



Agri DFS: Emerging business models to support the financial inclusion of smallholder farmers

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GSMA Agritech Programme

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The GSMA AgriTech Programme works towards equitable and sustainable food chains that empower farmers and strengthen local economies. We bring together and support the mobile industry, agricultural sector stakeholders, innovators and investors in the agritech space to launch, improve and scale impactful and commercially viable digital solutions for smallholder farmers in the developing world.

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The campaign is based on the Action Agenda for Innovation, which will be presented at the COP26 UN Climate Change Conference in Glasgow, Scotland, in November 2021.

Find out more at www.climateshot.earth

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Executive summary

Globally, nearly 500 million households depend on smallholder farming¹ for their livelihoods.² Smallholder farmers manage about 25 per cent of the world's cropland and produce around a third of the world's food.³ However, they often experience food insecurity and financial exclusion, which leave them unable to invest in their farms and increase their productivity and incomes.

The estimated annual demand for credit from smallholder farmers in low- and middle-income countries (LMICs) is \$238 billion,⁴ or eight per cent of the agriculture sector's contribution to GDP.⁵ Less than a third of this demand is being met.⁶

Digital solutions are enabling new business models for agricultural digital financial services (agri DFS) that can help to address this financing gap. These services capture a wealth of farm and farmer data for credit risk assessments, facilitate data-sharing partnerships through APIs⁷ and increase access to assets through the use of remote-locking technologies.

1 Smallholder farmers are farmers who produce crops or livestock on two hectares of land or less.

2 The MasterCard Foundation Rural and Agricultural Finance Learning Lab and ISF Advisors. (2019). *Pathways to Prosperity: 2019 Rural and Agricultural Finance State of the Sector Report*; GSMA AgriTech. (2020). *Digital Agriculture Maps*.

3 Ritchie, H. (2021). *Smallholders produce one-third of the world's food, less than half of what many headlines claim*. University of Oxford.

4 This figure includes LMICs in Sub-Saharan Africa, South and Southeast Asia, and Latin America. MasterCard Foundation Rural and Agricultural Finance Learning Lab and ISF Advisors. (2019). *Pathways to Prosperity: 2019 Rural and Agricultural Finance State of the Sector Report*.

5 GSMA calculation based on World Bank data.

6 MasterCard Foundation Rural and Agricultural Finance Learning Lab and ISF Advisors. (2019). *Pathways to Prosperity: 2019 Rural and Agricultural Finance State of the Sector Report*.

7 API = Application Programming Interface. APIs are a software program that makes it possible for the application programs of different organisations to speak a common technical language, and therefore interact with each other and share data.

This report looks at the rise of digital solutions in the financial and agricultural sectors and how they are enabling different business models to provide agri DFS to farmers. It focuses on five models:

1 Digitisation of savings groups,

which builds on both the established financial habits of farmers and community-based relationships to bring informal financial flows into the formal sector and generate financial histories for farmers;

2 Digitisation of credit processes,

which uses digital solutions to reduce costs and risks for financial service providers (FSPs) to serve farmers;

3 Digitisation of value chains,

which leverages established farmer-buyer relationships and farmers' data footprints collected through digital procurement solutions to estimate production and credit risks;

4 Embedded finance,

which uses APIs to integrate financial services with other digital agriculture use cases within the same solution or platform; and

5 Pay-as-you go (PAYG),

which uses mobile money to open access to assets, such as irrigation pumps or solar panels, through frequent micro-instalments, as well as remote-locking technologies that allow service providers to interrupt the service remotely in case of arrears.

Each agri DFS business model has its own path to scale, but they all rely on partnerships to grow. No one service provider has all the data, expertise and assets required to offer a range of financial products to farmers in formal and informal value chains at scale. Our analysis shows that embedded finance and PAYG models have the greatest potential for growth when they combine digital solutions and alternative data sources with access to capital, the credit risk assessment expertise of FSPs and the far-reaching distribution channels of mobile money providers (MMPs). Digital value chain business models also have significant growth potential, but to achieve scale, FSPs and MMPs must partner with multiple agribusinesses.

This report finds that digitally enabled agri DFS business models are increasing financial inclusion for farmers. In addition to the well-established, traditional input financing of formal value chains, farmers are also gaining access to financial services such as formal savings, short-term loans for agricultural and non-agricultural needs and productive and non-productive assets such as smartphones and solar panels.

Access to finance for long-term investments is still rare. PAYG models are helping to reduce this financing gap by providing access to assets, but loans for investments such as plantation renovation or storage infrastructure – crucial to increasing productivity and climate resilience – are difficult to obtain. Some farmers can access long-term loans thanks to established relationships with agribusinesses that negotiate ad hoc partnerships with FSPs and act as guarantors.

The widespread use of digital solutions, such as digital procurement and digital payments along value chains, is creating new opportunities for partnerships between agribusinesses and FSPs, and gradually unlocking longer term financing for farmers. Macro-intelligence solutions that could allow FSPs to factor climate and environmental risks in their credit-scoring models are also emerging. Having a clearer picture of production and climate risks, combined with more efficient digital credit processes, will eventually allow FSPs to offer a diverse set of agri DFS to more farmers.



Introduction

Addressing the financing gap in smallholder agriculture

Smallholder farmers⁸ play a crucial role in agricultural production in LMICs. Globally, nearly 500 million households depend on smallholder farming for their livelihoods, most of which are in South and Southeast Asia (208 million) and Sub-Saharan Africa (48 million).⁹ Smallholder farmers manage about 25 per cent of the world's cropland and are responsible for producing around a third of the world's food.¹⁰

The estimated annual demand for credit from smallholders in LMICs is \$238 billion,¹¹ or eight per

cent of agriculture's contribution to GDP.¹² However, less than a third of this demand is being met.¹³ Smallholders typically require between \$500 and \$1,500 in short-term financing¹⁴ and \$500 to \$2,000 in long-term financing¹⁵ every year to cover their agricultural expenses (depending on the value chain). There is a 98 per cent gap in smallholder demand for long-term agricultural financing, and there are also significant shortfalls in short-term agricultural financing (67 per cent) and non-agricultural financing (34 per cent).¹⁶

8 Smallholder farmers are farmers who produce crops or livestock on two hectares of land or less.

9 MasterCard Foundation Rural and Agricultural Finance Learning Lab and ISF Advisors. (2019). *Pathways to Prosperity: 2019 Rural and Agricultural Finance State of the Sector Report*; GSMA AgriTech. (2020). *Digital Agriculture Maps*.

10 Ritchie, H. (2021). *Smallholders produce one-third of the world's food, less than half of what many headlines claim*. University of Oxford.

11 This figure includes LMICs in Sub-Saharan Africa, South and Southeast Asia and Latin America. MasterCard Foundation Rural and Agricultural Finance Learning Lab and ISF Advisors. (2019). *Pathways to Prosperity: 2019 Rural and Agricultural Finance State of the Sector Report*.

12 GSMA calculation based on World Bank data.

13 MasterCard Foundation Rural and Agricultural Finance Learning Lab and ISF Advisors. (2019). *Pathways to Prosperity: 2019 Rural and Agricultural Finance State of the Sector Report*.

14 Short-term financing is defined as loans with a tenure of less than 12 months.

15 Long-term financing is defined as loans with a tenure of more than 12 months.

16 *Ibid.*

Sub-Saharan Africa has the widest financing gaps. South and Southeast Asia have the smallest gap in non-agricultural financing, mainly because value chain actors and informal financial institutions¹⁷ often provide

financing to farmers. In Latin America, formal financial institutions¹⁸ play a key role, covering 46 per cent of smallholders' non-agricultural financing needs (see Figure 1).

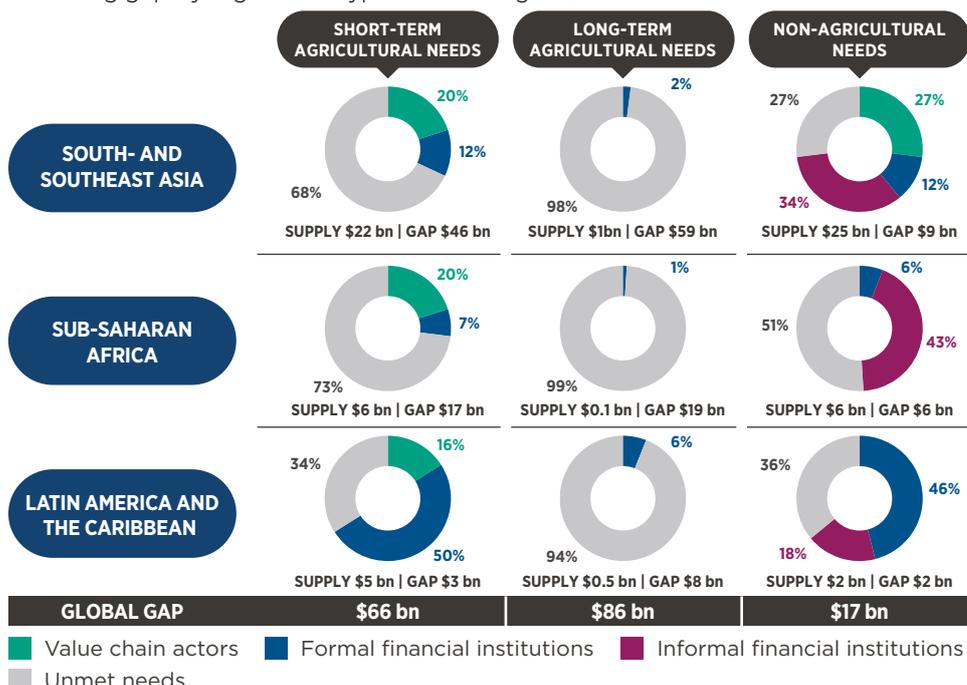
Figure 1

Financing gap by region and type of financing need

Total smallholder financing needs, 2019



Financing gap by region and type of financing need



Source: Adapted from Mastercard Foundation Rural and Agricultural Finance Learning Lab and ISF Advisors. (2019). Pathways to Prosperity: 2019 Rural and Agricultural Finance State of the Sector Report.

Although value chain actors like agribusinesses have an interest in farmers becoming more productive, farmers' financing needs are still largely unmet.

Value chain actors provide smallholders with 44 per cent of currently available financial services.¹⁹ For instance, input suppliers provide inputs such as seeds and fertilisers on credit while agribusinesses and cooperatives provide input financing and cash advances. Depending on the crop, the formality of the value chain and the size of the company, financing farmers can create significant liquidity pressure and credit risk for value chain actors.

Informal financial services along the value chain and community-based financial institutions, such as social networks and savings groups, account for 25 per cent of currently available financial services. Intermediaries (especially in less formal value chains) tend to facilitate a range of financial services, from holding savings

and financing family milestones and emergencies to refinancing farmers after a bad harvest.²⁰ Informal and community-based financial institutions play a crucial role in the financial lives of smallholders. They are typically closer, able to disburse funds faster and are often willing to renegotiate repayment terms. In sub-Saharan Africa and South- and Southeast Asia where demand for financing is high, value chain actors are the main sources of short-term agricultural financing, while informal financial institutions are the main providers of non-agricultural financing.

This persistent financing gap is driven by a perception among FSPs that financing agriculture is high risk, expensive and low return. Most FSPs have little incentive to invest in gathering intelligence on agricultural production and expanding into rural areas. The agriculture sector is also increasingly vulnerable to climate change and environmental risks, including

17 Informal financial institutions are non-regulated organisations such as savings groups and other community-based institutions.
 18 Formal financial institutions are regulated FSPs such as commercial banks, state banks, MFIs and SACCOs
 19 Mastercard Foundation Rural and Agricultural Finance Learning Lab and ISF Advisors. (2019). Pathways to Prosperity: 2019 Rural and Agricultural Finance State of the Sector Report.
 20 Anderson, J. and Wajih, A. (2016). "Smallholder Diaries: Building the Evidence Base with Farming Families in Mozambique, Tanzania, and Pakistan". Perspectives 2. CGAP.

irregular rainfall patterns and increased incidence of pests and diseases. It is also vulnerable to market risks, such as price volatility and poor infrastructure. A lack of data on smallholder incomes and credit histories limits the ability of FSPs to accurately predict future cash flows and assess farmers’ creditworthiness. Farmers usually live in remote areas, which makes collecting and verifying this information costly, especially when the reward is unclear. All this has contributed to the underfunding of the agriculture sector.

