a dominant contributor to Panama's GDP, this sector plays a critical role in sustaining livelihoods, ensuring food security, and supporting local economies. In provinces like Chiriquí and Coclé, agriculture remains the backbone in sustaining economic activity.

Agricultural Value Chains in Panama are divided into two main categories.

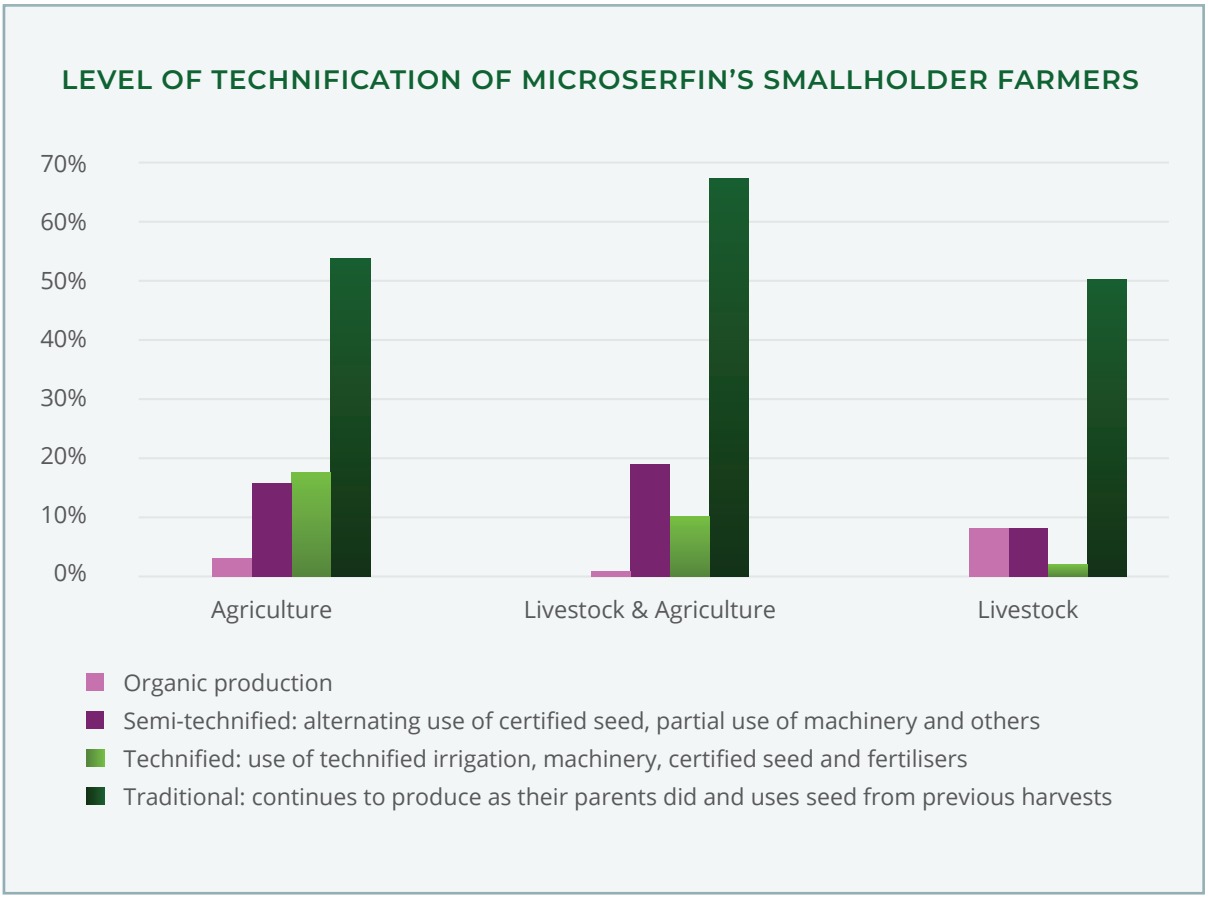
- **Structured Value Chains:** supported by the Ministry of Agriculture Development (Ministerio de Desarrollo Agropecuria – MIDA), aimed at increasing scale, efficiency and integration into national and export markets.
- **Short Food Supply Chains (SFSCs):** focused on proximity to local consumers, building trust in local communities and ensuring local food sovereignty (Adams, Branco, 2023).

Currently, 11 structured value chains are prioritised by MIDA, including rice, maize, potato, plantain, oil palm, coffee as well as the diary and swine/bovine meat value chains (MIDA, 2020).

DIMENSION	STRUCTURED VALUE CHAINS	SFSCS
Structure and actors	Participation of multiple actors- including aggregators, cooperatives, wholesalers, distributors, exporters and retail companies, depending on the agricultural crop and market.	Direct marketing systems with few or no intermediaries. The farmers offer their products to an aggregator, a cooperative or smaller retailers or even directly to the end-consumer.
Market outreach	Regional, national, international markets.	Primarily local and regional markets.
Contractor Relationship	Based on formal agreements (e.g. supply contracts) allowing traceability and compliance with quality standards (e.g. certifications).	Informal or semi-formal agreements (e.g. verbal agreements, cash payments), often lacking traceability.
Value addition	Opportunities for processing, branding logistics improvements.	Minimal value addition; limited processing and technology use.

Table 1: Characteristics of structured value chains and SFSCs

Smallholder farmers are agricultural producers who typically manage less than 2 hectares of land and operate with limited access to technology, finance, and formal markets. Smallholder farmers represent around 60% of all farms in Panama (FAO n.d). The vast majority operate with limited government support and rely on selling their products through local markets and informal intermediaries. Their main challenges include price volatility, minimal access to resources such as financing and technology, and limited opportunities for capacity building. Despite these constraints, informal value chains offer important advantages, including their proximity to local consumers, stronger community connections and their adaptability to economic crises and natural disasters. Majority of Microserfin's customers operate in the SFSCs with low levels of technification in their agricultural practices as illustrated in Figure 2.



Source: Own data. Primary market research with 305 farmers, clients of Microserfin

Figure 2: Characteristics of small holder farmers – Use of agricultural technologies and innovations

17%

of farmers use modern technologies such as irrigation systems, and certified seeds, fertilizers etc.

15%

of farmers use some technologies such as certified seeds but mainly nontechnical solutions.

The majority of farmers

54%

still rely on traditional methods.

Despite its agricultural potential, Panama's agricultural sector faces several challenges:

- **Access to agricultural finance in Panama functions as both an enabler of rural development and a continuing challenge for inclusion.** Well-structured and broadly accessible, financial services can enhance productivity, foster innovation, and promote market integration across rural areas (FAO, 2021).

Although financial institutions in Panama - including private and public banks as well as MFIs - offer tailored financial products and services for the agricultural sector, green and sustainable financing instruments are still at a nascent stage. For many smallholder farmers, particularly those outside high-value chains, systemic barriers persist. Institutional outreach in rural provinces remains low, while strict collateral requirements and limited financial literacy further constrain access to credit.

On the supply side, financial institutions often lack the technical capacity or risk assessment tools needed to design products compatible with the volatility and seasonality of agricultural activities (IFAD, 2022). Consequently, although agricultural finance holds significant potential to drive inclusive growth, its benefits in Panama remain unevenly distributed, reinforcing the need for more adaptive and inclusive financial solutions.

- **Climate Vulnerability is rising sharply due to erratic rainfall patterns, droughts, and other extreme events.** These climate risks significantly affect crop yields, soil fertility, and the predictability of agricultural cycles, undermining both productivity and income stability. **Limited access to irrigation infrastructure, crop insurance, and climate-resilient technologies exacerbates their vulnerability,** leaving many farmers dependent on rain-fed systems and unable to recover quickly from losses.

- **Weak Rural Infrastructure remains a significant barrier to agricultural productivity and financial inclusion in Panama.** Poor-quality rural roads, limited storage facilities, and inefficient logistics systems increase transaction costs and hinder farmers' access to markets. As a result, smallholder producers—particularly those in remote provinces—often face post-harvest losses estimated between 40% and 60%, especially for perishable crops such as fruits and vegetables (FAO, 2021; IDB, 2020).

- **Land Fragmentation** limits economies of scale, hinders mechanization and technology adoption, and increases production costs. It also weakens farmers' ability to use land as collateral, restricting access to credit and investment (IFAD, 2022).

- **Low Mechanization and Technology Use** is common amongst farmers, with many lacking access to modern equipment. In particular small holder farmers apply traditional techniques with little use of machinery and technology (see figure 2).

3 CLIMATE CHANGE AND ITS IMPACT ON AGRICULTURE IN PANAMA

Panama stands out for its rich biodiversity and diverse ecosystems, ranging from tropical rainforests and misty cloud forests, to a vast array of islands in both the Pacific and Atlantic Oceans. Its forests play a crucial role in absorbing carbon dioxide, making Panama one of the few nations with a net negative carbon footprint. Protected areas cover 31.8% of land and 13.5% of marine territory in the country (World Bank 2025b). This extraordinary biodiversity is both a national asset and highly vulnerable to climate change.

According to the ND-GAIN Index of June 2025 (NDGAI 2025), Panama ranks 101 out of 187 countries in terms of climate vulnerability and readiness to adapt to climate changes. Specifically, Panama ranks 125 in terms of readiness (ability to leverage investments and convert them to adaptation actions) and 84 in terms of vulnerability (a country's exposure, sensitivity and ability to adapt to the negative impact of climate change (NDGAI 2025).

Panama has taken steps towards mitigation and adaptation, including investments in early warning systems, climate-resilient infrastructure, and renewable energy policies. In December 2020, the government revised its Nationally Determined Contributions (NDCs), committing to reduce emissions in the energy and forestry sectors by 11.5% by 2030 and 24% by 2050, and to restore 50,000 hectares of forest (UNDP, n.d). In addition, the country also joined international coalitions to combat climate pollutants.

Despite these efforts, Panama faces several significant climate risk challenges that threaten both its urban and rural environments.

- **Extreme Weather Events:** Floods, landslides, and extreme winds are the most frequent climate-related hazards. Between 1933 and 2019, Panama recorded over 1,900 flood events and 625 landslides, affecting over 500,000 people and damaging over 100,000 homes (RuizandMack-Vergara, 2024).

- **Rising Sea Levels:** Coastal and indigenous communities, such as the Guna, are at imminent risk. Rising sea levels have already forced the evacuation of entire island communities such as Gardi Sugdub (Climate Control Journal, 2025).

- **Water Scarcity:** The Panama Canal, a vital economic artery, is experiencing rainfall deficits and droughts, disrupting shipping and threatening water availability. These issues are exacerbated by El Niño. The 2023–2024 drought was the most severe drought in over 70 years, with rainfall levels falling roughly 43% below average. This struck water supply, local agriculture and livestock production, especially in rain-fed zones, while also forcing the Panama Canal to operate at its lowest water levels on record, disrupting global shipping and value chains.