Commercial banks provide just three per cent of financial services currently available to smallholders.

²¹ In Tanzania, for instance, agriculture accounted for 24.6 per cent of GDP growth in 2020, but received just 8.7 per cent of the credit issued by banks.²² Of all the actors in the formal banking system, microfinance institutions (MFIs), rural banks and savings and credit cooperative organisations (SACCOs) are typically more socially minded and likely to be located in farming communities. This gives them better access to information on farmers’ needs, behaviours and economic activities that they can then use to assess credit risk. However, they often have limited operational and technical capacity, higher operational costs and may depend on donor funding.

Organisations that have commercial relationships with smallholder farmers have an opportunity to use digital agriculture solutions to provide financial services.

These solutions capture a wealth of farm, farmer and production data, and agribusinesses, agritechs, FSPs and MMPs are increasingly using data, technologies and relationships with farmers to address the information gap, conduct credit risk assessments and design new savings and credit products. They are also experimenting with partnership arrangements and innovative business models to provide commercially sustainable financial services to farmers.

This report presents business models for agri DFS with a focus on digitally enabled savings and credit products that meet farmers’ agricultural financing needs.

It builds on a framework developed by the GSMA AgriTech programme that categorises digital agriculture solutions into five use cases: digital advisory, agri DFS, digital procurement, agri e-commerce and smart farming.²³ The report focuses on two agri DFS sub-use cases: savings and credit (Figure 2). It also provides an overview of digital solutions and how they enable innovative business models and partnerships to provide viable agri DFS for smallholders.

Figure 2

GSMA AgriTech sub-use cases for agri DFS

Digital payments	Digitised procurement payments from buyers such as agribusinesses and cooperatives to smallholder farmers	Credit	Data-driven and digitally-enabled products tailored to farmers’ crop cycle. These products address specific agricultural needs either in cash or in-kind
Savings	Digital savings products designed to match farmers’ spending and savings habits, including digital agri wallets	Crowdfunding	Online platforms that enable smallholders to access funds from individuals (investors, lender or sponsors)
Insurance	Digitally-enabled agricultural insurance services to mitigate the risks associated with external shocks	Record keeping	Digital solutions designed to help farmers track farming activities, including expenses and revenues, and prove their creditworthiness
Credit scoring	Digital solutions to assess farmers’ creditworthiness using aggregated data from multiple sources	Digital transformation	Solutions that digitise processes and other business areas to change how the business operates and delivers value to farmers

■ Sub-use cases analysed in this report ■ Other sub-use cases

Source: Adapted from GSMA AgriTech. (2020). Digital Agriculture Maps.

21 Mastercard Foundation Rural and Agricultural Finance Learning Lab and ISF Advisors. (2019). Pathways to Prosperity: 2019 Rural and Agricultural Finance State of the Sector Report.
 22 Bank of Tanzania. (December 2020). Economic Bulletin for the quarter ending December 2020 Vol. LIII No 4.
 23 GSMA AgriTech. (2020). Digital Agriculture Maps.

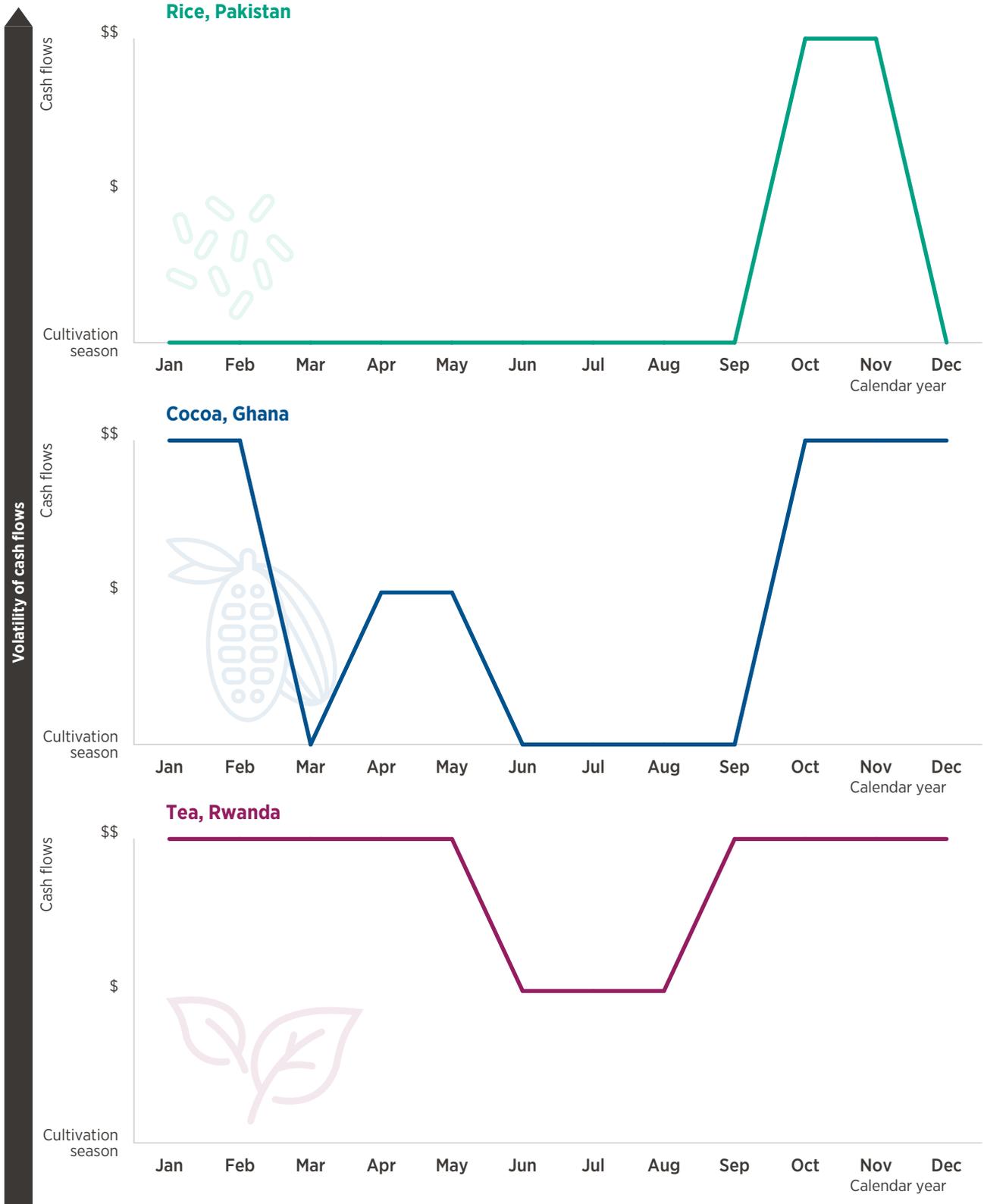


The role of agricultural value chains in smallholder financing

The lives of farmers revolve around their crop cycles, which determine **both their income and financial needs**. Farmers' cash flow is irregular and depends on the characteristics of their crops and local agro-climatic conditions. These determine the number and length of harvest seasons in a year, crop yields and the extent to which produce is perishable or can be stored (Figure 3).

Figure 3

Examples of irregular cash flows, by crop type



Source: GSMA AgriTech

In the case of cereals such as rice and wheat, smallholders have higher cash outflows at the start of the crop season when they buy seeds, hire farm labourers and purchase agricultural inputs. They do not earn income from their harvest for another five to six months.²⁴ These crops are demanding in terms of labour and inputs (seeds, fertilisers and pesticides) and require specialised equipment and storage facilities (Figure 4).

Perennial tree crops, such as coffee, cocoa and tea, have a major and minor harvest each year. They are less demanding in terms of land preparation since

plants produce over several years, but inputs and labour are required for mulching and pruning to maintain optimal productivity. After many growing seasons, productivity naturally declines and financing is necessary to acquire new seedlings and replace older plants.

Vegetables have shorter crop cycles and can be grown several times a year. They usually provide higher margins and are used to complement other crops. However, they are input-intensive and perishable, which makes better market access an urgent need.

Figure 4

Production and agri DFS requirements along the value chain, by crop type

Crop type	Harvests per year	Cultivation			Harvest and value addition		
		Labour financing	Input financing	Asset financing	Savings	Post-harvest financing	Asset financing
Cereals	1-2						
Perennial tree crops	1-2						
Vegetables	3-4						

■ Light
 ■ Moderate
 ■ Intensive

Source: Adapted from Strategic Impact Advisors, MasterCard Foundation, IFC. (2018). Digital Financial Service for Agriculture Handbook.

Climate change and increasing environmental risks exacerbate farmers’ production risks while price fluctuations make their incomes less predictable.

LMICs are experiencing 20 per cent more extreme heat today than in the late 1990s.²⁵ Higher temperatures reduce the amount of water available for crops, reduce labour productivity and increase pests and diseases.²⁶ It is estimated that yields from rainfed agriculture may have declined by as much as 50 per cent by 2020 in some African countries,²⁷ hitting smallholder farmers

hardest. Climate change is likely to raise food prices by 20 per cent for billions of low-income people.²⁸

To mitigate the various risks associated with farming, smallholders diversify their income.

Smallholder households tend to combine crops with different cycles, and supplement their income by breeding livestock and selling dairy products, operating retail or manufacturing businesses or earning wages from occasional or regular jobs (see Figure 5).²⁹

24 Anderson, J. and Ahmed, W. (2016). "Smallholder Diaries: Building the Evidence Base with Farming Families in Mozambique, Tanzania, and Pakistan". Perspectives 2. CGAP.

25 FAO, et al. (2018). The State of Food Security and Nutrition in the World 2018. In GSMA AgriTech. (2021). Digital Innovation for Climate Resilient Agriculture.

26 Global Commission on Adaptation (GCA). (2019). Adapt Now: A Global Call for Leadership on Climate Resilience. In GSMA AgriTech. (2021). Digital Innovation for Climate Resilient Agriculture.

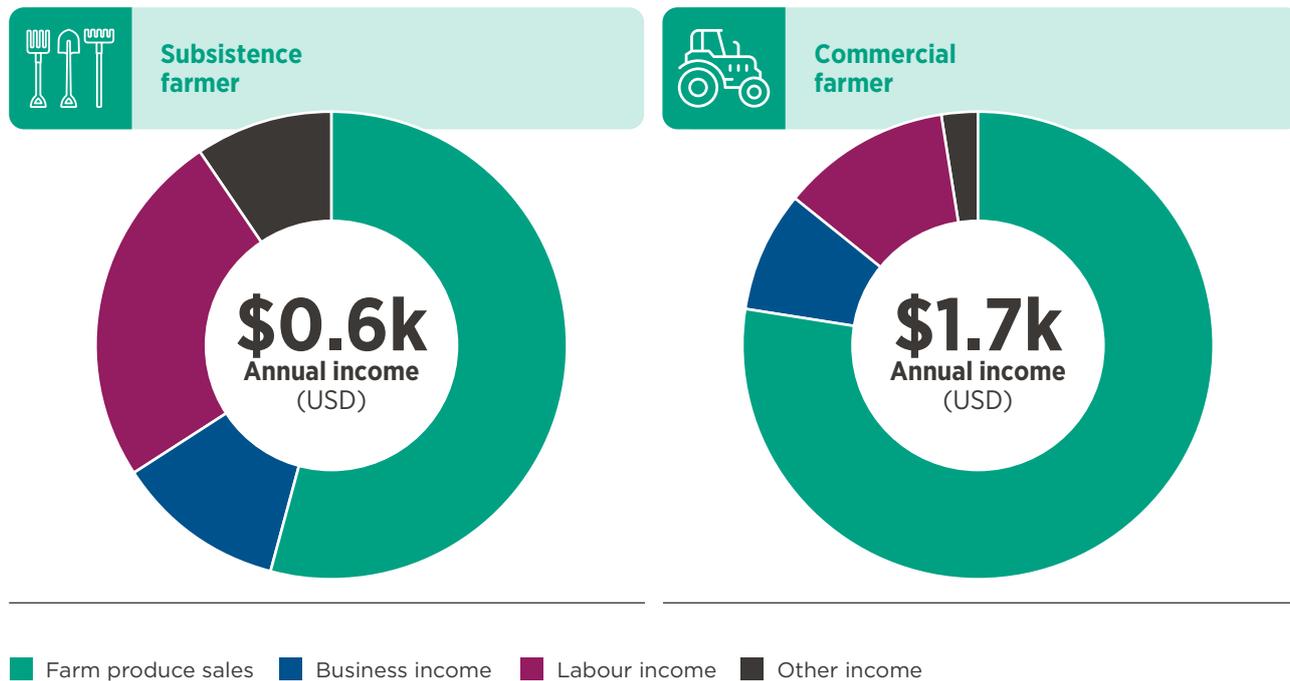
27 IPCC. (2007). AR4 Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. In GSMA AgriTech. (2021). Digital Innovation for Climate Resilient Agriculture.

28 Nelson, C.C., et al. (2014). "Climate Change Effects on Agriculture: Economic Responses to Biophysical Shocks." Proceedings of the National Academy of Sciences of the United States of America. In GSMA AgriTech. (2021). Digital Innovation for Climate Resilient Agriculture.

29 Anderson, J. and Wajjha, A. (2016). "Smallholder Diaries: Building the Evidence Base with Farming Families in Mozambique, Tanzania, and Pakistan". Perspectives 2. CGAP.

Figure 5

Income distribution of subsistence and commercial farmers



Source: Adapted from Mastercard Foundation Rural and Agricultural Finance Learning Lab and ISF Advisors. (2020). *COVID-19 Learning Brief. A Pathways Approach to Understanding the Impact of COVID-19 on Rural Households.*

Access to tailored savings and credit products enables smallholders to manage irregular cash flows, increase productivity and incomes, and mitigate the effects of climate change and external shocks such as COVID-19. Irregular cash inflows and regular cash outflows make it difficult for farmers to manage their finances. This makes savings crucial to meet agricultural consumption and household needs when cash inflows are limited. Savings have also proven vital for farmers to cope with financial shocks, such as COVID-19.³⁰ At the same time, farmers need flexible access to credit to supplement their savings and cover their short-term agricultural and non-agricultural expenses throughout the year. Access to credit also enables farmers to make long-term investments, such as in drip irrigation systems, tillage equipment and storage space, that could increase their productivity and build their resilience to future shocks.

The type of value chain in which a farmer operates has a major influence on their financing options. To understand the opportunity to provide formal financial services such as agri DFS, it is also vital to understand how farmers engage with agribusinesses, cooperatives and other value chain actors. Research by CGAP shows that commercial farmers are more likely to use both formal and informal financial services while subsistence farmers are more likely to rely on informal finance.³¹ Farmers in informal value chains tend to sell to several different buyers at harvest, typically aggregators or intermediaries, with no formal agreements in place.³²

It is therefore risky for buyers to finance farmers due to the high potential for side-selling. In contrast, farmers in formal value chains typically sell to an agribusiness buyer or small group of buyers based on contracts or established relationships. These are often large traders, exporters or cooperatives that pre-finance agricultural production activities at the beginning of the season and collect repayments when crops are procured. Providing financial support to farmers in formal value chains not only improves the quality and predictability of supply, but can also promote greater farmer loyalty or stickiness.

30 Mastercard Foundation Rural and Agricultural Finance Learning Lab and ISF Advisors (2020). *COVID-19 Learning Brief. A Pathways Approach to Understanding the Impact of COVID-19 on Rural Households.*
 31 Anderson, J., et al. (2019). *Smallholder Households: Distinct Segments, Different Needs.* Focus Note n.111, CGAP.
 32 Anderson, J. and Wajjha, A. (2016). "Smallholder Diaries: Building the Evidence Base with Farming Families in Mozambique, Tanzania, and Pakistan". Perspectives 2. CGAP.



Box 1



AB InBev: how value chain structures influence smallholder financing

AB InBev, a brewing company, procures cereals directly from farmers or through intermediaries. The company takes different approaches to short-term agricultural financing depending on the level of vertical integration in the value chain.

For instance, in Mexico, the smallholder malt barley value chain is formalised through farmer cooperatives that provide services to farmers, including input distribution, agricultural advisory and market access. AB InBev is working with farmer cooperatives to strengthen their governance and service capacity so that they can support farmers throughout their crop cycle. They also provide credit to farmers for seeds and other inputs through the cooperatives, which track all farmer transactions, including inputs supplied, training attended and produce delivered.

In Uganda, the malt barley value chain is less formal. It has large numbers of smallholder farmers with limited access to support services. AB InBev works with an aggregator to distribute inputs on credit and collect produce at the end of the season. They maintain a direct relationship with farmers through their team of agronomists who provide advisory services and support. There are risks, however, as it is unclear which farmers receive the inputs, which price they are paid at harvest and whether the selling price allows farmers to repay their credit. Through a collaboration with blockchain-enabled platform BanQu, AB InBev is working to make all transactions with farmers transparent. This solution will help farmers build a digital economic identity while also allowing AB InBev to reduce their credit risk and extend input credit to more farmers.

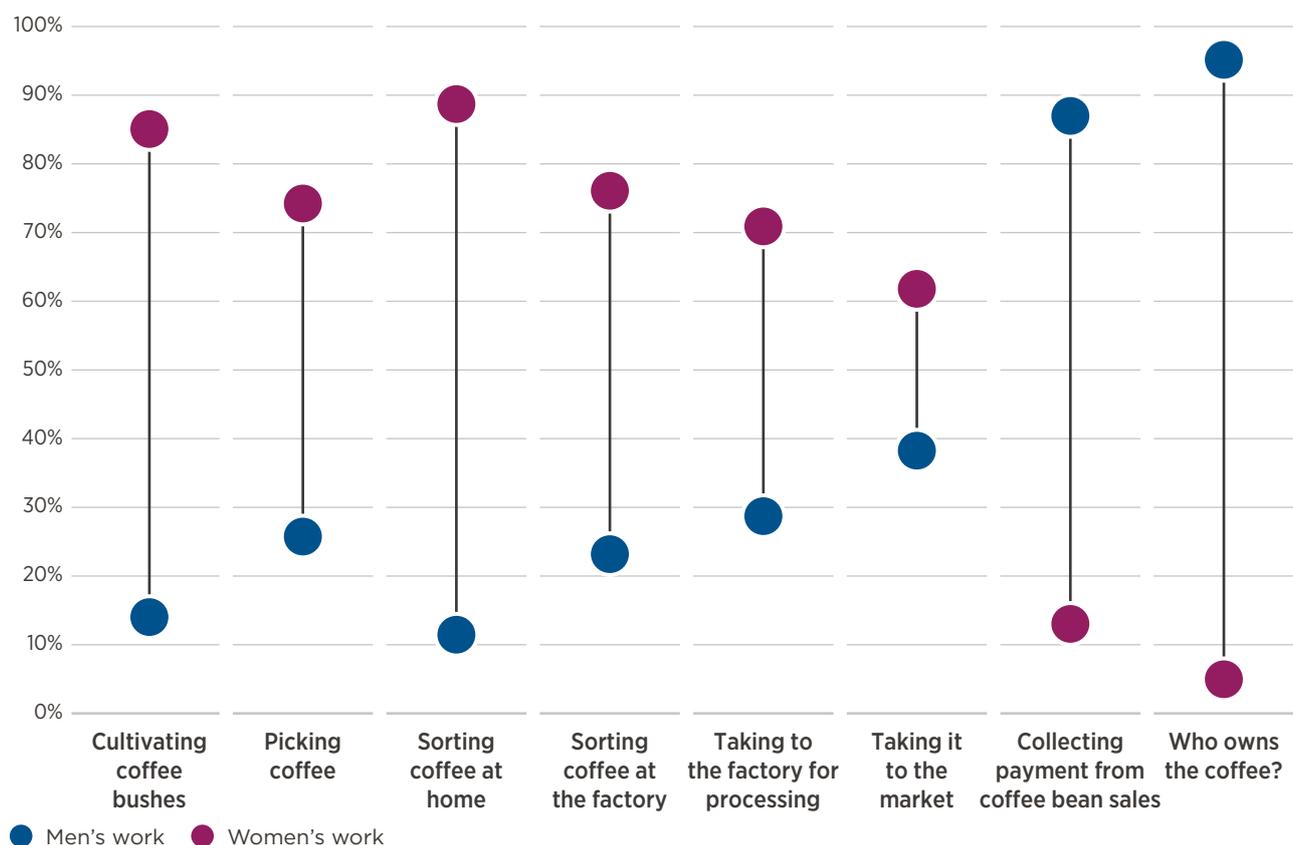
Women are generally underrepresented in formal agricultural value chains, which makes it more challenging for female farmers to access financing through value chain actors. Women are often described as “invisible stakeholders” who play an active but often informal role in production, harvest and post-harvest processing. Women are rarely involved in the marketing and selling of agricultural produce, and traditionally participate in parts of the value chain that generate lower economic return (Figure 6).³³

Gendered social norms around women’s roles and capabilities are the main factors preventing women from participating in and reaping the benefits of the

most profitable segments of the value chain. These barriers are multidimensional and include: religious traditions that regulate women’s interactions and mobility; social norms that define women as primary caregivers and housekeepers and limit their time for farming; and inheritance practices and land ownership laws that result in cooperatives registering men as the primary member and owner of the farm. Therefore, women produce labour-intensive, lower revenue crops that are grown close to the household and sold at the farm gate or local markets, if not consumed at home. They also face barriers to accessing inputs, training and advisory services, assets and finance, and generating returns from labour.³⁴

Figure 6

Work distribution in Kenya’s coffee value chain, by gender



Source: USAID. (2021). A briefer: gender inequality causes poverty.

³³ International Finance Corporation. (2016). Investing in Women along Agribusiness Value Chains.
³⁴ Ibid.



Enablers of agricultural digital financial services

Technological innovations and cross-sector partnerships are enabling disruptive agri DFS to reach smallholder farmers. This section provides an overview of the key digital solutions shaping these new business models.

The role of mobile money in financial inclusion for smallholders

The proliferation of mobile money and digital payments has created an entry point to financial inclusion for farmers, and new opportunities for FSPs to reach smallholder farmers at scale.

In less than a decade, mobile money services have expanded dramatically. In 2020, 310 mobile money services had 300 million monthly active users in 96 countries, three times more than in 2016 (Figure 7). Sub-Saharan Africa saw the strongest mobile money presence with 157 mobile money services serving 159 million active accounts.³⁵