- **Climate change directly affects agricultural cycles, increasing production uncertainties, accelerating soil degradation and reducing yields, especially for smallholder farmers who depend almost entirely on rain-fed agriculture.**

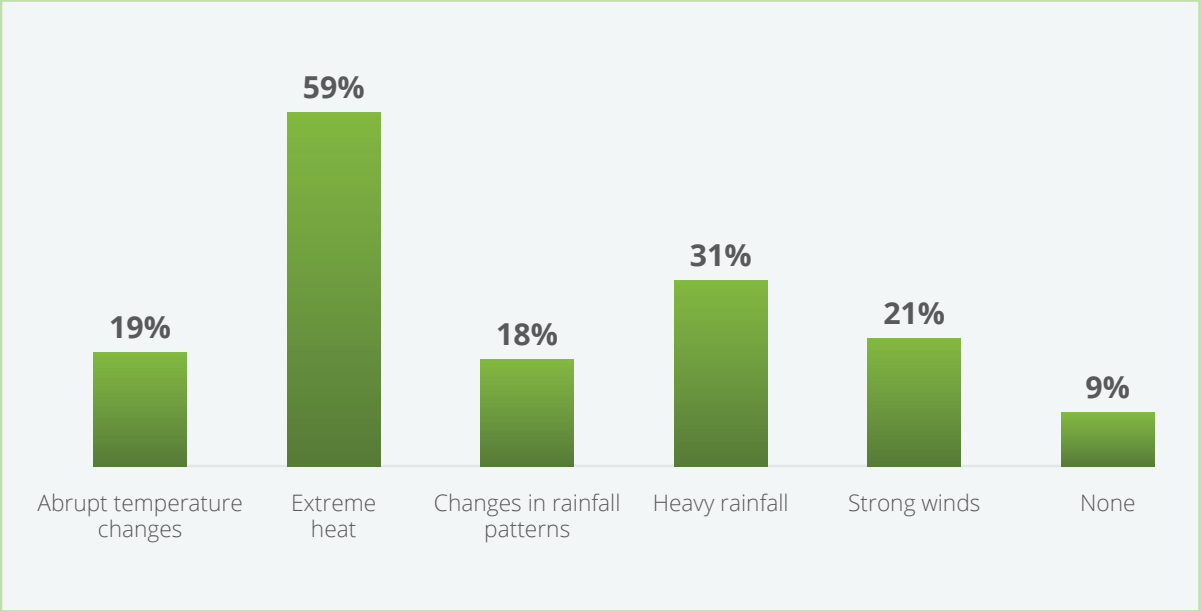
A recent study conducted with 305 of Microserfin's clients found:

90% of farmers have already experienced multiple climate-related shocks

Most frequently reported threats include extreme heat, heavy rainfall, abrupt temperature changes, irregular rainfall patterns and strong winds. Together, these climate events are causing significant production losses and income instability for farmers .

> **"I planted, waited for rain to come, but it came too late. I lost my entire crop."**

Microserfin Client during Market Research, May 2023



Source: Own data. Primary market research with 305 farmers, clients of Microserfin
Figure 3: Main climate events experienced by Microserfin's farmers

To address these growing challenges, Microserfin's customers need to enhance their resilience to climate change by adopting innovative technologies—such as precision agriculture tools and mobile applications that monitor crop health and soil conditions—and by integrating sustainable practices like organic farming and agroecological methods. However, these farmers often face limited awareness and technical knowledge of climate-smart practices, as well as restricted access to affordable green finance solutions that would enable them to adopt such technologies and methods.

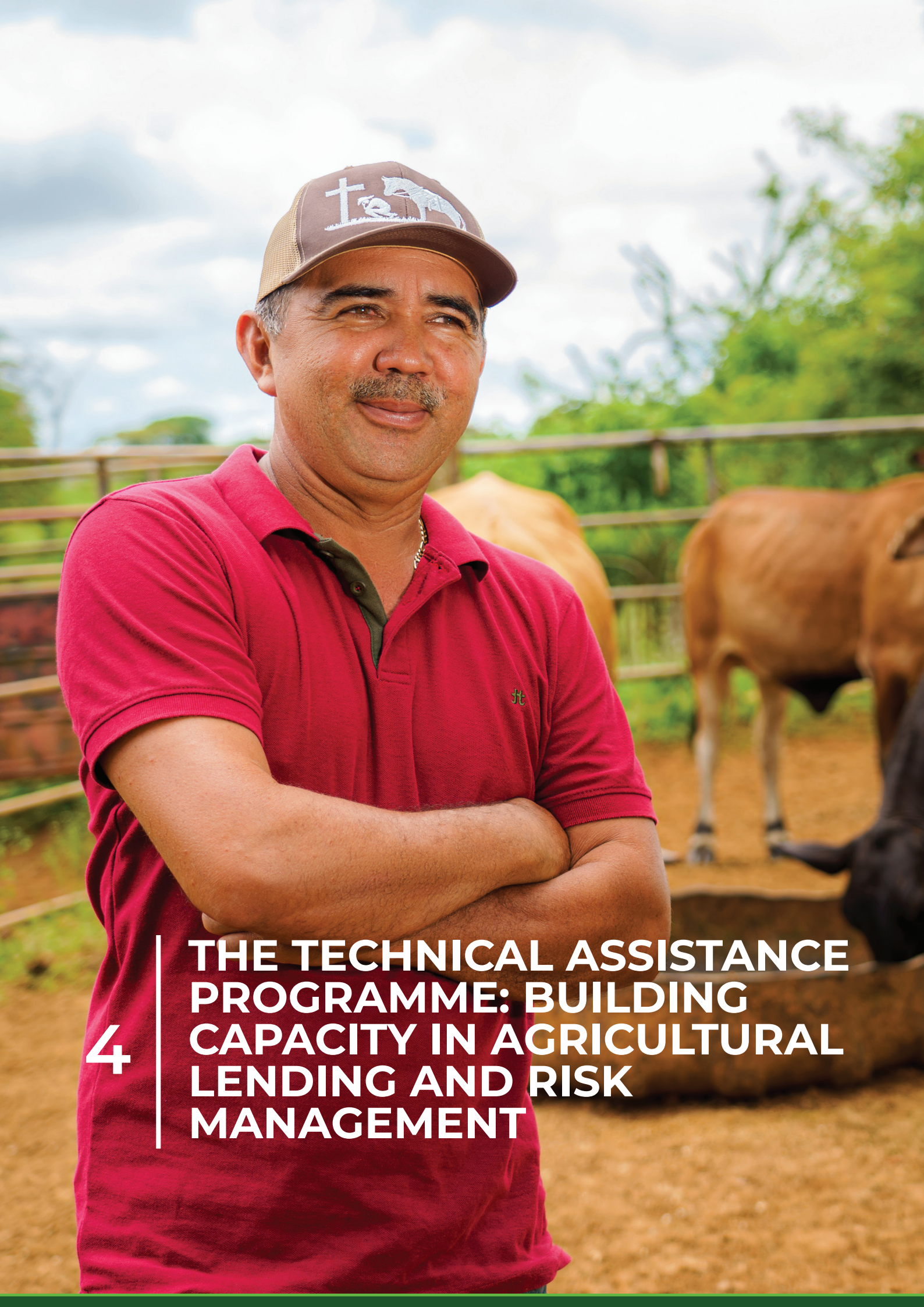
73%

of farmers **are interested in technologies and practices** to reduce the impact of climate finance on their production.

67%

of farmers **have never received any training on climate smart technologies and solutions.**

Box 1: Awareness and capacity building needs
Source: Own data. Primary market research with 305 farmers across four regions



4 THE TECHNICAL ASSISTANCE PROGRAMME: BUILDING CAPACITY IN AGRICULTURAL LENDING AND RISK MANAGEMENT

The Technical Assistance programme (TA). "Improving credit methodology and agricultural risk management at Soluciones de Microfinanzas S.A. (Microserfin)." was designed to strengthen Microserfin in effectively managing and mitigating risks in agricultural lending. The TA programme recognizes that financial inclusion in rural areas requires more than capital - it demands a strong methodology, skilled staff, and a clear value proposition tailored to the agricultural sector. Building the capacity of Microserfin's staff - in agricultural lending, and marketing, and climate risk - was therefore a central element of the TA programme.

GAWA Capital places transformation at the heart of its strategy, linking technical assistance (TA) with its investment activities to generate a scalable impact. This dual approach enables the Fund to go beyond traditional impact investing by building local capacity and catalysing systemic change, especially for smallholder farmers.

Huruma Fund uses TA to support financial institutions in designing tailored products and building capacity. This lowers barriers to innovation and ensures that financing solutions are not only available on paper, but effectively adopted and impactful in the field.

For Financial Service Providers (FSPs), adopting a new agri-products involves financial and operational risks. The TA programme was therefore designed to strengthen agricultural credit assessment and risk management, enabling financial institutions to better evaluate, manage, and expand lending in the sector. At the same time, it fosters the development of innovative, climate-smart solutions to help farmers and lenders navigate production, market, and climate risks with confidence.

A cornerstone of the programme is building the capacity of financial institutions' staff—equipping them with practical skills in agricultural lending, marketing, and climate change mitigation and adaptation strategies to deliver sustainable and lasting impact. The TA programme is structured across six workstreams and unfolds in two distinct phases:

Phase 1: Analysis – laying out the groundwork through in-depth institutional and market assessments.

Phase 2: Implementation – bringing solutions to life with a hands-on, 6-month pilot project.

Together, these efforts aim to strengthen agricultural finance, fostering greater resilience and financial inclusion for both farmers and Microserfin.

Figure 4: Workstreams of TA Facility

5 | CATALYSING CHANGE: RESULTS AND IMPACTS

This section highlights the major accomplishments and impacts achieved through the TA support to Microserfin, its clients, and the wider ecosystem.

RESULTS AND IMPACT ON MICROSERFIN

MICROSERFIN

IMPROVED CREDIT ASSESSMENT AND LOAN DECISION IN AGRICULTURAL FINANCE

Microserfin is adopting the newly developed agricultural credit assessment methodology and tools by integrating them into its core banking system and making it available to loan officers through a mobile application, enhancing efficiency and customer focus during field visits.

“Loan analysis has improved significantly thanks to the integration of the technical sheets of the crops and livestock activities with the cash flow statement”

Commercial Manager, Microserfin

By connecting technical sheets (production sheets) for crop and livestock activities to cash flow analysis, Microserfin has strengthened both operational efficiency and the quality of agricultural credit decisions, leading to the following benefits:

- Structured and standardized risk assessment through systematization of production factors and costs.
- Reduced loan assessment time.
- Enhanced onboarding of new staff, who can now rely on standardized data rather than experience alone.
- Holistic assessment of the rural household as it integrates agricultural and non-agricultural income and expenditure streams, investments and financial obligations, supporting responsible lending.
- Clearer definition of loan amounts and repayment schedules, aligned with production cycles.