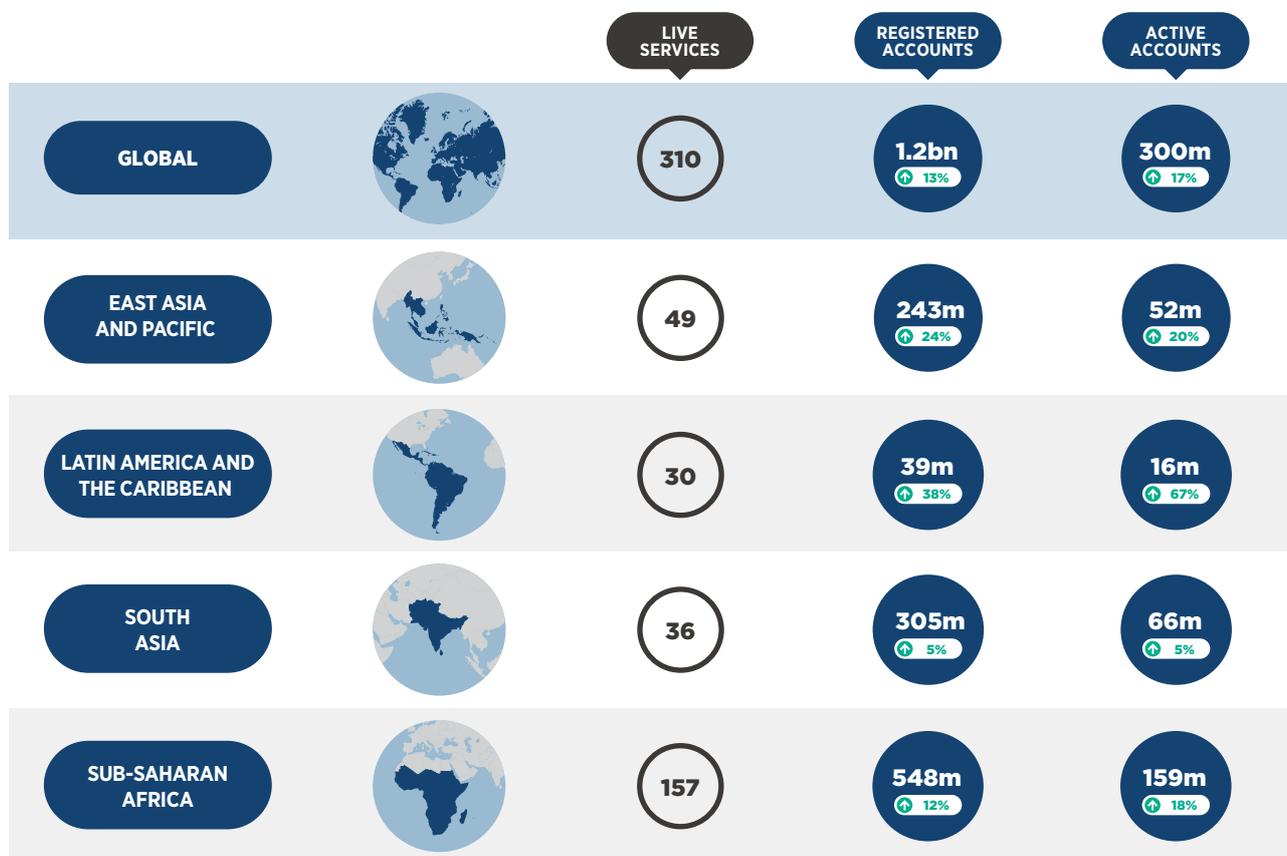
With account ownership at financial institutions remaining low across LMICs, mobile money has been driving global uptake of formal financial accounts. Offering unbanked populations a safe place to send, receive and store money, mobile money emerged as a convenient and cost-effective alternative to cash for mass market customers in LMICs. In recent years, MMPs

have moved beyond a purely transactional model to a platform approach that offers more advanced financial services, such as insurance, credit and savings.³⁶

With agent networks penetrating the last mile, mobile money has brought financial services closer to users in remote areas. In 2020, the number of unique agent outlets reached 5.2 million worldwide³⁷ – approximately one for every 60 active monthly users. The GSMA estimates that a mobile money agent has seven times the reach of ATMs and 20 times the reach of bank branches.³⁸ This is particularly important in rural areas where the penetration of ATMs and bank branches is extremely low.

Figure 7

Mobile money account ownership in LMICs, 2020



Source: GSMA. (2021). State of the Industry Report on Mobile Money 2020.

35 GSMA. (2021). State of the Industry Report on Mobile Money 2020.
 36 GSMA Mobile Money. (2021). Profitability 2.0: Ecosystem-driven business modelling & the future of mobile money margins.
 37 GSMA. (2021). State of the Industry Report on Mobile Money 2020.
 38 GSMA. (2020). State of the Industry Report on Mobile Money 2019.

In the agriculture sector, mobile money has provided an alternative to cash payments for crop procurement and an entry point to savings and credit products for smallholders. The GSMA State of the Industry Report on Mobile Money 2020 reported that 39 per cent of MMPs offering bulk payments also provide agricultural value chain payments to farmers, and 120 agricultural organisations have digitised value chain payments via mobile money, 75 per cent of which are in Sub-Saharan Africa.³⁹ For instance, TruTrade, a social enterprise serving as an aggregator in Kenya and Uganda, has fully digitised agricultural

payments across their value chain. Farmers bring their produce to collection points where TruTrade sourcing agents check for quality, weigh the produce and make a purchase offer. If the offer is accepted, the agent triggers a payment directly to the farmer's mobile money account.⁴⁰

Although digital payments in agricultural value chains are gaining ground, they still have enormous potential for growth. The GSMA estimates the global value of cash-based business-to-person (B2P) agricultural payments in 2021 at \$392 billion.⁴¹



39 GSMA. (2021). State of the Industry Report on Mobile Money 2020.

40 World Bank. (2020). Digitisation of Agribusiness Payments in Africa: Building a Ramp for Farmers' Financial Inclusion and Participation in a Digital Economy.

41 GSMA AgriTech. (2020). Digitising payments in agricultural value chains: The revenue opportunity to 2025.

Economic identities and alternative data for credit scoring

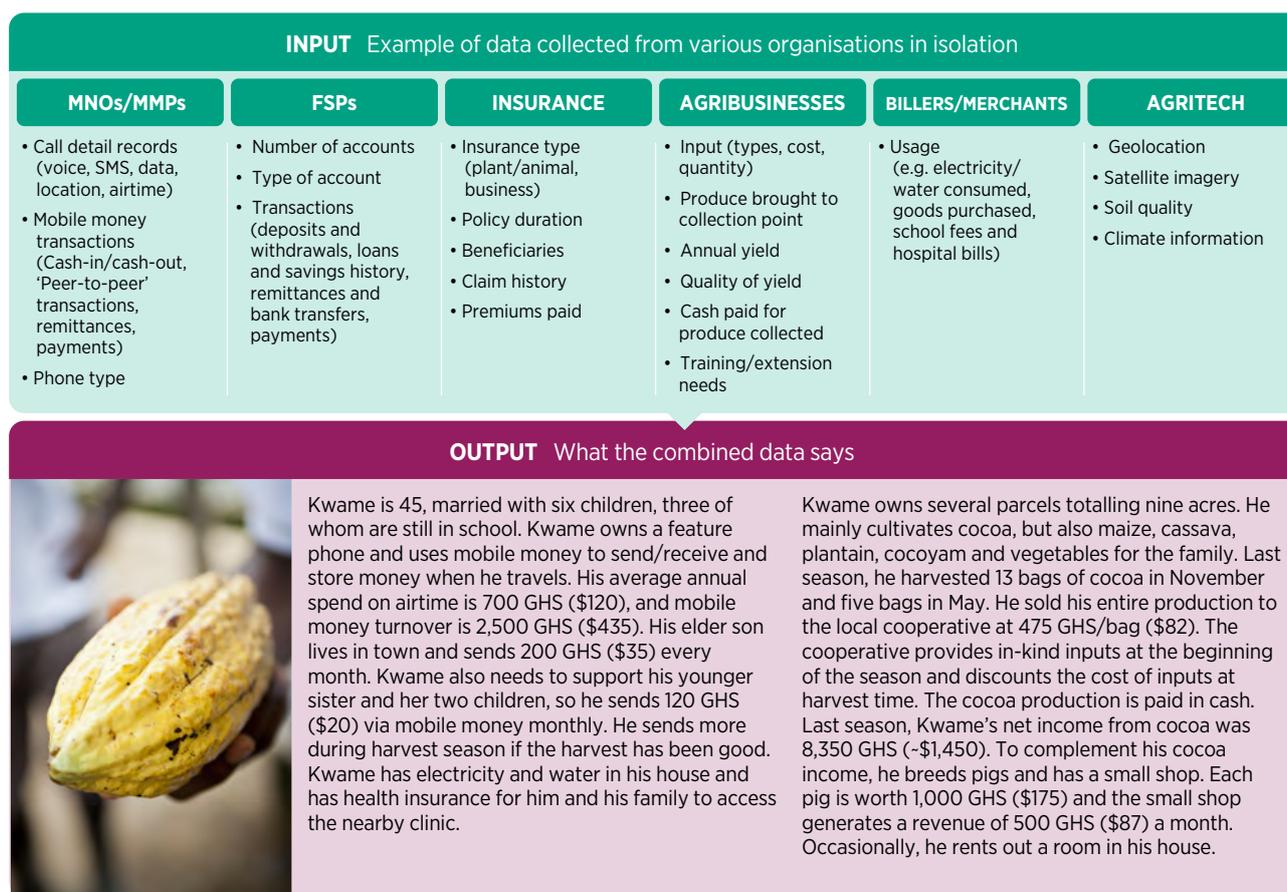
Alternative data captured by digital agriculture solutions, such as digital procurement, e-commerce and smart farming (see Figure 9), enable FSPs to estimate credit risks more accurately.

Digital agriculture solutions capture a wealth of farm and farmer data that could be used to create economic identities for farmers and enable the provision of formal financial services. Besides foundational identities⁴² (government-issued documents like birth certificates or national IDs), economic identities are a form of functional identity⁴³ that enables access to certain services, such as credit, insurance and savings.⁴⁴ For farmers, an economic identity is created using data from multiple sources to provide a dynamic and holistic picture⁴⁵ of household events, assets and transaction history.

Creating economic identities for farmers requires transitioning from paper to digital data collection and aggregating a variety of data points. Many organisations that work with farmers, such as cooperatives, intermediaries, input suppliers, SACCOs and savings groups, still use paper-based systems for data collection that can be prone to error, fraud and inefficiency.⁴⁶ Even when farmer data is collected digitally, organisations tend to collect and use it in isolation – a barrier to creating economic identities for farmers (Figure 8).

Figure 8

Sample framework for creating an economic identity for a farmer



Source: Adapted from GSMA Digital Identity and GSMA Mobile Money. (2019). Mobile-enabled Economic Identities for Smallholder Farmers in Ghana.

42 Foundational identity is a government-issued documents like birth certificates or national IDs that are typically universally available to citizens and used for multiple purposes., see GSMA Digital Identity. (2017). Digital Foundational Identities using Mobile Technology.
 43 Functional identity is a form of identity that enables access to certain services, such as credit, insurance and savings., see GSMA Digital Identity. (2018). Using Mobile Technology to Provide Functional Identities.
 44 GSMA AgriTech. (2018). AgTech Innovation Unlocks Economic Identities for Smallholder Farmers in Indonesia.
 45 GSMA Digital Identity and GSMA Mobile Money. (2019). Mobile-enabled Economic Identities for Smallholder Farmers in Ghana.
 46 Ibid.

A farmer’s economic identity can inform credit risk assessments and enable access to credit. To extend financial services to farmers, FSPs require both agriculture- and non-agriculture-related data to meet basic Know Your Customer (KYC) requirements, assess reliable sources of income and identify potential collateral. Agri DFS providers can use farmers’ economic identities to predict yields, identify production risks and make credit risk assessments more accurate, transparent and efficient. Economic identities are even more important for women, who are less likely to have a form of ID⁴⁷ or assets to offer as collateral.

Not all data have the same predictive power for credit risk assessments. Historical data on farm productivity, input expenses and crop sales provide a good estimate of a farmer’s income and cash flows, which determine their ability to repay a loan in the future. Collecting farmer profiles and farm data has become easier and less costly thanks to digital agriculture solutions. If this data is absent or fragmented, mobile phone, mobile money and digital agri wallet usage patterns can be used as indicators of a farmer’s ability to repay.⁴⁸ In addition to the variety of farmer and farm data highlighted in Figure 9, economic identities often use open data from national ID registries, national agricultural statistics and market information to fill gaps or validate information.

Figure 9

Examples of alternative data points generated by digital agriculture services

Digital advisory	Agri DFS	Digital procurement	Agri e-commerce	Smart farming
<ul style="list-style-type: none"> Farmer name Mobile number Smartphone usage Mix of crops Input requirements Pest and disease incidence Rainfall patterns Quality of soil Market prices 	<ul style="list-style-type: none"> Farmer profile Household composition Mobile number Cash in and out flows Frequency of transactions Location of transactions Other sources of income Insurance policies 	<ul style="list-style-type: none"> Farmer profile and location Household composition Coop membership Mix of crops Area cultivated Input requirements Input source and cost Productivity and quality Sales transactions Sales prices Net income per harvest Ownership of land Buyer and input providers 	<ul style="list-style-type: none"> Farmer profile Mix of crops Productivity Sales frequency Sales transactions Sales prices Number of buyers 	<ul style="list-style-type: none"> Affordability and usage of machinery Availability of irrigation system Geolocation

Source: Adapted from GSMA AgriTech. (2020). The GSMA AgriTech Toolkit for the Digitisation of Agricultural Value Chains.

47 In low-income countries, 44 per cent of women do not have an ID, compared to 28 per cent of men. World Bank. (2019). Identification for Development: 2019 Annual Report.
 48 Ibid.



Digitising cooperative data to generate economic identities and enable access to finance

The Clinton Development Initiative (CDI), an NGO, brings smallholder farming communities together and organises them into small- and medium-sized cooperatives and business incubation hubs. Through their Community Agribusiness Approach, CDI provides training on best-fit and climate-smart agricultural practices, financial and agri-business management and links community cooperatives to local and international buyers, input suppliers and financial and governmental organisations to improve their incomes.

In Malawi, CDI partnered with agritech Farmforce to create digital economic identities and financial histories at the farmer and cooperative level that FSPs could use to assess credit risk. Farmforce is a cloud-based digital procurement solution that allows agribusinesses and

cooperatives to track interactions with farmers for crop procurement, as well as farmer payments and input supply, using an Android app. Examples of data points typically captured in the app include farmer ID, crop information, farm geolocation data, farm size, crop cycles and a photo of the farmer.⁴⁹

Since 2017, CDI has formed 15 officially recognised cooperatives supporting more than 30,000 farmers predominantly engaged in soybean production in Malawi.⁵⁰ The NGO provided more than \$500,000 in input loans across Malawi, Rwanda and Tanzania, with Farmforce tracking how much was given to each farmer and the repayment. Using the farmers' digital financial histories generated by Farmforce, CDI brokered a relationship between the cooperatives and Standard Bank to unlock post-harvest loans for farmers.⁵¹



49 Farmforce, Clinton Development Initiative, Standard Bank (2020), *Farmforce Case Studies: Building Access to Finance in Malawi*.

50 Ibid.

51 Ibid.

Remote-locking technologies for access to assets

Remote-locking technologies, or locks, have unleashed the power of asset financing in LMICs.

Because productive or life-transforming assets, such as farm machinery or electricity grids, are generally too expensive for the low-income households that need them, financial intermediation is necessary to lower the upfront costs. However, FSPs have long considered asset finance too risky, and relatively high loan amounts combined with a lack of collateral do not suit their risk appetite.

Locking technologies applied to physical assets allow an FSP to shut the device off remotely if certain conditions are not met, for example, instalment payments are not made. This means that the locked asset can be converted into collateral to secure the loan, therefore minimising losses for FSPs if the customer defaults.⁵² As soon as they pay back what is due, the device can be reactivated remotely. Locking technologies first showed promise for financing solar home systems (SHSs) in rural markets where decentralised energy service companies (DESCOs) combined flexible repayment options (via mobile money) with “lockable” SHSs that they control remotely to entice borrowers to repay. Evidence from a recent study in Uganda shows that this technology can enable providers to profitably serve low-income customers who lack traditional forms of collateral and have long been excluded from access to credit.⁵³

The success of PAYG solar companies has led to locking systems being tested on other electronic assets, such as smartphones and farm machinery, bringing asset finance to farmers through an innovative new business model. PAYG models combine remote locking with flexible digital payments that are tied to usage. Customers own the asset after paying for it in full. PAYG is better suited to low-value, non-productive assets such as household appliances and smartphones, since locking productive assets could affect customers’ income and ability to repay.⁵⁴ Other business models are better suited to productive assets, such as rent-to-own, which combines an initial down payment with flexible instalments and the ability to repossess the asset.⁵⁵ However, research in Uganda has found that most respondents are unaware of PAYG.⁵⁶ When it was explained, interviewees were initially interested in acquiring an SHS, but this interest dropped by more than a third when the locking system was explained. They considered it unfair or even counterproductive since they would be forced into debt to buy kerosene, making it more difficult to resume SHS payments.⁵⁷

Innovative partnerships built on APIs

The ability of FSPs to collaborate with non-financial players has become key to innovative business models for agricultural financing. APIs enable these partnerships by specifying a common technical language.

An API allows one software program to exchange information with another. APIs connect different providers and make the transfer of payments and related data possible, even though the providers’ software “do not speak the same language”. With an API, an organisation can open their data, communications, payments, banking or distribution

assets with third-party providers that register for access.⁵⁸ More specifically, APIs allow organisations to move money, use providers’ customer data, manage customers’ identities and consent and reach new customers through services like account opening, loan applications and customer service capabilities.

52 Mattern, M. (2020). *Innovations in asset finance. Unlocking the potential for low-income customers*. CGAP.

53 Gertler, P., Wolfram, C., and Green, B. (2020). *The Impact of School Fee Loans on Educational Outcomes in Uganda*. Innovation for Poverty Action in Mattern, M., and Garcia, A. (2021) *Flipping the Switch: How Locking Assets Unlocks Credit for the Poor*. CGAP

54 Mattern, M. (2020). *Innovations in asset finance. Unlocking the potential for low-income customers*. CGAP

55 Ibid.

56 Waldron, D. and Swinderen, A. M. (2018) *Remote Lockouts: The Dark Side of Pay-as-You-Go Solar?* CGAP

57 Ibid.

58 Hanouch, M., and McKay, C. (2020). *How to Engage Third Parties with Your Open APIs*, CGAP

APIs play a key role in enabling the provision of financial services to the unbanked or underbanked. They allow non-bank actors and fintech companies to fast-track their innovative solutions – new products, services or customer experience – by seamlessly integrating them with established finance and telecommunications providers. APIs also enable established FSPs and fintech companies to build additional services on top of mobile money or banking services, and provide opportunities to monetise these services.⁵⁹

Because agritech companies are increasingly providing financial services, APIs are key to create sustainable partnerships with agribusinesses and other value chain partners. Agri DFS providers can develop their own open API solution or use the GSMA Mobile Money API initiative,⁶⁰ which provides a modern harmonised API specification for mobile money transactions and management that is easy to use, secure and helps the industry speak the same language.



59 GSMA Inclusive Tech Lab: "Seamless Integration".
60 GSMA Inclusive Tech Lab: GSMA Mobile Money API



Agri DFS business models

Agri DFS business models depend on the digital solutions used to provide financial services to farmers, the number of partners involved and the complexity of the partnerships. This section examines five different business models for agri DFS:

- 1 Digitisation of savings groups:** Agri DFS providers⁶¹ build on established financial habits and community-based relationships to bring informal financial flows into the formal sector and generate financial histories for farmers.
- 2 Digitisation of credit processes:** FSPs deploy digital solutions within their current credit processes to reduce the costs and risks of serving farmers.
- 3 Digitisation of value chains:** Agri DFS providers use established farmer-buyer relationships and digital procurement data to estimate production and credit risks.
- 4 Embedded finance:** Agri DFS providers use new technologies and digital solutions to embed financial services in their platforms or digital solutions.
- 5 PAYG:** Agri DFS uses mobile money payments and remote-locking technologies to enable farmers without collateral to access assets.

61 In this report, agri DFS providers are defined as commercial organisations that provide formal or informal financial services to farmers. These include agribusiness buyers, FSPs, MMPs and agritechs.

The first three models build on existing financial services by digitising components of the customer journey or using digital data to enable agri DFS.

The last two are new digital models enabled by technological innovations (Figure 10).

Figure 10

Summary of agri DFS business models

Business model	Agri DFS	Target market	Enabling digital solutions	Lead provider	Examples
1 Digitisation of savings groups	Savings	Formal and informal value chains	Mobile money	MMP	M-Koba
				FSP	Eazzy Chama
2 Digitisation of credit processes	Credit	Formal and informal value chains	Mobile money/digital transformation solutions ⁵⁹	FSP	Musoni
3 Digitisation of value chains	Short-term input loans, cash advances	Formal value chains	Mobile money/alternative data	Agribusiness	Kamapim
				FSP	Advans
				MMP	MTN Rwanda
4 Embedded finance	Short-term loans, input loans	Formal and informal value chains	Mobile money/alternative data/APIs	Agritech	Apollo Agriculture
				MMP	Digifarm
5 PAYG	Asset financing	Formal and informal value chains	Mobile money/alternative data/remote locking	Agritech	SunCulture

Source: GSMA AgriTech.

Digitisation of savings groups

Traditional savings methods like savings groups are popular in rural settings, especially among women.⁶²

Savings groups typically consist of about 30 members who contribute variable amounts to a group fund, traditionally kept in a cash box, from which members can borrow. Members can access loans that are usually up to three times the amount they saved, have a maturity of one month and interest rates between 10 and 20 per cent a month. At the end of the cycle, usually

once a year, groups “share out”, with each member receiving their accumulated savings plus a share of accumulated interest. **Although savings groups are not tailored to farmers, they are playing an important role in developing a digital savings culture and enabling farmers in both informal and formal value chains to address short-term financing needs.**

62 In this report, these are defined as solutions that digitise credit processes and other business areas such as finance, marketing, customer service, etc., to change how the business operates and delivers value to farmers.

63 Women represent approximately 80 per cent of savings group members worldwide. Rickard, K. and Johnsson, A. (2018). *Women’s Empowerment and Savings Groups: What do we know?* SEEP, Nathan, FSD Africa and UK Aid.



Digital agri wallet providers are using savings groups to reach farmers and reduce operational costs

Digital agri wallets, which allow farmers to transact with various actors in the agriculture ecosystem,⁶⁴ are evolving from agricultural payment solutions to savings tools that allow farmers to save towards a goal (e.g. inputs), develop a transaction history, link to savings accounts at FSPs and access a wider range of financial products, such as credit. myAgro is a social enterprise launched in 2011 that allows farmers in Mali,

Senegal and Tanzania to purchase high-quality inputs on layaway. myAgro is currently experimenting with an innovative digital model that uses mobile money, a call centre to provide advisory services and existing savings groups to enrol farmers. myAgro estimates that these changes could lower their acquisition and field-related costs by up to 60 per cent.⁶⁵

Digitising and linking savings groups to the formal financial system capture significant funds and build farmers' financial histories. For instance, it is estimated that in Kenya nearly 62,000 savings groups mobilise more than \$12 million annually.⁶⁶ Digital solutions that digitise group records and transactions are proliferating. They are designed to mirror how savings groups traditionally operate by digitising each process. Group managers monitor records, track payments and approve pay-outs securely and transparently. Digital savings groups can be implemented with both USSD and apps, and use mobile money to enable savings group members to contribute and check their individual and group balances. To reap the long-term benefits of financial inclusion, these solutions will need to link groups and member wallets to a formal savings account with an FSP. This will generate a transaction history and unlock new opportunities to access a wider range of financial products, such as credit.

MMPs, FSPs and fintechs have developed digital savings group solutions. For instance, Vodacom Tanzania launched M-Koba in partnership with TPB Bank in 2019. The M-Koba account, a product accessible only via M-Pesa, is created via USSD by the group leader who adds members to the group using their mobile numbers. No fees are incurred by group members when sending money from their M-Pesa wallet to the M-Koba group savings account. Each member can request the group's savings balance and request loans automatically from the system. In addition to driving financial

inclusion, M-Koba has increased overall stickiness and usage of M-Pesa and Vodacom services.⁶⁷

In 2017, Equity Bank Kenya launched Eazzy Chama, an app to manage financial and non-financial records of savings groups. To use Eazzy Chama, group members need to open an account at Equity Bank. The account can be accessed through Equitel, Equity Bank's mobile virtual network operator using the Airtel Kenya network as its carrier. In Uganda, the fintech Ensibuuko offers SACCOs and savings groups a platform to digitise processes, records and member transactions. Thanks to a partnership with MTN Mobile Money and Airtel Money, Ensibuuko users can withdraw cash, make deposits or repay loans using their existing mobile money account.⁶⁸

Partnerships between MMPs, FSPs and NGOs play an important role in scaling up the digitisation of savings groups. About 20 million people are active members of savings groups in Africa alone, and these groups are supported by hundreds of local and international NGOs.⁶⁹ NGOs can help FSPs expand further into rural areas, reach new savings groups and test credit products tailored to group members.⁷⁰ For instance, CARE has supported more than 350,000 village savings and loans associations (VSLAs). Based on this experience, CARE developed Chomoka, an app that enables digital record keeping and provides an easy way to make contributions, receive loans and calculate group disbursements.⁷¹ In 2016, CARE and NMB Bank in Tanzania launched a partnership to link digital savings groups to formal savings accounts through mobile money.⁷²

64 GSMA AgriTech. (2020). *Digital Agriculture Maps*.

65 CGAP webinar: *Is there a Business Case for Digital Financial Services for Women Farmers?*

66 Bankable Frontier Associates and Bill & Melinda Gates Foundation. (2014). *Focus Note 1: Outcompeting the Lockbox – Linking Savings Groups to the Formal Financial Sector*.