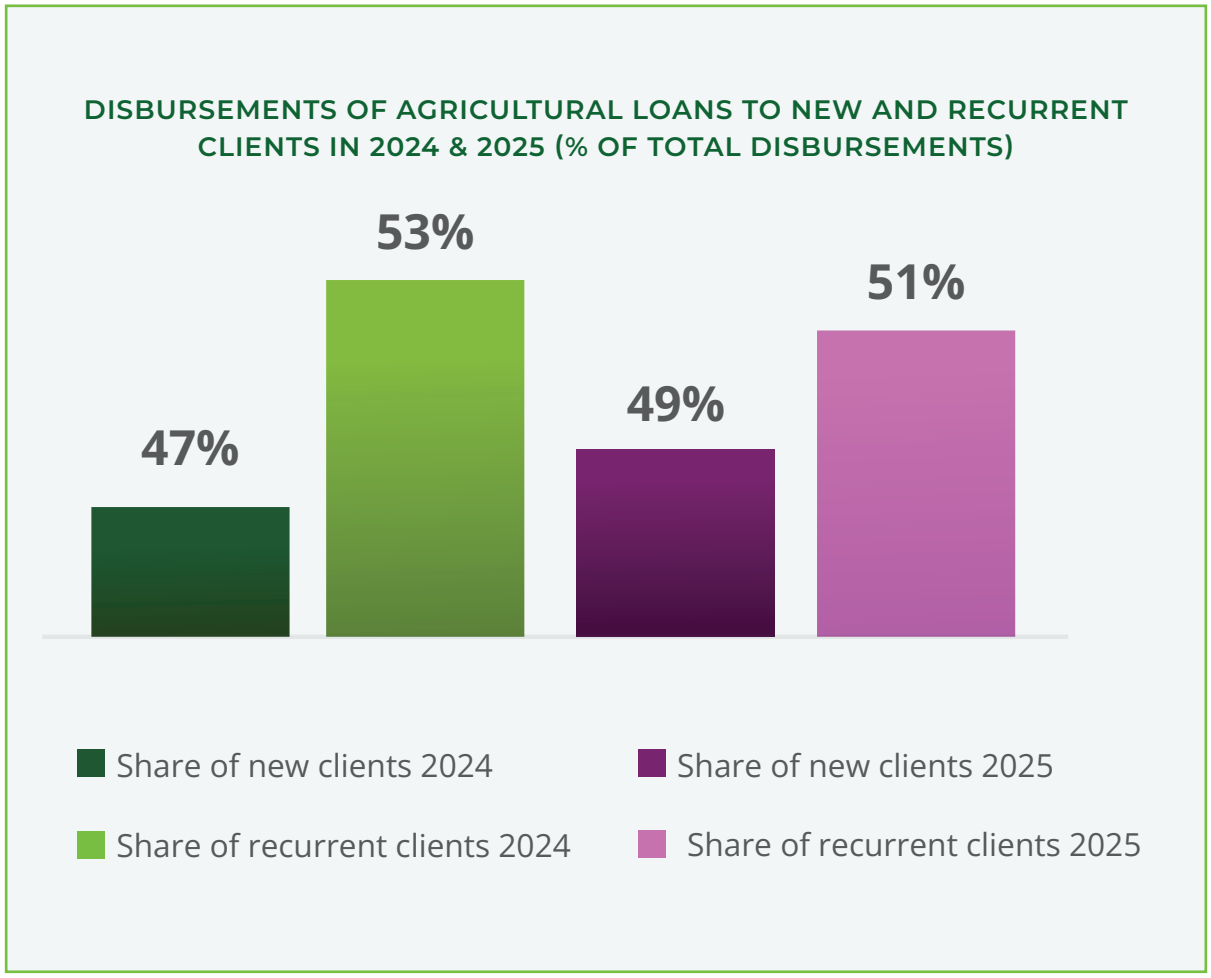
ENHANCED PRODUCT OFFERING TO SMALLHOLDER FARMERS

- Developed suite of tailored agri-lending products, such as *Rapifin* and *Solución* matching the needs and profiles of farmers as well as climate smart solutions to foster farmers' resilience to climate risks.

As a result, Microserfin broadened its outreach, issuing nearly half of its 2025 loans to first-time customers as to 47% in 2024 (see figure 5).

- Launched the first strategic partnership with a supplier of solar-powered water pumps, a major milestone in line with Microserfin's new commercial strategy to expand outreach to new customers and scale sustainable, climate-smart solutions to smallholder farmers.

- Initiated the development of agricultural insurance in collaboration with Costa Rican insurer to help farmers protect their business from multiple risks. The same insurer has expressed interest in piloting a parametric insurance product to safeguard businesses and farmers from climate hazards — a pioneering step toward climate-resilient financial protection in Panama.



Source: Database Microserfin, September 2025

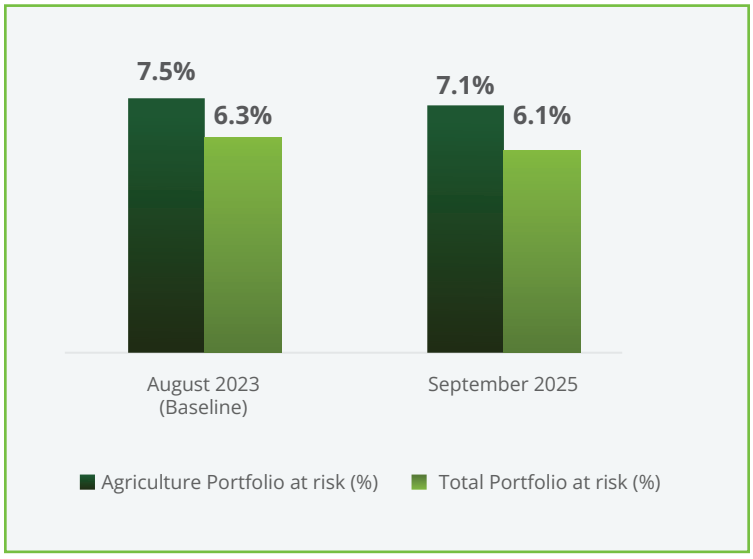
Figure 5: Disbursements of agricultural loans to new and recurrent clients in 2024 & 2025 (% of total disbursements)

IMPROVED AGRICULTURAL PORTFOLIO QUALITY AND POTENTIAL FOR GROWTH AND DIVERSIFICATION

- The strengthened credit assessment methodology and better-aligned repayment schedules introduced by the TA programme have improved the quality of agricultural lending and decision-making. However, due to external disruptions that caused significant payment delays[1], these improvements are not yet reflected in the overall quality of the agricultural portfolio (see figure 6)

- Adopted direct disbursement to suppliers for investment loans in green technologies - such as solar pumps and rainwater harvesting systems ("reservoirs") - ensuring correct installation, improved product quality, and preventing misuse of funds.

- The partnership with a solar pump supplier is expected to drive portfolio growth and diversification, enabling Microserfin to attract new clients and finance productive investments that reduce farmers' exposure to climate risks.



Note: Total portfolio is composed of agriculture and micro, small enterprise portfolio. Portfolio at risk > 30 days
Source: Database Microserfin
Figure 6: Portfolio at risk

STRENGTHENED CAPACITY OF STAFF IN AGRICULTURAL LENDING

- Developed and delivered a comprehensive training programme in agricultural finance which was rolled out to all rural branches.

- A train-the-trainer model established to ensure ongoing capability and institutional ownership.

- Agricultural lending and credit assessment training modules are integral parts of the induction training, ensuring new staff are prepared to serve as loan officers in rural branches.

[1]The portfolio was severely affected in branches across the Bocas del Toro region, particularly at the Changuinola branch, due to the closure of a major banana company. As a result of socio-political unrest between May and July 2025, defaults exceeded 20% of the portfolio.

RESULTS AND IMPACTS ON THE TARGET SEGMENT

ENHANCED CUSTOMER SERVICE

The TA programme has already generated tangible benefits for Microserfin's smallholder farmer clients by improving access, speed, and service quality:

- Revised credit assessments and clear repayment schedules enhance transparency and trust.

- Faster credit decisions reduced waiting times and uncertainty.

- Better cost and yield insights support stronger investment choices.

- Loan officers serve not only as financial partners but also as trusted advisors, and go-to resources - offering valuable insights, practical guidance, and support that help farmers grow their businesses and make informed decisions. Therefore, making farmers feel better served, more confident, and more likely to re-invest in their farms.

IMPACTS ON THE ECOSYSTEM: BUILDING OPPORTUNITIES AND PATHWAYS

STRATEGIC PARTNERSHIPS FOSTERING SYNERGIES, GROWTH AND INNOVATION

Through strategic partnerships, Microserfin is driving collaboration to deliver affordable climate-smart solutions - allowing suppliers to grow and farmers to adopt practices that safeguard their livelihoods from climate risks. These early alliances create a strong platform for scaling and replicating innovation across rural markets:

- The foundations are now in place to scale services, replicate successful models, and drive continuous innovation in agriculture finance.
- Improved visibility of agriculture as a viable segment for portfolio growth.
- Strengthened recognition of farmers' financing needs linked to climate adaptation.
- Expanded dialogue on responsible agricultural lending practices.

6 REFLECTIONS AND LESSONS LEARNED FROM THE TA PROGRAMME

This section provides a reflective analysis of the results achieved through the TA delivered to strengthen Microserfin's agricultural lending. It describes the key components of the programme and highlights the main achievements and lessons learned.

6.1 BUILDING THE FOUNDATION: ASSESSMENT AND GAP ANALYSIS

The institutional assessment examines internal capacities, systems, and readiness for change, while the market assessment identifies external opportunities and gaps in demand, competition, and potential growth areas. Insights gained from both assessments serve as the foundation for refining and enhancing strategic direction, risk management and agricultural lending operations.

The market assessment complemented the institutional analysis by identifying where and how Microserfin could boost agricultural finance potential, emphasizing regions where Microserfin has a strong presence and strategic focus.

INSTITUTIONAL ASSESSMENT

The institutional assessment examined the readiness of the organization for agricultural lending by reviewing:

Strategy:

How does agricultural finance fit in the organizations' strategy? Which institutional adjustments or upgrades are required? Would agricultural finance align with the existing organisational culture? How can potential resistance or concerns be addressed?

Competencies:

Do staff currently have the required technical and operational skills? What additional skills and knowledge need to be developed?

Leadership:

Is leadership fully supportive of the transition and aware of the risks and opportunities posed by agricultural finance?

Processes and structures:

Are current risk assessment policies and processes adequate to analyse farmers' financing needs and repayment capacity? What are the gaps in terms of appraisal tools, delivery channels, products necessary to effectively serve the agricultural sector?

Based on the institutional assessment, the following recommendations were formulated:

Refinement of the agricultural strategy.

Improvement of existing agricultural credit methodology to improve risk management, productivity and efficiency.

Adjustment of existing agricultural product offering and development of climate smart financial products .

Upskilling staffs' capabilities and knowledge on agricultural lending, climate risk and awareness as well as sales and relationship management.

MARKET ASSESSMENT

Through tools like competitive analysis and market segmentation, the market assessment examined:

- Geographic distribution of agricultural activities and rural communities (see figure 7).
- Types of production and their relevance for household income and food security.
- Exposure to market and climate risks affecting different regions and value chains.
- Competitor presence and product gaps in rural financial services.
- Farmers' financial behaviour, willingness to invest, and appetite for innovation.