67 GSMA Connected Women. (2020). *M-Koba: Vodacom Tanzania's Innovation to Digitise Savings Groups*.

68 GSMA. (2020). *State of the Industry Report on Mobile Money 2019*.

69 The SEEP Network. (2020). *The power of savings groups: an underutilised platform for local economic development in Africa*.

70 Savings at the Frontier. (2019). *Project Briefing: NMB Bank – Bridging the Unbanked*.

71 See: <https://chomoka.care.org/>

72 NMB Bank. (2016). *Press release: Partnership launched for financial inclusion of thousands of community groups nationwide*.

Digitisation of credit processes

FSPs have been digitising every step of their credit processes, which has increased operational efficiencies, improved credit risk assessments and reached new market segments such as farmers (see Figure 11).

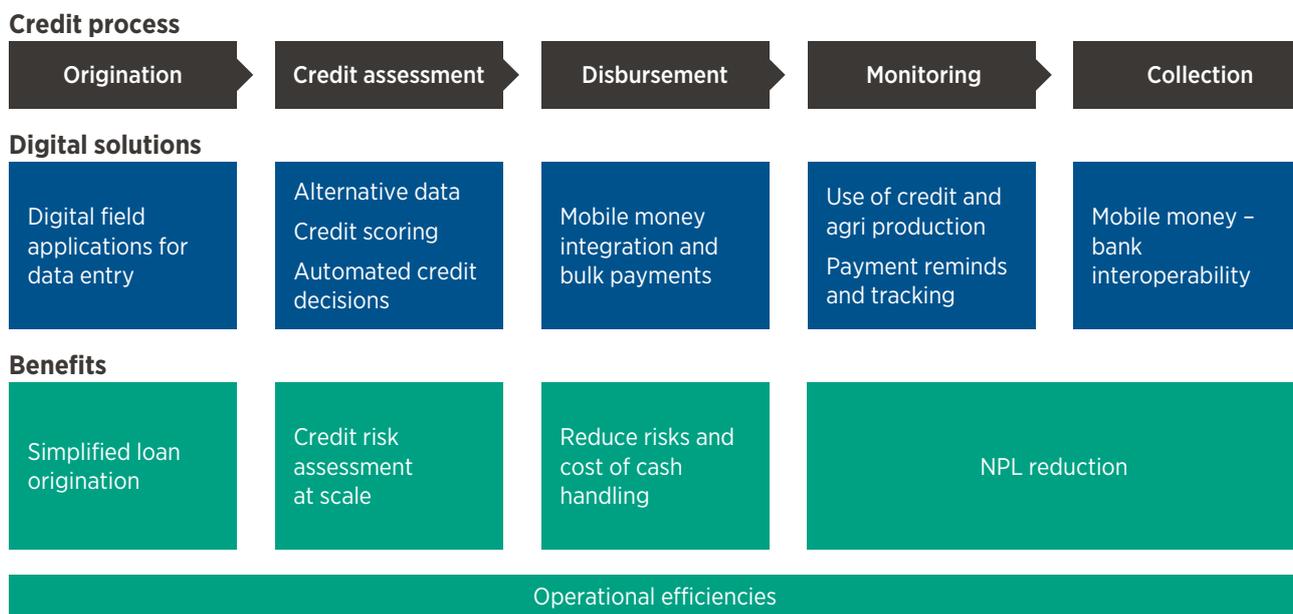
Some FSPs, such as Musoni in Kenya (see case study below), use digital field applications (DFA) to digitise field operations via roving agents.⁷³ These operations fall under four categories: data entry (collecting farmer profiles, loan applications, etc.), savings (collection of deposits and withdrawals), loans (credit scoring by loan officer in the field, disbursement, repayment and payment reminders) and account management (statements, balances, transaction receipts, etc.).

Another example is MFI BRAC in Myanmar, which increased staff productivity by 40 to 60 percent after digitising rural customers' loan origination.⁷⁴

In Nepal, UNCDF partnered with DFS provider Prabhu Management to digitise payment tracking and monitoring of dairy cooperatives in Kavre and Bhaktapur districts. Prabhu Management developed a digital milk ledger, a cloud-based record keeping solution and integrated their bulk payment platform with their mobile wallet Prabhu Pay. As of March 2020, the pilot project had digitised 20 dairy cooperatives, registered nearly 5,000 dairy farmers in the system and enabled more than 1,500 farmers to save on their mobile wallets.⁷⁵ The next step will be developing and testing a credit-scoring model that uses farmers' procurement transactions and financial histories.

Figure 11

Benefits of digitised credit processes



Source: GSMA AgriTech.

Loan origination and monitoring data collected directly by FSPs through digital solutions can be insufficient for credit scoring and limit the potential for automation and scale. It is, therefore, important for FSPs to establish partnerships with agribusinesses

and agritechs to acquire the farm and farming data necessary to estimate and monitor production and credit risks, and to leverage their field presence and relationships with farmers.

73 MasterCard Foundation, UNCDF and PHB Development. (2016). How to succeed in your digital journey: A series of toolkits for financial service providers.
 74 Leshner, N., Okumura, A. and Bogatu, I. (2021). Digital Credit for Smallholder Farmers: Lessons Learned from the Field. World Bank Group, Korean World Bank Partnership Facility.
 75 UNCDF. (2020). When digitising the agricultural value chain improves financial inclusion in Nepal.

CASE STUDY

Musoni: Improving operational efficiencies with digital agriculture solutions

FOUNDING YEAR

2010

MARKETS

Kenya

PRODUCT TYPE

Short- and long-term loans

TARGET FARMERS

Formal and informal

DATA COLLECTION METHOD

Field agents

CREDIT SCORING

In-house

REVENUE MODEL

Interest

Key features

Musoni Microfinance Ltd. (Musoni) was established as a cashless, data-driven organisation to serve the unbanked. Kilimo Booster, a loan product for farmers designed in partnership with the Grameen Foundation, was one of their first products. Loans range from \$45 to \$27,500⁷⁶ and repayment periods are flexible up to 36 months to cater to farmers’ diverse needs and crop cycles. Musoni’s loan officers capture loan applications and collect farmers’ KYC, farm and farming data directly in the field through a DFA. The application is integrated with the core banking system through a web portal accessible by staff at the branch who can review and approve loan applications initiated in the field.

Key lessons

Turnaround time decreased from 72 to six hours on average and the caseload per loan officer increased by 68 per cent.⁷⁷ Each loan officer can serve up to 300 customers.⁷⁸ Musoni uses the mobile money transfer service M-Pesa for loan disbursement and repayments, which further reduces the costs of providing credit to farmers. Musoni has reduced their overall operating costs by 30 per cent.⁷⁹ Collecting data directly instead of in partnership with an agribusiness or agritech enables Musoni to build a long-term relationship with each farmer and have a better understanding of their needs. Since Musoni has not collected enough data on farmers to build an accurate in-house credit scoring model, they rely on more traditional credit risk mitigation approaches such as loan officer assessments, and alternative collateral requirements such as a group guarantee for group loans or moveable assets for individual loans.

⁷⁶ Exchange rate: 1 USD=109.10 KES

⁷⁷ Channels & Technology, Accion. (2015). [Digital Field Applications: Musoni Case Study](#).

⁷⁸ Mastercard Foundation Rural and Agricultural Finance Learning Lab. (2017). [Video: Going digital to reach the unreachable](#).

⁷⁹ Ibid.

Digitisation of value chains

Agribusiness buyers and cooperatives are increasingly using digital solutions, such as digital procurement tools, to capture and analyse data about their operations and transactions with farmers. Examples of typical data points include the farmer's name, ID (when available) and photo, farm geolocation data and farm size, crop mix, quantity and quality of production and selling prices. This data can be analysed to monitor growing practices and the farmer's productivity, estimate cash flows and track disbursements and repayments of advances and loans to farmers transparently.

Agribusinesses, FSPs and MMPs are all benefiting from digitisation as they seek to serve farmers in formal value chains. Analysis of digital procurement data enables service providers to design agri DFS that can be tailored to the crop cycle and meet farmers' agricultural finance needs, such as short-term loans in the form of cash advances at certain points in the growing season.

Digital payments and procurement solutions allow agribusinesses to reduce their costs and risks to provide agri DFS to farmers in cash. Agribusinesses have an interest in pre-financing inputs for farmers as this can help to increase productivity and crop quality, improve farmer loyalty and minimise side-selling. They build on their deep understanding of agricultural activities and farming practices to provide agri DFS to farmers that are relevant to their agricultural needs and cash flows. They also draw on their established

relationships with farmers to reduce the operational costs of data collection, as well as their credit risk by automatically deducting repayments at harvest. Digital solutions help agribusinesses to monitor disbursement and repayments efficiently, and to avoid handling large amounts of cash.

Agribusinesses have typically limited their financial offering to input financing and cash advances since they do not have the financial expertise to design, deliver and assess the risks of more sophisticated loan products at scale. Their operations are often restricted by liquidity constraints since they use their own capital to lend to farmers, and by the staff resources required to manage the service. Agribusinesses also do not meet the regulatory requirements to offer a diverse set of financial products, such as savings, credit and insurance.

To overcome these limitations and provide additional financial services to farmers, agribusinesses are either exploring new models and partnership arrangements (see case study on Kamapim in Papua New Guinea) or acquiring a licence to provide agri DFS directly (see case study on Ibero in Uganda). In a partnership model, agribusinesses contribute their farmer relationships and data, secure market access and, in some cases, a financial guarantee for these partnerships. They work with agritechs to acquire digital procurement solutions and/or data analytics capabilities, and with FSPs (and MMPs where possible) to provide a range of financial services.

CASE STUDY

Kamapim: Achieving financial inclusion for farmers through digitisation and economic identities

FOUNDING YEAR

2018

MARKETS

Papua New Guinea

PRODUCT TYPE

Labour loan

TARGET FARMERS

Formal (vanilla value chain)

DATA COLLECTION

METHOD

Field agents

CREDIT SCORING

Outsourced

REVENUE MODEL

Loan application fees; increased sourcing of vanilla

Key features

The GSMA AgriTech programme is currently supporting Kamapim, an agribusiness operating in the organic vanilla value chain in Papua New Guinea, to fully digitise farmers’ profiles, transactions and payments in collaboration with agritech Field Buzz. The data will be shared with MFI MiBank to enable access to credit for farmers.

Key lessons

Customer research has shown that farmers select buyers based on convenience. They are unaware of market prices beforehand, and reaching a buyer can be costly and unsafe given the country’s infrastructure challenges. Farmers are interested in receiving loans to expand their vanilla farms and identify labour loans as their primary need. However, giving farmers access to their loans is a key challenge for Kamapim and their partners due to low mobile phone penetration, lack of digital literacy and thin agent networks in rural areas.

Future roadmap

Kamapim, Field Buzz and MiBank are currently designing a credit-scoring model and loan product for farmers who sell vanilla to Kamapim and attend their training on agricultural practices. Thanks to the Field Buzz digital solution, Kamapim will be able to feed data into the credit-scoring model, also hosted by Field Buzz, and monitor farmer activities and loan repayments on behalf of MiBank.

CASE STUDY

Ibero Farmer Services Unit: Meeting the financing needs of coffee farmers at scale

FOUNDING YEAR

2017

MARKETS

Uganda

PRODUCT TYPE

Input financing, cash advances

TARGET FARMERS

Formal (coffee value chain)

DATA COLLECTION

METHOD

Field agents

CREDIT SCORING

In-house

REVENUE MODEL

Interest (can be paid through coffee deliveries)

Key features

Ibero Uganda is a company of Neumann Kaffee Gruppe (NKG), an international green coffee service group. It provides three key offerings to farmers: soil analysis and fertilisers on credit; mobile money cash advances; and advisory services in agriculture and business best practices. Through its Farmer Services Unit (FSU), Ibero provides input financing and mobile money-enabled cash advances that are capped at the volume of coffee delivered in the previous season. It partners with agritech Field Buzz, which provides a smartphone-based digital procurement solution to support the entire loan process, from loan application and collection of farmer, farm and farming data, to contract signing, farmer monitoring and repayment tracking. The agribusiness then uses the data to analyse farmer credit risk through a credit-scoring model.