Chiriquí Province

Panama's main agro-industrial region; **5.6% of GDP**
High biodiversity, diverse crops, strong irrigation systems, largest cattle population

6,500 to 11,000
cattle farmers with **<50 animals**

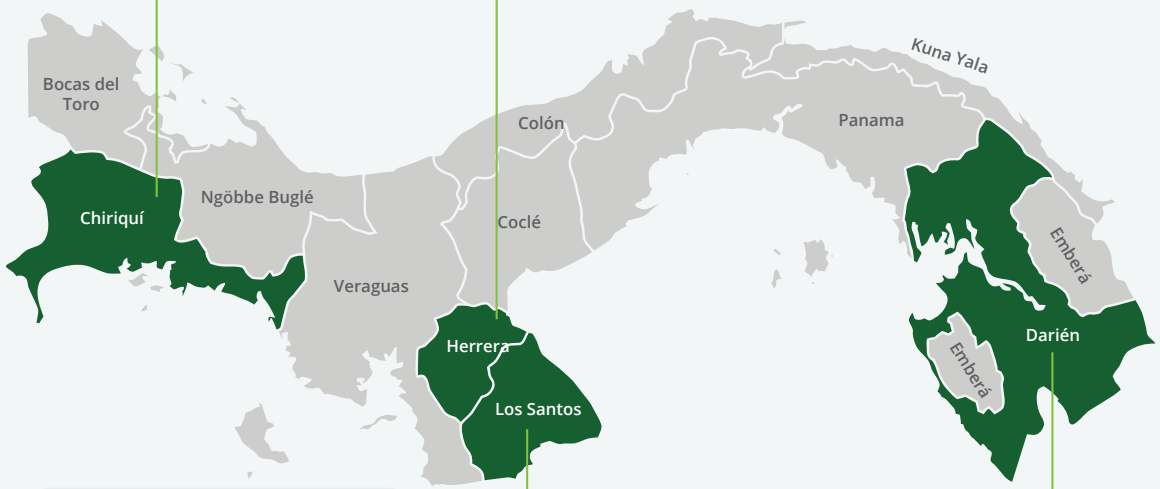
~6,000 farmers
with <6 hectares of land on average

Herrera Province

Smallest region: **1.3% of GDP**
Known for roots/tubers (yam, oto), grains (corn and beans), and curcubits (squash, watermelon)

Market:
- **~2,000** farmers <2 hectares of land on average
- **~2,480** pig producers with 10 pigs on average

~1,896 to 3,160
cattle farmers with <50 animals



Los Santos Province

Main industries are livestock, forestry and agriculture including grains (corn), cucurbits (pumpkin, watermelon), roots/tubers (yam)

Market:
- **~4,200 – 7,000** small cattle farmers with 30 to 50 head of cattle
- **~10,440** pig producers with 10 pigs on average

2,000
smallholder farmers with <2 hectares of land on average

80%
of the land is suitable for agriculture 1% to GDP

El Darién Province

Largest region with low population density: 0.3% of GDP
Low mechanisation > low productivity, mainly serves local market
Volatile and week value chains
Limited land suitable for agriculture

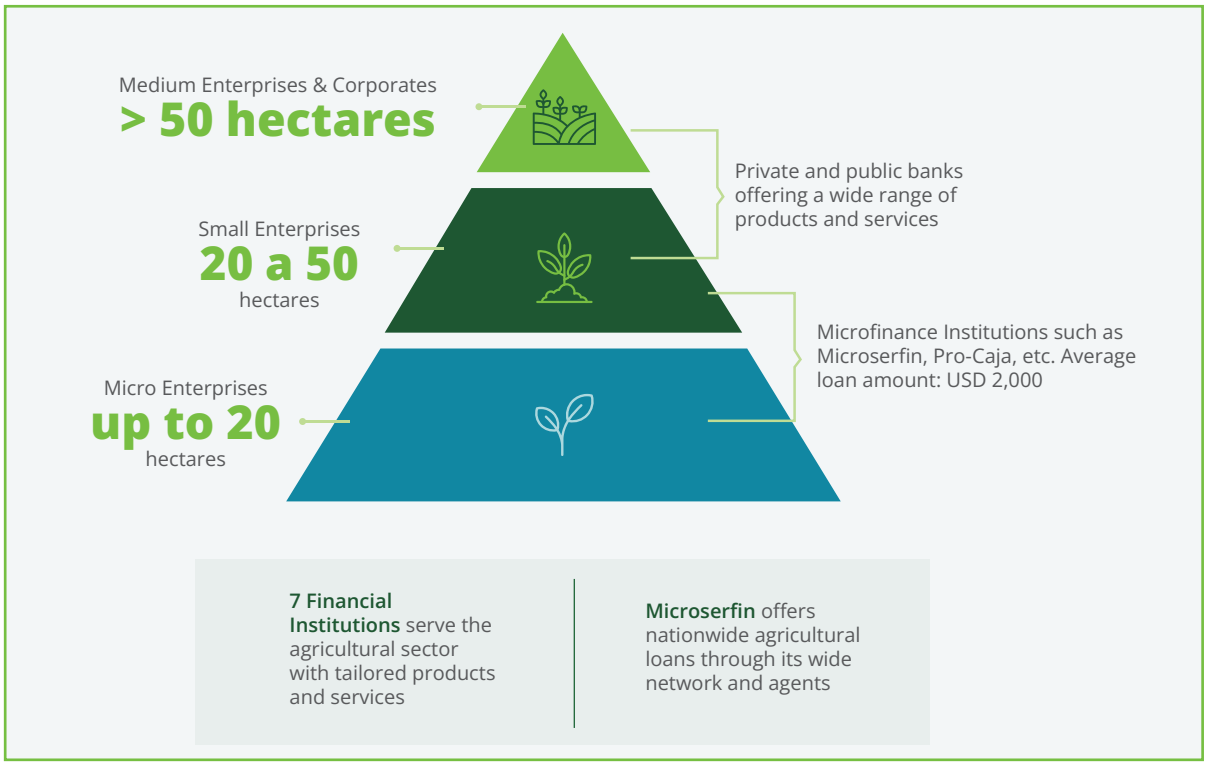
Market:
- **~4,500 – 7,000** small cattle farmers

- **~5,000** smallholder farmers with <1 hectare of land on average

Figure 7: Selected regional profiles

COMPETITIVE ANALYSIS

Understanding the competitive landscape allowed Microserfin to refine its commercial strategy, supporting the design of relevant and competitive financial products and services while tailoring marketing strategies to better position Microserfin's value proposition for agricultural finance in the market.



Box 2: Findings from Competitor Analysis

Figure 8: Agricultural segments served by type of financial institutions

INSIGHT-DRIVEN CUSTOMER SEGMENTATION FOR AGRICULTURAL FINANCE

Understanding client profiles enabled segmentation beyond the traditional classification of micro, small, and medium-sized farms. Segmentation criteria included farm size (cultivated area or livestock numbers), type of agricultural activity, as well as socio-economic characteristics, exposure to climate risks, level of mechanization, openness to innovation, financial capacity, and access to and control over resources. Financial behaviours, needs, aspirations, and long-term goals were also considered to ensure a holistic view of each segment.

Based on primary market research with more than 300 farmers, distinct persona profiles were developed to reflect socio-economic conditions, mindsets, production realities, and financial strengths. This segmentation directly informed the design of tailored financial products and strengthened the alignment of Microserfin's commercial and marketing strategies with the needs of agricultural clients.

Survival Farmer: Cultivates a small farm with up to 2 hectares, with a few animals. Uses traditional agricultural methods and has limited financial capacity and resources. Not integrated to a structured value chain, but primarily sells within local markets through informal channels.

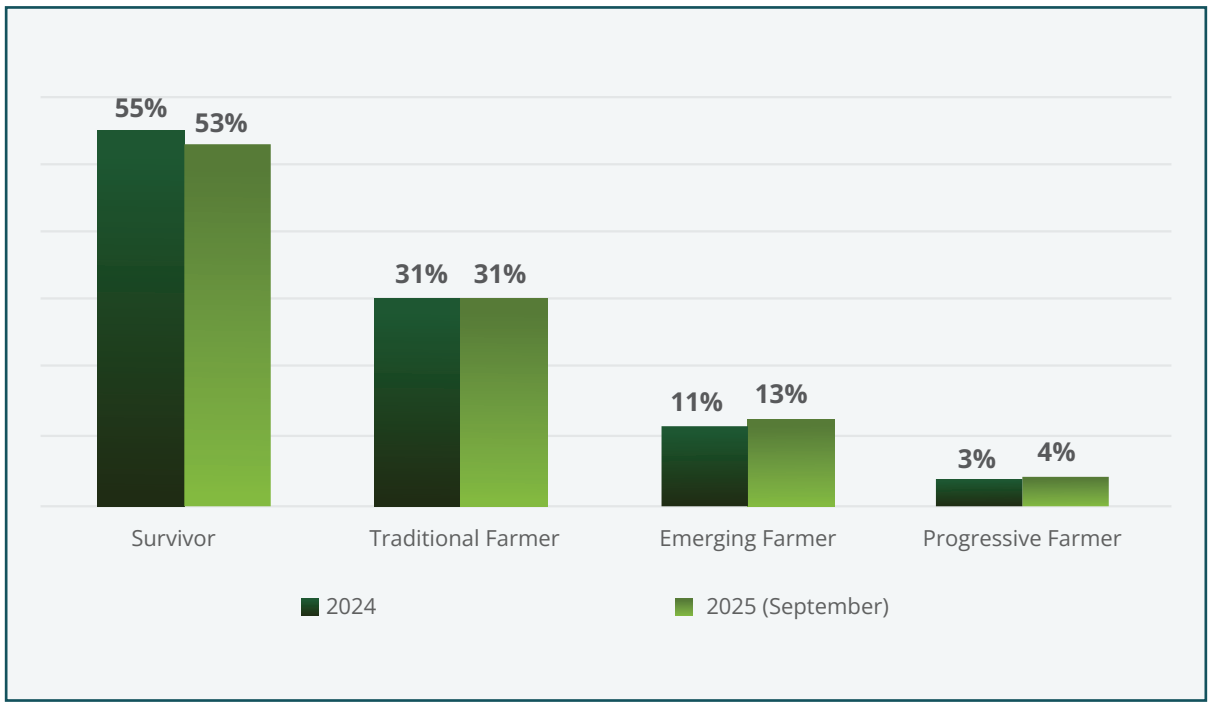
Traditional Farmer: Operates farms up to 10 hectares, producing multiple crops, and often raising livestock. Maintains low level of mechanisation and a conservative attitude towards growth, continuing to rely on traditional agricultural practices.

Emerging Farmer: Manages a mid-sized farm (10 - 30 hectares) with more diversified production and some technology adoption. Uses market information, including online sources, to improve price negotiation. Shows a clear vision for growth and expansion.

Progressive / Innovative Farmer: Operates a larger mid-sized farm (20 - 50 hectares) with multiple crops and livestock. Open to innovation, actively investing in new technologies and productivity improvements. Has stronger financial capacity and access to necessary resources, demonstrating a growth-oriented mindset.

Box 3: Persona based on market research conducted

Farmers classified as Survivors remain the dominant client group of Microserfin, followed by traditional farmers, though a gradual shift toward more advanced and tech-driven profiles is emerging (see figure 9).



Source: Database Microserfin, September 2025

Figure 9: Disbursements by client profiles in 2024 and 2025 (September) in % of total disbursements

LESSONS LEARNED

- **Market and institutional assessment are key pillars in the design of a TA programme as it builds the foundation for the next steps.**

  - The institutional assessment identified strengths, gaps, and opportunities to refine strategy, improve agricultural credit assessment, and enhance risk management capabilities.

  - Market assessment clarified the financial realities and investment behaviour of smallholder and mid-sized farmers, informing the design of more responsive and needs-based agri-finance solutions.

- **Competitive analysis** highlighted Microserfin's position in the market and revealed clear paths for growth and differentiation.

- **Allocation of adequate time and resources,** especially for primary market research, are essential when designing a TA programme.

6.2 CREDIT METHODOLOGY AND RISK MANAGEMENT IN AGRICULTURAL LENDING

Agricultural finance involves multiple risk factors including production, input, investment risks as well as climate and market risks. However, these can be mitigated through a strong credit risk assessment methodology, tailored financial products and services, enhanced risk management capabilities, and effective reporting systems.

The TA focused on strengthening the credit assessment methodology to address production, investment, and input risks. Climate risks were addressed through the design of climate smart agriculture (CSA) products. Market risk was addressed only indirectly as most of Microserfin's target clients are smallholder farmers operating in unstructured value chains, where formal arrangements such as contract farming are difficult to establish.

DEVELOPMENT OF SOLID AGRICULTURAL CREDIT METHODOLOGY

1 The Agricultural Credit Assessment Tool combines Technical Sheets (TSs) for Crop and Livestock activities, with a projected cash flow model (TS Tool):

The TS compiles production costs (for seeds, fertilizer, labour, services, etc.) across each stage of the production cycle (preparation, planting, harvesting, commercialization). The TS also incorporates regional differences in yield and pricing collected from last harvest and current market to reflect local conditions. So far, TS has been developed for 53 crops and 13 livestock activities such as cattle, pigs, and poultry. These are maintained and continuously updated by Microserfin's Project Manager, with IT support to ensure proper functionality and data security.

During credit assessment, the TS provides standardized reference values for evaluating a farmer's capacity to repay. At the same time, loan officers can adjust productivity and price assumptions based on the farmer's level of technification and past performance. All cost, yield, and pricing information feeds directly into the farmer's projected cash flow, which considers all agricultural and non-agricultural income streams of the household. This enables more accurate, consistent, and responsible lending decisions in rural areas as illustrated in figure 10.

HIGHLIGHTS

53 agricultural crops for which Technical Sheets (TS) have been developed.

13 livestock activities for which Technical Sheets (TS) have been developed.

Covered livestock activities include: Cattle, pigs, and poultry.

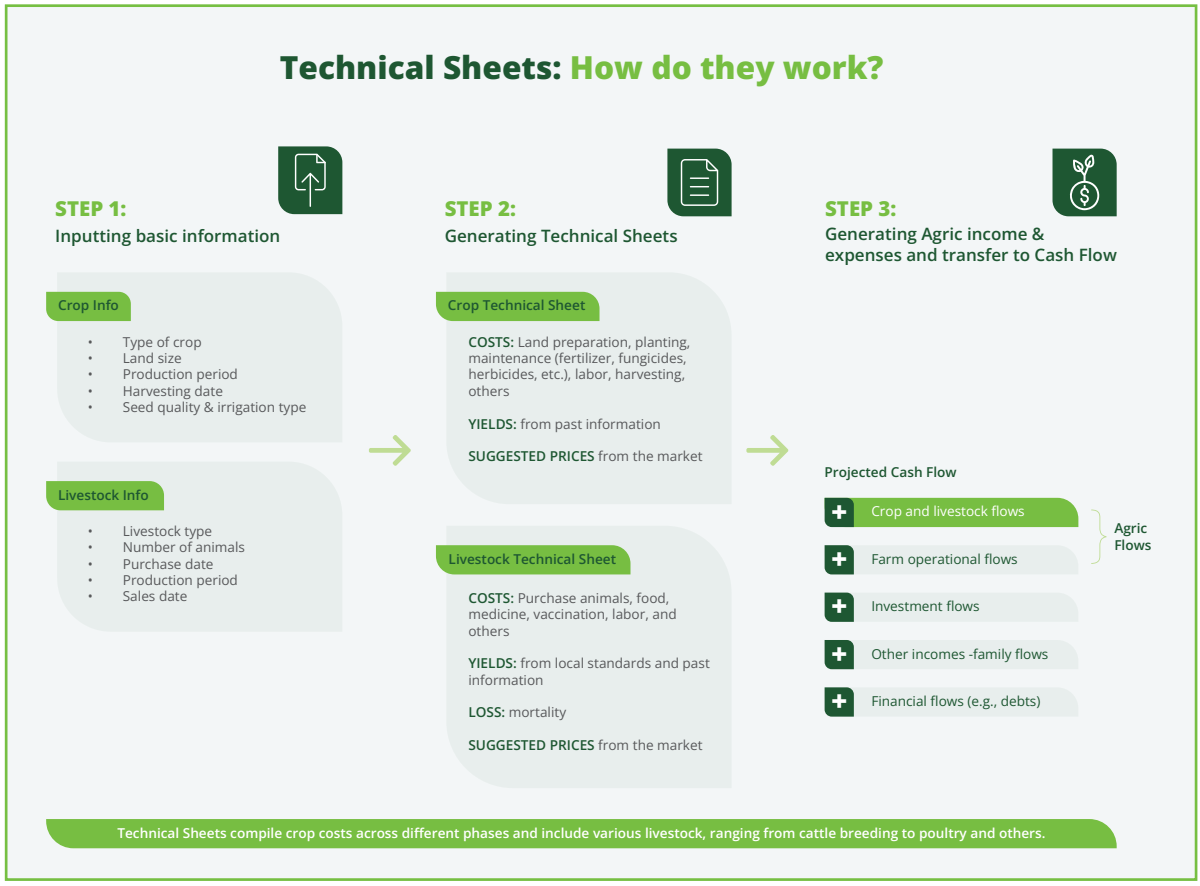


Figure 10: Technical Sheets: from data collection to cash flow integration

> “The Technical Sheets (TSs) provide information about agricultural production and facilitate the analysis. Previously, only what the client said was taken into account, and there was no comparative reference.”

Branch Manager, Microserfin

2 Holistic analysis of farmer's activities

A holistic assessment of rural households requires an integrated view of both agricultural and non-agricultural activities, recognizing the diverse income sources and expenses that shape economic resilience. Projected cash flow is a key tool in this process, providing a monthly projection that includes revenues and costs from agricultural products, livestock activities, investment flows, household income and expenditure, and outstanding financial obligations. This approach offers a comprehensive understanding of liquidity, financial sustainability, and financing needs for each farmer.

> "The TS has helped, for example, to show that fattening 3 or 4 pigs is not profitable."

Project Manager, Microserfin

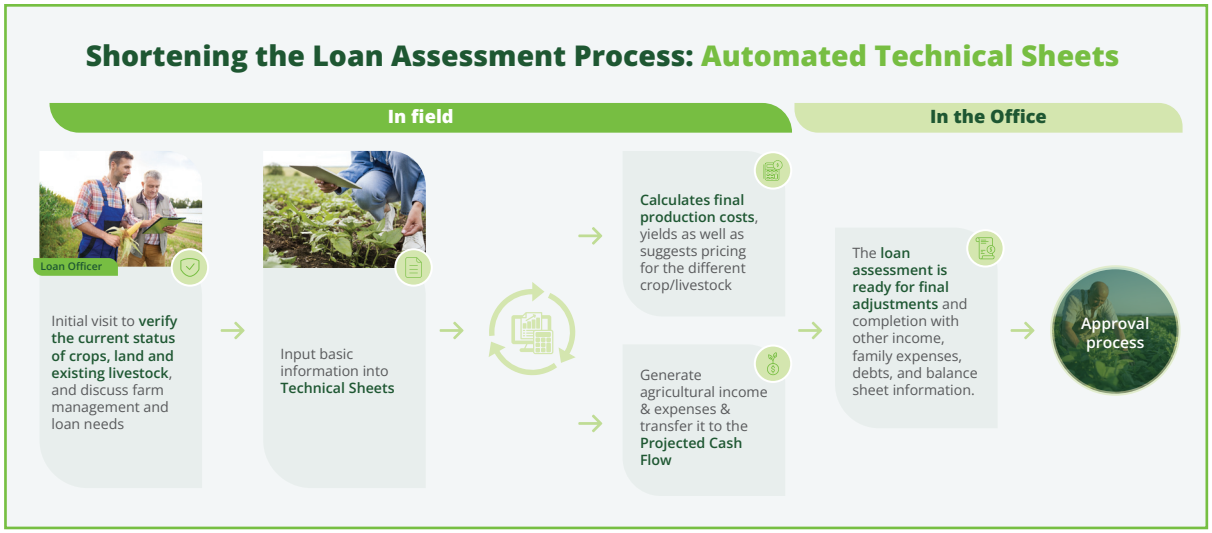


Figure 11: Automated Technical Sheets improve agricultural assessment and response time

3 Tailor payment conditions to production cycles

The TS Tool enables repayment schedules to be tailored to agricultural production cycles, allowing loan officers to define both the loan term and instalment frequency based on seasonal cash flows. **From the risk perspective of a financial institution, aligning repayment schedules with crop cycles, livestock rearing periods, or harvest seasons reduces the likelihood of default,** since farmers can meet their obligations when income flows are predictable.

“

We use the TS Tool to define the payment conditions such as the loan period based on the repayment conditions such as terms aligned to the production cycle, income–expense flows, and the loan amount.”

Loan officer, Microserfin

From the client perspective, repayment schedules aligned to production cycles reduce financial pressure during the growing period, strengthen trust in financial services, and enhance the farmer’s capacity for productive investment. The following figure illustrates the adjusted loan repayment schedule aligned with agricultural and livestock income cycles. Most clients preferred six-month payments, while monthly payments remain suitable for those with non-agricultural income sources.

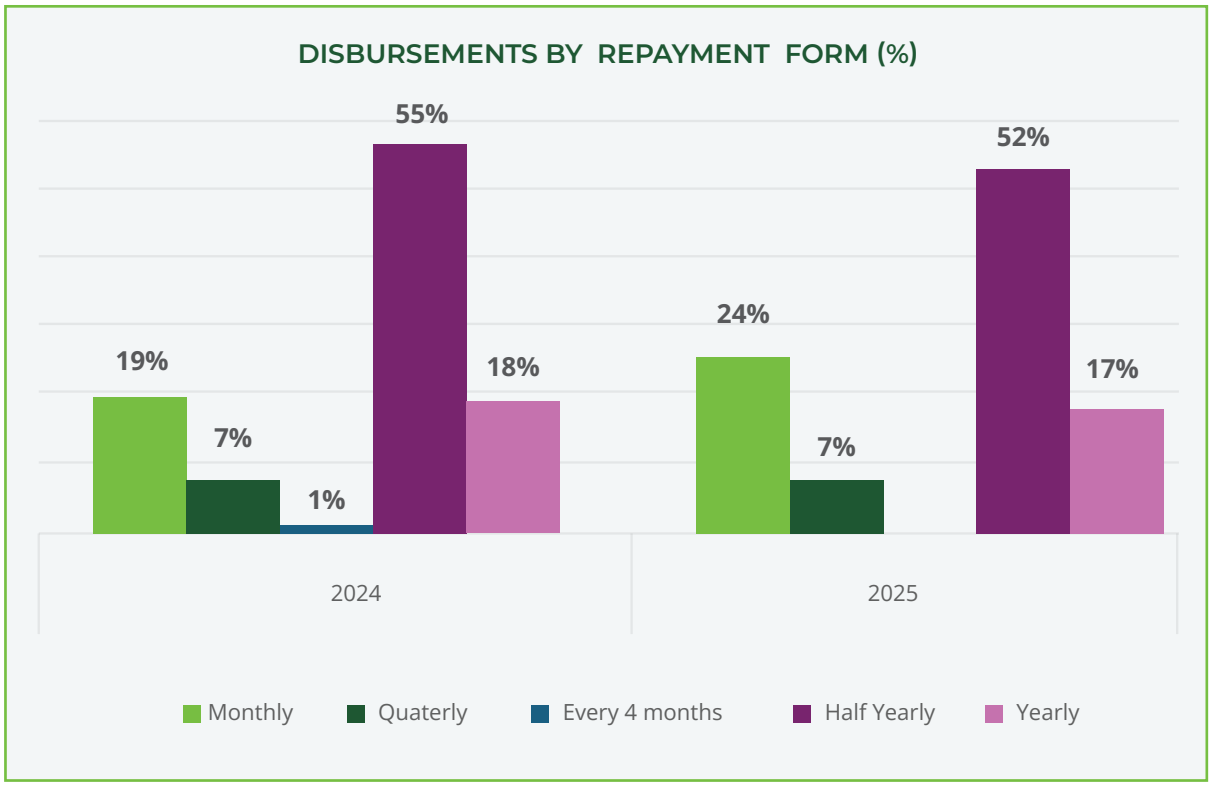


Figure 12: Disbursements of agricultural loans by repayment frequency 2024 and 2025