Key lessons

Digitising the credit process allowed Ibero to reach more farmers. To date, more than 9,000 farmers have received financial services and more than 25,000 have benefited from other services offered by the Ibero FSU. Cash advances have also proved to be an effective incentive for farmers to sell a larger share of their coffee production to Ibero, which in some cases increased from 10 per cent to 70 per cent.⁸⁰

The Ugandan coffee buyer acquired a Tier 4 MFI licence to meet regulatory compliance requirements and offer financial services to coffee farmers at scale.

80 NKG BLOOM Global. (2020). [What NKG BLOOM learned from efforts in Mexico and Uganda.](#)

FSPs seeking to provide agri DFS to farmers (see case study on MFI Advans in Côte d’Ivoire), have partnered with value chain actors such as agribusinesses and cooperatives that deploy digital procurement solutions. Digital procurement data is essential to create economic identities for farmers and support accurate and efficient credit-scoring

models. However, by tracking loan disbursements and repayments transparently, digital procurement solutions can help FSPs monitor large numbers of small loans directly rather than relying on cooperatives to extend loans to farmers. Through these partnerships, FSPs can add many farmers to their books, monitor performance and build credit histories.

CASE STUDY

Advans: Moving to a digital value chain approach

FOUNDING YEAR
2005

MARKETS
Côte d’Ivoire

PRODUCT TYPE
Input financing, school loans, savings

TARGET FARMERS
Formal (cocoa value chain)

DATA COLLECTION METHOD
Field agents, mobile money

CREDIT SCORING
In-house

REVENUE MODEL
Interest

Key features

In Côte d’Ivoire, the MFI Advans has adopted a B2B2C model to extend input financing to cocoa farmers through farmer cooperatives. Input loans are provided in-kind, Advans pays input suppliers directly and the cooperatives repay Advans by deducting the loan amount from farmers’ procurement payments when they deliver their cocoa. Cooperatives play a crucial role in access to finance for farmers since they collect farmers’ loan applications and cash collateral, distribute the inputs and oversee loan repayments.

In 2017, Advans designed a fully digital school loan for farmers that is accessible through a USSD channel in partnership with MTN Côte d’Ivoire. Although the loan is intended to cover farmers’ non-agricultural needs, it is still designed to fit the cocoa crop calendar, with the loan disbursed at the start of the school year during a period of negative cash flow and repaid in instalments during harvest months.⁸¹ Advans used a credit-scoring model for the school loans that combined agricultural and financial data.

Key lessons

The collaboration with cooperatives allows Advans to reduce their operational costs and provide affordable loans to farmers who live far from branches. However, this model does not provide data that could be used to assess farmers’ creditworthiness at scale through a scoring model. To overcome the data challenge, Advans is studying the feasibility of improving individual repayment monitoring or creating data-sharing partnerships with other stakeholders.

Future roadmap

Advans has begun to work on optimising the input loan model in partnership with Barry Callebaut and with the support of IDH Launch Pad.

81 European Microfinance Platform. [The European Microfinance Award 2018 Finalists: Advans CI](#).

With a large customer base and established customer relationships, MMPs may be able to provide agri DFS to farmers at scale and increase customer loyalty in rural areas. MMPs also have other assets that could support the provision of financial services, including mobile money data, far-reaching distribution channels, brand recognition, brand stickiness and the potential to cross-sell other products, such as airtime and data. However, MMPs do not have the expertise to design financial products for farmers and assess credit risks on their own.

To overcome their lack of agricultural and financial expertise, some MMPs have adopted a value chain partnership approach. MMPs build partnerships with agribusinesses and cooperatives to acquire data

captured through digital procurement solutions, and then combine it with mobile money data to develop credit-scoring models in partnership with FSPs. The GSMA AgriTech programme is working with MTN Rwanda and Vodacom Tanzania to develop agri DFS using a value chain partnership approach.⁸²

MMPs pursuing value chain partnerships primarily provide unsecured short-term loans that are better suited to the agricultural needs of farmers in value chains with short crop cycles and frequent payments, such as dairy or tea. These value chains are also a better fit for traditional MMP business models based on transaction fees,⁸³ and a preferred entry point to test new products, such as agri DFS.



82 GSMA AgriTech. (2021). Introduction to the Innovation Fund for Digitisation of Agricultural Value Chains.
83 GSMA Mobile Money. (2016). Rethinking the Mobile Money Business Model to Capitalise on Adjacencies.

CASE STUDY

MTN Rwanda: Adapting instant loans to farmers' needs through value chain digitisation

FOUNDING YEAR

1998 (launched mobile money in 2010)

MARKETS

Rwanda

PRODUCT TYPE

Short-term input loan

TARGET FARMERS

Formal

DATA COLLECTION

METHOD

Mobile money

CREDIT SCORING

Outsourced to partner FSP

REVENUE MODEL

Interest share

Key features

In Rwanda, MTN is designing a digital input credit product for farmers in partnership with FSP NCBA through the GSMA AgriTech Innovation Fund. Building on the experience of MoKash, a digital savings and instant loan product for the mass market launched in 2017, MTN and NCBA aim to become relevant to farmers by offering bundled DFS, including savings, short-term loans and insurance. With a large customer base and trusted and recognised brand in the country, MTN Rwanda is in charge of KYC verification, marketing and distribution, customer engagement and data collection. NCBA developed an in-house credit-scoring model for digital lending based on more than 160 mobile money variables, including the recency, frequency and monetary value of mobile money transactions.

Key lessons

To apply the credit-scoring model to farmers, more data is needed on farmer profiles, farm data and farming activities. MTN Rwanda is building partnerships with agribusinesses and cooperatives to digitise their data collection processes and automate data sharing. Cooperatives currently capture data on their members' profiles and transactions in an Excel sheet, but by the time the data is used by NCBA for credit scoring, it is about two months old. Digitisation is therefore critical to creating a reliable credit-scoring model that combines mobile money and farming data.

Future roadmap

This new model is still in the development stage and will be tested in value chains with a short crop cycle, such as tea, to minimise exposure to credit risk.



Agritechs using digital value chains to provide agri DFS: The case of Verqor

To reduce operational costs of agri DFS, agritechs can adopt a business-to-business-to-consumer (B2B2C) model that enables them to partner with agribusiness and use their digital procurement data. In Mexico, agritech Verqor has used a value chain approach that links input suppliers, FSPs and agribusinesses in

an input financing scheme that minimises credit risk through automated repayments at delivery. However, this model only works for farmers in formal value chains, and automated repayments limit the ability of the agritech to test a credit-scoring model.



Embedded finance

Agritech, together with a handful of MMPs, are using an embedded finance approach to develop specialised offerings for farmers. Embedded finance uses API-driven banking and payments services to integrate financial services in other environments and ecosystems.⁸⁴ Embedded finance models are typically applied to holistic digital agriculture offerings or service bundles that combine financial services with other digital agriculture use cases within the same solution or platform.⁸⁵

Embedded agri DFS provided by agritech typically bundle savings wallets and input financing with agricultural insurance, digital advisory services and market access. Access to quality inputs is one of the most immediate needs for farmers that, if met, has great potential to increase productivity and incomes and, in turn, reduce credit risk. At the same time, agritech can benefit from the lower cost of aggregating input demand and buying in bulk from input suppliers and selling to individual farmers.

In this model, agritech not only cater to farmers in formal value chains, but also to farmers in informal value chains where the farmer-buyer relationship is weaker and data plays a more important role in assessing productivity, market access and credit risk. Agritech deploy field agents to capture farmer, farm and farming data via DFA, and use mobile-based tools such as call centres, SMS, IVR or apps, as well as remote-based tools such as satellites, weather stations or sensors. They then use their data management and analytics capabilities to generate economic identities for farmers, develop credit-scoring models and design agri DFS that address traditional barriers to financial inclusion, such as KYC verification and unsuitable repayment cycles.

Despite extensive use of data and digital solutions, field agents still play a crucial role in customer acquisition, financial and digital literacy training, brand awareness and sustaining usage. However, field agents also represent a significant operational cost and a barrier to growth and scale for small companies. Agritech are taking different approaches

to reduce their reliance on field agents while not losing touch with farmers. For instance, Apollo Agriculture in Kenya combines commission-based field agents with call centres for advisory, and complements farmer data collected at registration with satellite and weather data for credit scoring. Kilimo Tija+ in Tanzania relies on savings groups for customer acquisition and trains local input suppliers in their network to collect data for farmer profiling.

Agritech-led embedded finance is still at a nascent stage; agritech have not yet developed partnerships with FSPs and are still assuming the credit risk. They often use their own capital⁸⁶ to lend to farmers and test their credit-scoring models (“on-balance sheet lending”). As they grow, access to capital becomes a key barrier to scale. They need to rapidly raise low-cost funds to satisfy the growing demand of farmers for affordable loans. However, this is a time-consuming and resource-intensive endeavour for agritech, which are usually small companies with limited resources. For instance, Agri-wallet, an agritech that provides a blockchain-enabled digital wallet account and overdraft facility to farmers, buyers and input suppliers in Kenya, faced cumbersome procedures and unrealistic growth projections and return expectations that were designed for much larger funds. The company is now considering partnerships with other organisations that could provide access to capital.

Agritech seeking to scale are exploring different options to address these barriers, including partnerships with FSPs, acquiring a non-banking licence and creating a separate entity to take over the lending side of the business. Ricult, an agritech in Pakistan that provides an integrated solution to farmers that includes advisory services, an input marketplace, crop selling and input financing, is considering partnering with MFIs or acquiring a non-banking licence to scale up their model. In Tanzania, Kilimo Tija+ (see case study) uses APIs to integrate their digital agri-wallet with formal savings accounts at FSPs. Data generated through the current solution will allow partner FSPs to provide credit products to farmers using Kilimo Tija+.

84 OpenPayd. (2020). What is Embedded Finance?

85 Digital platforms facilitate direct interactions between multiple users. Digital solutions are digital products/services provided by a company directly to the end user. USAID Feed the Future, ISF Advisors, Mastercard Foundation Rural and Agricultural Finance Learning Lab. (2021). **Agricultural “Platforms” in the Digital Era: Defining the Landscape.**

86 Company capital could consist of founders’ personal resources, grant funding from donors or early-stage investments.

CASE STUDY

Kilimo Tija+: Linking farmers' savings groups to formal financial savings accounts

FOUNDING YEAR

2018

MARKETS

Tanzania

PRODUCT TYPE

Input savings, advisory and marketplace

TARGET FARMERS

Formal, organised in savings groups

DATA COLLECTION

METHOD

Field agents, transactional data wallet-to-account

REVENUE MODEL

Mark-up on inputs

Key features

Kilimo Tija+, developed by DMA Limited in Tanzania, provides farmers with a bundled solution that includes a digital agri wallet to save for input purchases; digital advisory services via a range of delivery channels, including the Kilimo Tija+ app, USSD and SMS; and access to a marketplace to sell produce and buy inputs from affiliated vendors. The Kilimo Tija+ wallet is linked to M-Pesa and HaloPesa mobile money accounts, and TPB Bank savings accounts. When farmers receive payments from the sale of their crops through mobile money or bank transfers, they can make deposits of any amount in the Kilimo Tija+ digital agri wallet. These funds can be used for future input purchases through Kilimo Tija+'s network of village-based input suppliers. To date, Kilimo Tija+ has reached more than 1,200 savings groups and opened group bank accounts for 21,000 farmers.

Key lessons

Kilimo Tija+ builds on existing savings groups, so farmers that do not meet a bank's KYC requirements can open an account at a partner bank using their savings group credentials.

On their own, savings are not a sufficient value proposition for farmers to sustain wallet usage over time. Therefore, savings are bundled with other services, such as agricultural advisory, access to an input and output marketplace and airtime purchase.

Savings groups also play an important role in registering and educating farmers, which reduces the need for an extensive field agent network. However, field agents are still deployed to fill financial and digital literacy gaps, monitor savings groups and digitally capture their financial activities and records.

Future roadmap

Data collected and generated through Kilimo Tija+ will be used to design additional services for farmers, including credit products. Integration with more MMPs and FSPs is also on-going.