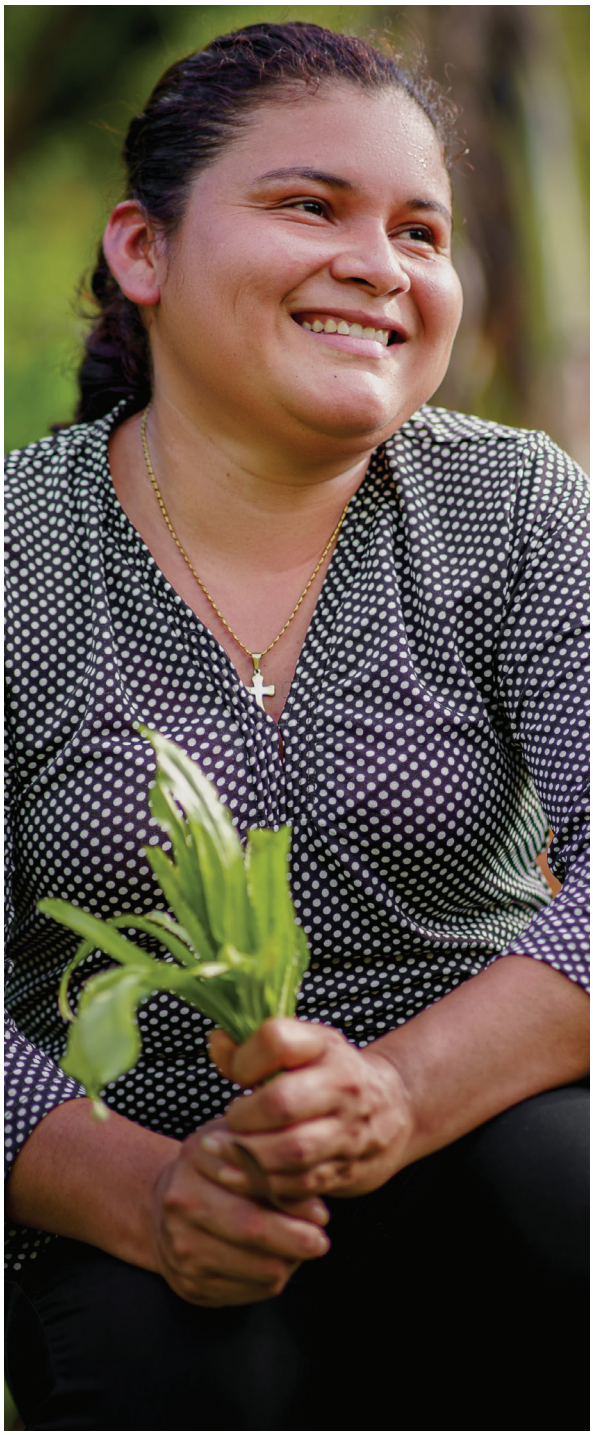
4 Enhanced dashboards and reporting for improved risk management in agricultural lending

A range of risk management tools are already in place, including vintage analysis and portfolio reports that track payment behaviour and assess risks by agricultural activity, region, loan amount, and repayment terms.

The TA supports enhanced staff capacity to analyse these reports and strengthen decision-making. Particular attention was given to risks arising from long credit tenures and misalignment between repayment schedules and production cycles or cash flow, which can affect borrowers' ability to ensure smooth repayment.

5 Adoption of revised credit policy

Following the pilot phase, the proposed modifications to the credit policy are being validated and incorporated into the existing policy framework, ensuring that product adjustments, target segment definitions, and risk acceptance criteria are fully formalised and institutionalised.



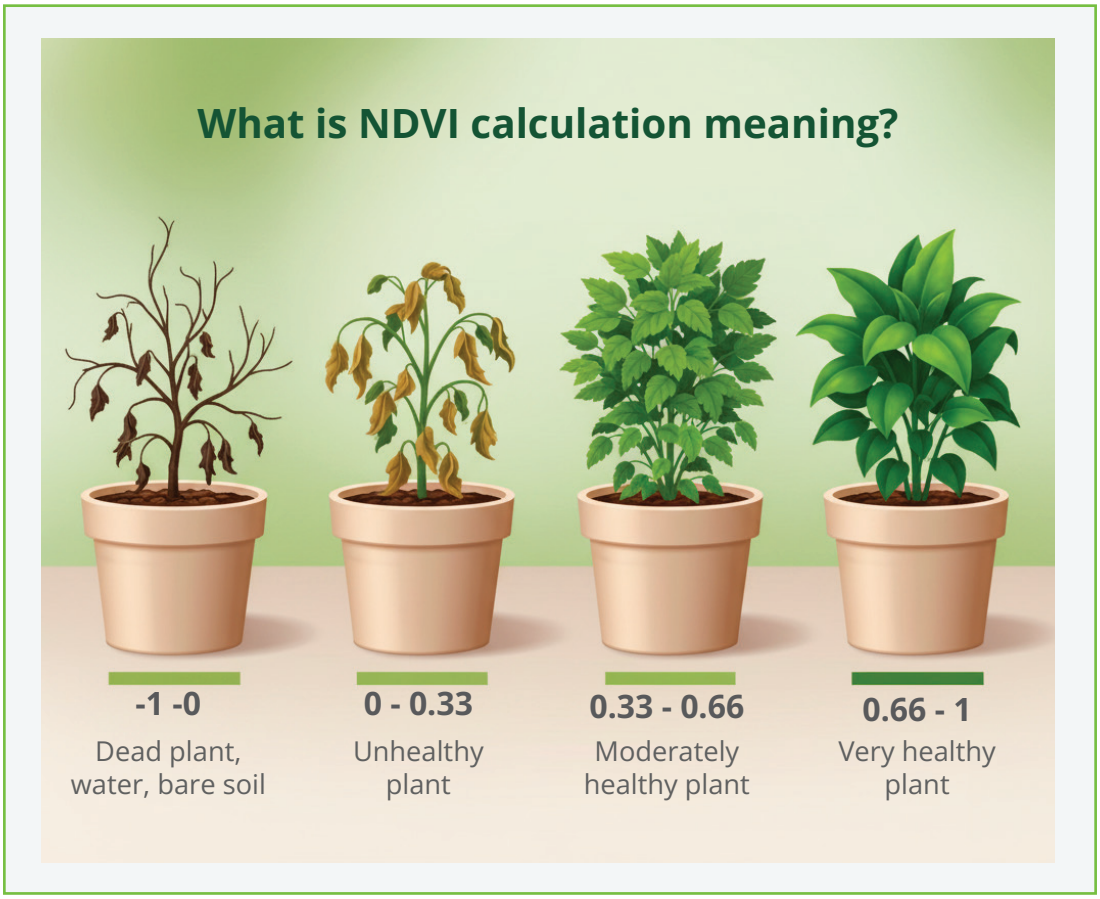
LESSONS LEARNED

- Introducing technical sheets (TSs) for crop and livestock activities, and linking them to projected cash flows, proved valuable for improving agricultural credit risk assessment.
- Staff-wide adoption of these tools strengthened operational capacity and enhanced credit decision quality in rural branches.
- Updating and institutionalizing the agricultural credit policy alignment and consistency in lending practices.
- System integration of technical sheets and projected cash flow models into the core banking systems are essential for full adoption, compliance, and long-term sustainability. However, limited financial and human resources - both within the institution and among suppliers - slowed integration progress.
- Clear responsibility for updating and updating technical sheets is critical, especially when entering new regions with diverse agricultural profiles.

INNOVATIVE SOLUTIONS TO BALANCE RISKS AND OPERATIONAL COSTS IN AGRICULTURAL FINANCE

The inherent risks to agricultural activities - including price volatility, input availability, climate impacts, and the physical remoteness of farms - create the need to develop mechanisms that balance credit risks with operational costs to sustainably manage and grow an agricultural portfolio. Within the TA programme, digital solutions were piloted to support remote verification and improve efficiency in agricultural lending:

- **Geolocation of farms**
  - Identification of farmers and their plots through GPS coordinates.
- **Access to the Copernicus Data Space Ecosystem**
  - The Copernicus Data Space Ecosystem is an open platform to access a wide range of data and services from the Copernicus Sentinel missions. (CDSE, 2025). The aim was to remotely verify crop locations and development, reducing the need for field visits, reducing time and transport costs.
- **Use of the NDVI- Normalized Difference Vegetation Index**
  - The NDVI measures the “greenness” of vegetation ranging between -1 and +1 where the higher the NDVI value, the healthier the vegetation.



Source : Geospatial Artificial Intelligence solutions

Figure 13: NDVI calculation meaning

Use cases for NDVI in agriculture:

- Farmers and agricultural scientists use NDVI scans and images to monitor crops, manage the application of fertilizers, optimize irrigation, and improve crop selection (Bedunkevich, 2025).
- NDVI can act as an indicator of drought: When water limits vegetation growth, it has a lower relative NDVI and density of vegetation (EarthData, 2025).

Innovative solutions based on remote sensing—such as access to the Copernicus Data Space Ecosystem and the use of NDVI—represented an effort to integrate satellite and geospatial information into agricultural risk management. **However, their implementation revealed technical, institutional, and economic limitations that prevented them from fully meeting the objectives of balancing credit risk and operational costs.**

LESSONS LEARNED

- **Technological complexity proved a major challenge.** Processing satellite imagery requires advanced geospatial analysis, robust digital infrastructure, and staff skilled in the interpretation of spectral indices. Many rural financial institutions lack these capabilities, which can create dependency on external service providers and increase operational costs.

- **Limited applicability at the microfinance scale.** Although NDVI is useful for monitoring crop health, water stress, or drought at large scales, it is less precise in small and fragmented plots with diverse cropping systems. The heterogeneity of smallholder farming practices in rural areas made it difficult to correlate NDVI results with credit repayment capacity, reducing the reliability of the index for credit risk management.

- **Unfavourable operational cost-benefit balance.** Although Copernicus was expected to reduce field verification visits and thereby lower logistical costs, in practice many visits still had to be made to validate satellite observations - resulting in duplicated efforts and higher costs. In addition, limited connectivity in rural areas made it difficult to access and process large datasets.

- **Gaps between potential and practical application:** From a climate and credit risk management perspective, the expectations of generating objective and standardized indicators to adjust interest rates, define credit limits, or design early-warning systems were not met. The gap between the satellite data availability and its integration into credit risk models was larger than anticipated. Overall, these tools remain promising, but require technological maturation, greater local contextualisation, and stronger institutional frameworks to be effective in the field of rural microfinance.

6.3 PRODUCT DEVELOPMENT AND INNOVATION DEVELOPMENT OF TAILORED AGRICULTURAL LOAN PRODUCTS

The existing sole agricultural loan product was adjusted and divided into two distinct offerings to better meet the needs of different customer segments identified during the market research, as well as to respond to operational issues and financial profitability.

- **Small farming loan "RapiFin"**
  This product mainly targets smallholder farmers in need of funding to purchase inputs, pay additional labour or for bridging liquidity challenges until the next harvest. The product is designed to **streamline and simplify the evaluation of small agricultural loans by reducing time-consuming farm visits and in-depth analysis of production costs, yields, and returns, using standardized TS as a reference.** Due to the simplified credit risk assessment, a maximum threshold and loan tenure was defined.

- **Agricultural loan "Solucion"**
  This product serves farmers with more diverse and capital-intensive needs, particularly emerging and progressive farmers, where higher levels of technification require more detailed analysis of production costs and yields.

DEVELOPMENT OF CLIMATE SMART LOAN PRODUCTS IN AGRICULTURE

Financial solutions enabling farmers to cope with climate risks, such as drought and irregular rainfall, were developed for smallholder farmers.

- **Loan product for solar powered water pumps and irrigation systems**

Objective: Support smallholders in securing water access, reducing dependence on fossil fuels, and building resilience to climate change while supporting environmentally responsible farming practices.

Context: Most smallholder farmers rely on rainfed agriculture, making them highly vulnerable to water scarcity and climate variability. Additionally, many water pumps depend on diesel or electricity, which are costly, inconsistent, and have negative environmental impacts.

Challenges: Identifying strategic partners who understand the needs of smallholders and are committed to developing affordable, capacity-appropriate solutions for smallholder farmers. While suppliers may be technically skilled, many lack the expertise or interest to effectively serve this segment.

- **Financing the purchase and application of Hydrogels**

Objective: Equip smallholder farmers with sustainable, affordable technologies that address water scarcity and irregular rainfall, building resilience against climate impacts on crops and income.

Context: Hydrogels are widely used in agriculture due to their ability to retain water and release moisture gradually, improving soil structure and fertility and supporting plant growth in arid or degraded soils. They can contribute to better crop yields and more efficient water use.

Challenge: As this is a novel solution offered by only one supplier in the country, Microserfin decided not to pilot this solution as it presented a high reputational risk.

GUILLERMO: INNOVATION NEEDS SUPPORT TO SUCCEED

Guillermo cultivates two hectares of land, growing otoe (a root vegetable similar to taro) as his main crop, along with corn and vegetables. Determined to maintain year-round production, he uses irrigation and other modern agricultural technologies to keep his crops thriving in the dry season and sustain consistent quality.

Forward-thinking and curious, he was eager to try Hydrogel - a new soil-enhancing technology that helps retain moisture and improve resilience against changing weather conditions.

"It seemed like a solution made for us," he recalls. "Affordable, efficient, and good for the soil."

But because the product was new to Panama, the supplier could not provide technical guidance. Critical information — such as dosage, watering schedules, and burial depth — was unavailable.

The result was costly: the product was applied incorrectly, leading to overwatering and approximately 35% seed loss.

Guillermo still believes in innovation, but his experience proves that resilience grows not from technology alone, but from the support and guidance that enables farmers to use it well.

(Microserfin Client, Guillermo).

- **Investment loan to finance rainwater harvesting systems as a sustainable and climate-resilient solution**

  Objective: Securing water availability during irregular rainfall periods and drought, in particular for livestock activities.

  Context: Current systems collect and store rainfall from rooftops or land surfaces into lined reservoirs, ensuring a reliable water source for livestock, especially during dry seasons. The setup typically includes catchment areas, conveyance systems (like gutters and pipes), and storage structures such as tanks or ponds, which can be gravity-fed or powered by solar pumps

  Opportunity: In the Central province and province of Darien, rainwater harvesting is being adopted by a few customers of Microserfin, presenting an opportunity to scale up through the development of a targeted sustainable product.

JEREMIA: WATER TO WITHSTAND DROUGHT

Jeremia manages an 8-hectare farm. He grows yuca and corn on three hectares and raises cattle and pigs on the remaining land. For years, his livelihood depended on the predictable rhythm of Panama's wet and dry seasons - until that rhythm changed.

"The rains usually arrive in April," he explains. "But last year, we waited and waited..."

In recent years, farming has become increasingly difficult for Jeremia. The delayed rainfall, driven by the El Niño phenomenon, hit his farm hard. Yields fell, pastures dried up, and his cattle lost weight, taking his income down with them.

Without any safety net, his family's future would have been left to the whims of drought and delayed rains, but fortunately, Jeremia refused to rely on luck alone and made an important investment in two rainwater harvesting reservoirs.

"Thanks to this preparation, I was able to sustain my animals," he says. "Many neighbours without such systems were forced to sell or slaughter their cattle early, suffering heavy losses."

These reservoirs became vital during the prolonged dry season, carrying his livestock, and his income, through the harshest months. In a season of loss for many, Jeremia's preparation paid off — turning early action into resilience in the face of an increasingly unpredictable climate.

(Microserfin Client, Jeremia).

LESSONS LEARNED

- **A strong supplier market is essential.** Green and sustainable financial products can be designed—with defined features, conditions, and clear contributions to climate-positive outcomes—but may not be piloted due to the difficulty of identifying suitable and interested suppliers. This underscores the importance of a diverse and skilled pool of local suppliers offering affordable solutions for solar-powered irrigation systems and pumps as well as for innovative solutions like hydrogel. Beyond affordability, technical expertise, service quality and reliability of suppliers are critical in order to build sustainable strategic alliances.

- **Capacity building and awareness are critical:** Enhancing staff knowledge and farmers' awareness can significantly boost interest in green, sustainable solutions and financing. Integrating a tailored training module for smallholder farmers would support change, adoption and loan uptake.

- **Collaborative Ecosystem Strengthening:** Analysing potential alliances and identifying key actors within the agricultural ecosystem are crucial steps for successfully implementing climate-smart financing solutions. Beyond direct project partners, engaging with input suppliers, extension services, research institutions, and local authorities can strengthen coordination and amplify overall impact. Ensuring alignment among all stakeholders—so that they deliver accurate, consistent, and complementary information—helps create an enabling environment for adoption. This ecosystem-wide collaboration enhances sustainability, fosters trust, and maximizes benefits for all, particularly farmers. Activities include.

    - Conducting comprehensive stakeholder mapping and engagement .
    - Capacity Building and Knowledge Exchange (e.g. training on CSA practices, green financing mechanisms, joint field demonstrations).
    - Development of collaborative frameworks (e.g. peer-learning platforms).
    - Setting up learning networks and monitoring framework.

6.4 BUILDING CAPACITY FOR ENDURING SUSTAINABILITY

Capacity-building focused on improving staff competencies to enable effective implementation, adaptability, and ownership of project activities. The objectives were to enhance technical and operational skills, promote a shared understanding of newly developed tools and concepts, and foster a culture of continuous learning. By equipping staff with the necessary knowledge and resources, the programme aimed to improve performance, ensure sustainability of interventions, and enable institutional growth beyond the project's duration. The capacity building programme primarily targeted loan and credit officers as well as branch managers of rural branches and staff in the credit risk and compliance departments.

In addition to classroom learning, on-the-job coaching was provided to credit and loan officers, branch managers, the credit risk team, and tool administrators to strengthen their practical application of the TS Tool (Technical Sheets and projected cash flow).

An agricultural finance induction course was developed to empower new hires with a solid understanding of the sector's principles, products, and risk dynamics. This training helps new staff quickly integrate into their roles, align with institutional objectives, and apply consistent approaches to assessing and managing agricultural clients. By strengthening early-stage capacity and confidence, the programme enhances staff performance, reduces onboarding time, and contributes to the overall quality and sustainability of agricultural finance operations.

Figure 14: Main training topics

LESSONS LEARNED

- **Continuous capacity building is vital to maintain staff competency,** especially in contexts with high staff turnover.
- **Establishing a team of trainers** enabled an effective rollout of the training plan, facilitated knowledge transfer, and supported institutionalisation of new products, tools, and concepts.
- **Systematic handover of manuals and training guidelines** to relevant departments deepened ownership and ensured continuity of implementation.

6.5 PILOTING: A CRITICAL SUCCESS FACTOR

Piloting new products, tools and processes is essential in financial services, where trust, compliance, and usability are critical. Piloting allows innovations to be tested in a controlled environment, enabling improvements based on practical, real-world feedback before full-scale rollout.

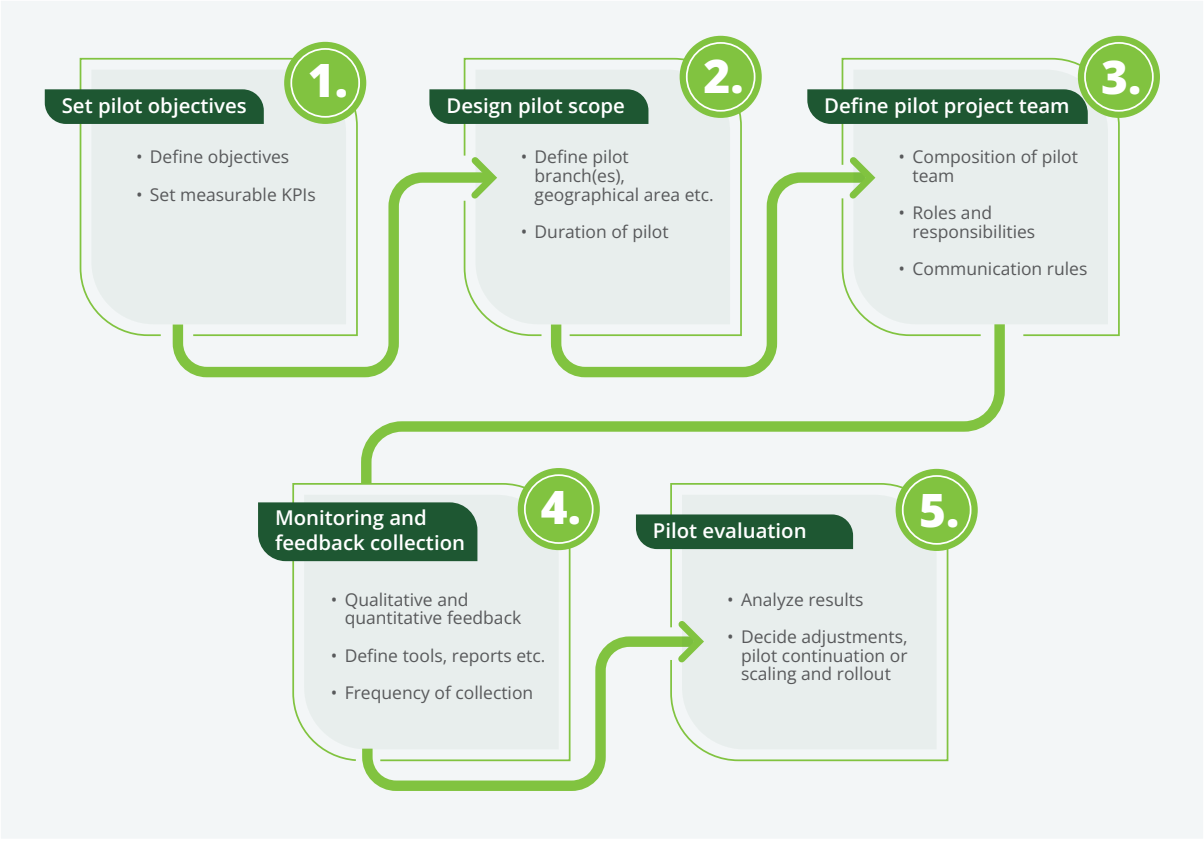


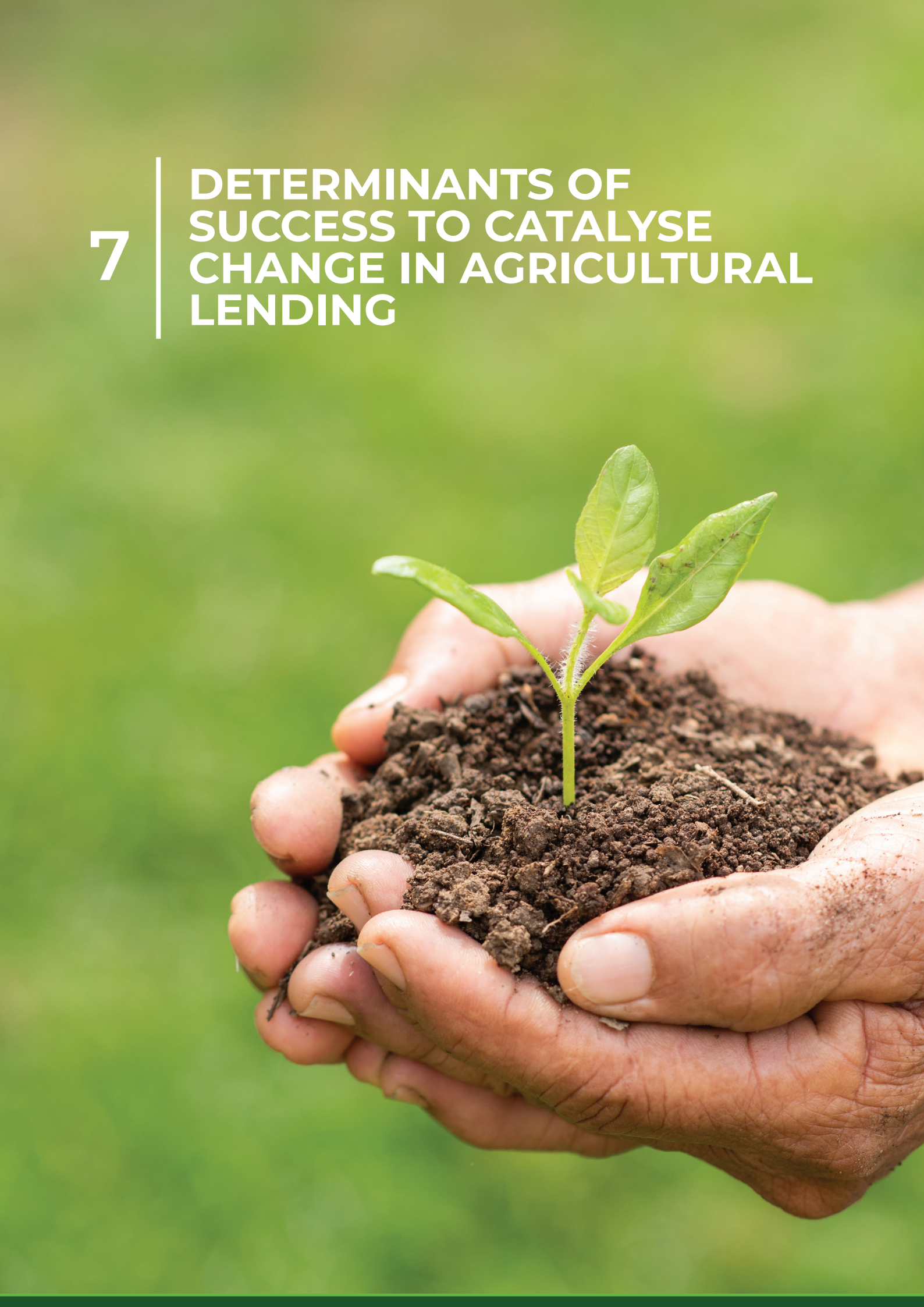
Figure 15: Pilot design steps

A six-month pilot was conducted in three branches located in different regions, each characterized by distinct agricultural potential, crops, and livestock activities. Based on the insights from the pilot evaluation, strategic recommendations were developed, and relevant policies were adjusted. A comprehensive rollout strategy was then crafted, supported by clear implementation guidelines, a robust training plan, and practical materials to ensure successful scaling and sustained impact.

LESSONS LEARNED

- **Sustained Team Engagement:** Ongoing collaboration with the implementing team proved essential to maintain commitment, ensure ownership, and sustain momentum throughout the pilot period.
- **Cross-Departmental Collaboration:** Regular updates shared with key departments—such as Risk, IT, and Business—helped maintain engagement, foster collaboration, and encourage constructive feedback for ongoing improvements.
- **Adaptive Management and Tool Refinement:** Assessment tools and related processes were updated during the pilot to enhance user acceptance, functionality, and the overall effectiveness of the tools, policies, and procedures.

7 DETERMINANTS OF SUCCESS TO CATALYSE CHANGE IN AGRICULTURAL LENDING



Based on the results, achievements and reflections, the following have been identified as the most important determinants for a successful TA programme to support financial institutions in strengthening their credit methodology and risk management in agricultural finance.

1 | Strong leadership commitment and engagement

Commitment and buy-in from senior management are critical for driving success, setting priorities, and establishing the importance of the project within the organization.

Leadership support ensures:

- availability of necessary resources;
- overcoming resistance to change, and that the project remains aligned with the institution's strategic objectives;
- accountability, motivation and more efficient decision-making.

2 | Dedicated, full-time project leader from the financial institution

The project leader should have the authority and credibility to provide clear strategic direction, make timely decisions, and engage directly with senior management when required. Equally important, this individual must be able to build strong connections across departments and with the branches responsible for implementing the value proposition.

By bridging the strategic vision with operational realities, the project leader ensures alignment, fosters collaboration across functional areas, and maintains momentum throughout the implementation process. This combination of seniority, authority, and cross-functional engagement is a decisive factor to reach sustainable results.

3 | Appetite for innovation and readiness for change

An openness to innovate and embrace change - in products, processes, and technologies - enables the introduction of climate-smart solutions that enhance the institution's value proposition and position it as a leader in green financing for smallholder farmers.

The willingness to innovate and adapt proves to be critical to align climate risk, customer needs and sustainability priorities and risk mitigation.

4 | Pilot testing as a foundation for scale and sustainability

Pilot testing is an essential enabler of successful rollout. Implementing a pilot to test the value proposition, credit methodology, tools and marketing approach before full-scale rollout proved essential for solution refinement and institutional learning.

Pilots allow financial institutions to test, validate, and adjust solutions in a controlled environment, reducing risks and providing evidence of viability. They also help build staff and client confidence, laying the groundwork for sustainable scale.

5 Development of collaborative ecosystem

Engaging diverse stakeholders across the agricultural ecosystem through joint and complementary actions is essential to scale agricultural finance, promote inclusion and capacity building. Strong ecosystem collaboration enhances sustainability and maximizes benefits for all actors — particularly farmers.

6 Integrating climate-related risk management

The inclusion of climate risk considerations within the institution's overall risk management framework enhances long-term portfolio sustainability. This could include the development and use of climate risk modelling tools, integration of climate risks into the overall risk management framework and capacity building of the institution's risk team, enabling the institution to manage and mitigate risks specific to agricultural finance. For the design of future similar technical assistance (TA) projects, it is advisable to include a specific component of climate risk management.

7 Ensuring sustainability beyond project timeline

Strengthened institutional ownership: project knowledge and tools are embedded within the institutions' existing structures and staff at across levels (HQ, departments and branch networks) was trained so that skills and expertise remain after the project ends.

Integration within core systems: Tools and products are fully integrated in the core banking system, in the institution's policies and processes and in its regular operations and performance indicators.

Financial and operational sustainability: A clear revenue model supports ongoing delivery and scaling.

Internal monitoring and feedback systems: Mechanisms are established to monitor outcomes and capture feedback, ensuring tools are used correctly and remain relevant and effective over time.

BIBLIOGRAPHY

Copernicus Data Space *Ecosystem (CDSE). n.d. Ecosystem – Documentation.* [online] Available at: https://documentation.dataspace.copernicus.eu/Ecosystem.html.

Food and Agriculture Organization of the United Nations. 2021. ***The State of Food and Agriculture: Making agri-food systems more resilient to shocks and stresses.***
FAO. https://doi.org/10.4060/cb4476en
Food and Agriculture Organization of the United Nations. (n.d.). Family Farming Knowledge Platform. Available at: https://www.fao.org/family-farming/countries/pan/en/

GeoAI: Normalized Difference Vegetation Index: Definition, Calculatin, Technology. Available at: https://geoai.au/normalized-difference-vegetation-index/

Instituto Nacional de Estadística y Censo (INEC). 2011. ***Censo Agropecuario 2011.*** Panama.

Iniciativa Panamá sin Pobreza. 2025. ***Informe sobre la Pobreza y la Pobreza Extrema en Panamá 2025.*** [online] Available at: https://panamasinpobreza.org/panama/pobreza/.

Inter-American Development Bank (IDB). 2020. ***Infrastructure and Rural Development in Latin America and the Caribbean.*** [online] Available at: https://publications.iadb.org.

International Fund for Agricultural Development (IFAD). 2022. ***Rural Development Report 2022: Transforming Food Systems for Rural Prosperity.*** [online] Available at: https://www.ifad.org/en/web/knowledge/-/publication/rural-development-report-2022.

MIDA. 2020. ***Logros Trascendentales.*** Ministerio de Desarrollo Agropecuario. [online] Available at: https://mida.gob.pa/unidades/unidad-tecnica-de-cadenas-agroalimentarias/logros-trascendentales/.

NDVI Explained: Understanding the Normalized Difference Vegetation Index. n.d. [online] Available at: https://www.cropler.io/blog-posts/ndvi-explained-understanding-the-normalized-difference-vegetation-index.

National Centre for Competitiveness; Adams, P. & Branca, J. 2023. ***Analysis of Production Chains: Agricultural Sector.*** Panama, September 2023.

Notre Dame Global Adaptation Initiative (ND-GAIN). 2025. ***Country Index.*** [online] Available at: https://gain.nd.edu/our-work/country-index/.

Pallas. n.d. ***Agriculture in Panama and Economic Impact.*** [online] Available at: https://pallaslife.com/knowledge/agriculture-in-panama/.

Rodríguez, V., Sánz Caneda, J. & García Azcárate, T. 2017. ***Short Food Supply Chain in Panama: Factors Determining Promoter Initiatives.*** 8 March 2017.

The Vital Role of Agriculture in Panama's Economy. n.d. [online] Available at: https://panacrypto.com/role-agriculture-panama-economy/.

UNDP. n.d. ***Climate Promise: Panama.*** [online] Available at: https://climate-promise.undp.org/what-we-do/where-we-work/panama

Which Problems Does Panama Face Due to Global Warming. n.d. [online] Available at: https://climatecontroljournal.com/which-problems-does-panama-faced-due-to-global.html.

World Bank. 2025. ***Panama Overview: Development news, research, data.*** [online] Available at: https://www.worldbank.org/en/country/panama/overview.

World Bank – World Integrated Trade Solutions (WITS). n.d. ***Panama Trade Profile.*** [online] Available at: https://wits.worldbank.org/CountryProfile/en/PAN.

World Bank Group. 2025b. ***Panama Country Diagnostic Final.*** [online] Available at: https://unfccc.int/sites/default/files/resource/Panama%20Country%20Diagnostic_Final_0.pdf.

World Bank. 2025c.Thedocs. P***anama MPO.*** available at: https://thedocs.worldbank.org/en/doc/e408a7e21ba62d843bdd90dc37e61b57-0500032021/related/mpo-pan.pdf


GAWA
CAPITAL
Co-funded by
the European Union
microserfin
Frankfurt School
of Finance &
Management