CASE STUDY

Apollo Agriculture: Using alternative data sources to enable access to finance for farmers in informal value chains

FOUNDING YEAR

2016

MARKETS

Kenya

PRODUCT TYPE

Input financing (in-kind)

TARGET FARMERS

Informal

DATA COLLECTION METHOD

Field agents, satellite and remote sensing

CREDIT SCORING

In-house based on machine learning

REVENUE MODEL

Mark-up on inputs and interest

Key features

Apollo Agriculture offers a short-term input credit product bundled with agronomic information and advice and weather index insurance.⁸⁷ The company uses alternative data sources to perform credit risk assessments.

From customer enrolment to credit risk assessment, disbursement and repayment, Apollo’s entire loan process is fully digitised. They combine farm and farmer data collected by their agents with satellite data to predict value chains, crop yields, crop cycles, housing ownership, animal/livestock ownership and road access. Apollo then applies machine learning to assess creditworthiness and design credit products tailored to farmers’ production cycles. The loan is disbursed and repaid using mobile money.

Key lessons

Unlike other providers, Apollo has chosen to target smallholder farmers who work in informal value chains despite the higher customer acquisition costs and operational expenses. Remote data collection techniques such as satellite data, and call centre on-boarding help to reduce these costs. When data needs to be collected on the ground, Apollo relies on a network of commission-based agents rather than paid staff to further reduce operational costs.

Future roadmap

In May 2020, Apollo raised \$6 million in Series A funding. The company is also securing working capital funding to finance loans provided in-kind, and grant funding to support research and development (R&D).⁸⁸

87 Strategic Impact Advisors, MasterCard Foundation and IFC. (2018). *Digital Financial Service for Agriculture Handbook*.
 88 Techpoint.africa. (2020). [How Apollo Agriculture is solving small-scale farmers’ credit problems in Kenya](#)

As MMP business models are transitioning from a basic transactional to an ecosystem-driven model⁸⁹, a handful of MMPs provide dedicated agri DFS embedded within bundled offerings or digital platforms. For instance, Telenor in Pakistan provides crop insurance, agricultural advisory and tele-veterinary services.⁹⁰ Econet in Zimbabwe is providing a range of digital solutions for farmers including weather indexed insurance and access to farming equipment through its Ecofarmer platform.⁹¹ The most notable example, presented in the case study below, is Safaricom's DigiFarm in Kenya.

In a platform approach, MMPs make their infrastructure available to other service providers via API integration, allowing them to reach many farmers at low operational costs. The service providers, in turn, provide the content, digital agriculture solutions and field presence, where needed, to collect data and deliver a wide range of financial and non-financial services to farmers. In Kenya, DigiFarm includes advisory services and

access to inputs, buyers and value-added services, such as soil analysis, insurance and input loans. These services are provided in collaboration with other companies. Input loans are extended to farmers through a partnership with FarmDrive, an agritech that specialises in credit-scoring models for farmers, and Stanbic Bank.

An embedded finance business model that builds on an MMP platform has great potential to scale. This is due to the large customer base and marginal costs to acquire new customers and increase financial inclusion for farmers through partnerships with FSPs and insurance providers. MMPs also have the resources to negotiate new partnerships and serve farmers in both formal and informal value chains. However, it can be challenging for MMP platforms to scale since they must be customised to different types of farmers, be capable of managing different seasonal and geographical demands and be able to sustain engagement and usage in the off-season.⁹²



89 GSMA Mobile Money. (2021). Profitability 2.0: Ecosystem-driven business modelling & the future of mobile money margins.

90 www.telenor.com.pk/digital-products/khushaal-watan/

91 www.ecofarmer.co.zw

92 ISF Advisors, Mastercard Foundation Rural and Agricultural Finance Learning Lab. (2021). Agricultural "Platforms" in the Digital Era: Defining the Landscape.

CASE STUDY

DigiFarm: Expanding farmers' access to relevant services through a platform approach

FOUNDING YEAR

2017

MARKETS

Kenya

PRODUCT TYPE

Short-term inputs or harvest loans

TARGET FARMERS

Formal

DATA COLLECTION

METHOD

Field agents and mobile

CREDIT SCORING

Outsourced

REVENUE MODEL

Transaction fees, interest

Key features

DigiFarm leverages the wide reach of Safaricom's M-Pesa to provide an integrated mobile solution for smallholder farmers that is accessible from a basic feature phone. The platform includes advisory services, access to inputs, buyers and value-added services, such as soil analysis, insurance and credit products. DigiFarm selects partners strategically to expand their product offering and complement their lack of field force and agricultural background. For instance, DigiFarm partners with the Kenyan Livestock Producers Association and Africa Instore Solutions to on-board and activate farmers and provide extension services.⁹³ The platform also creates economic identities for farmers through a combination of farmer, farm and farming data provided by farmers at registration, and DigiFarm data on farmers' phone and mobile money usage. Farmers' economic identities become richer as they engage with different services on the platform.

Key lessons

The input loan product initially offered a 30-day repayment term, but this was not sufficient for many borrowers with longer crop cycles. DigiFarm revised the product to offer multiple repayment options up to 120 days to accommodate farmers' different capital needs and cash flows and to reduce credit risk.⁹⁴

Since launch, DigiFarm has more than 1.3 million registered users, 38 per cent of whom are women. Access to input loans and advisory services are the most used and valued services on the platform. Human contact for on-boarding and training is preferred and contributes significantly to the use of DigiFarm's loan service. Bundling loans with market access and advisory on precision agriculture has a positive impact on farmers in terms of capacity building and higher incomes. DigiFarm users have also started using mobile wallets as their primary savings platform.⁹⁵

⁹³ GIZ, Mercy Corps AgriFin and Dalberg. (January 2021). [Digital Agricultural Platforms. Blueprints Deep-Dive Report.](#)

⁹⁴ DigiFarm, Mastercard Foundation and Mercy Corps AgriFin Accelerate. (2019). [DigiFarm: a digital platform for farmers. Case study.](#)

⁹⁵ Mercy Corps AgriFin, Busara and Bill & Melinda Gates Foundation. (2021). [DigiFarm Panel Study.](#)

Pay-as-you-go

Pay-as-you-go (PAYG) models that use mobile money and remote-locking technologies are enabling access to productive assets for farmers, such as farm equipment and irrigation systems. Agritechs are PAYG providers for farmers, who usually make a down payment on the agricultural asset and pay off the remainder in instalments over a fixed period.⁹⁶ In this model, remote-locking technologies allow agritechs, and FSPs involved in this model, to interrupt service, for instance, electricity or irrigation, if the farmer is in arrears. These technologies provide an incentive for farmers to keep up with their payments while also reducing the cost of servicing the loans for FSPs.

This model is a potential solution to the on-going exclusion of farmers from asset-based financing.

Farmers who do not have collateral can acquire assets that boost their productivity while also building their credit history, enabling them to take out larger and longer term loans. PAYG financing is available to farmers in both formal and informal value chains. SunCulture (see case study) is an example of a PAYG model that enables farmers to acquire solar-powered water pumps.

The potential of the PAYG model to scale depends on the liquidity and capacity of agritechs to serve large numbers of farmers. Currently, agritechs that provide PAYG solutions acquire the assets and lend to farmers with their own capital. Partnerships between agritechs and FSPs would allow this model to grow and scale while also supporting formal financial inclusion for farmers.

CASE STUDY

FOUNDING YEAR

2012

MARKETS

Kenya

PRODUCT TYPE

Asset financing

TARGET FARMERS

Formal and informal

DATA COLLECTION

METHOD

Farmer application and remote sensors

CREDIT SCORING

In-house

REVENUE MODEL

Mark-up on assets and interest

SunCulture: Applying PAYG models to productive agricultural assets

Key features

SunCulture provides PAYG solar-powered irrigation pumps to farmers in Kenya on credit that can be repaid for up to 36 months.⁹⁷ The company assumes most of the credit risk and has secured a second loss facility to cover residual risk. The pumps can be remotely locked in the event of non-payment. SunCulture irrigation systems are marketed directly to customers through phone sales and a network of agents in Kenya. The company also provides training, soil analysis and agronomy support to their customers via mobile phone.

SunCulture combines farm and farmer data collected at the application stage with data on pump efficiency and solar battery storage collected through remote sensors. This data allows SunCulture to provide farmers with advice on using irrigation more efficiently in different weather conditions.

Key lessons

SunCulture has recently secured \$11 million in funding to expand across Africa.⁹⁸

⁹⁶ Mattern, M. (2020). *Innovations in asset finance. Unlocking the potential for low-income customers*. CGAP.

⁹⁷ SunCulture products: specifications and pricing.

⁹⁸ SunFunder (18 March 2021). *Groundbreaking \$11m syndication for SunCulture to expand solar irrigation*.

The potential of agri DFS business models to scale

The agri DFS business models featured in this report all rely on partnerships between organisations that provide services to farmers. Each of the models has

different potential to scale depending on the digital solutions used, the partners involved and the complexity of the data-sharing arrangements (Figure 12).

Figure 12

The potential of agri DFS business models to scale



Source: GSMA AgriTech

The digitisation of savings groups enables members to use mobile money and generates significant transactional data for credit scoring. FSPs and MMPs using this model would benefit from partnerships with NGOs, which would open access to many savings groups. Several international NGOs, such as CARE, PLAN and WorldVision, as well as local NGOs, support savings groups with financial and digital literacy, among other services. Partnerships between agri DFS providers and NGOs can help to educate members, demonstrate the value of the digital solution and build trust. Partnerships could also provide additional data points on savings group members and add crucial word-of-mouth marketing to more traditional marketing and distribution channels. Depending on the size of the NGO, agri DFS providers might need to partner with several in a market to reach scale.

FSPs and MMPs providing agri DFS under the digital value chain model need to partner with multiple agribusinesses to reach farmers and access agriculture-related data points. Each agribusiness partner can only reach a certain number of farmers depending on their operational capacity and sourcing needs. The potential to scale these solutions, including the addition of agri DFS to their service bundle, depends on the ability of service providers to expand their offering to more agribusinesses and value chains. For example, through the GSMA Innovation Fund for the Digitisation of Agricultural Value Chains, MTN Rwanda and Vodacom Tanzania are providing digital procurement solutions to three local agribusinesses.⁹⁹

⁹⁹ The GSMA Innovation Fund for Digitisation of Agricultural Value Chains

The digitisation of credit processes also relies on partnerships with agribusinesses to reach scale.

FSPs providing agri DFS under this model reduce the cost of reaching farmers by using digital solutions at each step of the credit process. However, they often fail to generate enough data for credit scoring. Partnerships with agribusinesses, cooperatives or input suppliers enable FSPs to reach large numbers of farmers and generate agriculture-related data to fully automate credit risk assessments. This would allow FSPs to further reduce the cost of reaching farmers and increase revenue per farmer served.

In the absence of such partnerships, this model can be a challenge to scale up.

Embedded finance and PAYG models have the greatest potential to scale when they combine the operational efficiencies of digital solutions with FSPs' access to capital and credit risk assessment expertise and MMPs' far-reaching distribution channels.

Agritechs adopting an embedded finance and PAYG model use a combination of digital solutions and data sources for analysis and decision making. This allows them to develop commercially viable value propositions tailored to the needs and contexts of different farmers. They also have the capacity to develop and use API to integrate with FSPs' and MMPs' platforms and facilitate data sharing. However, these are still nascent models and there is not yet evidence of scale.





Key findings

Partnerships and data sharing are essential to the growth and scale required to close the financing gap for smallholder farmers. Partnerships with agribusinesses, MMPs and FSPs allow agri DFS providers to become more competitive, expand to new market segments and new products, increase customer loyalty and open new revenue streams. To realise these benefits, organisations need to leverage data and digital solutions and build on their respective strengths. No one service provider has all the data, expertise and assets required to offer a range of financial products to farmers in formal and informal value chains at scale. For partnerships to succeed, organisations should align themselves at strategic, commercial and operational levels, and forge a common understanding of data protection regulations and common rules and processes for data collection, data cleaning and data management.

Agri DFS are playing a crucial role in expanding financial inclusion for farmers. Roll-out depends on a variety of business models for agricultural financing. The digitisation of savings groups and embedded digital agri wallet solutions allow farmers to access formal savings accounts and build a transactional history that FSPs can use to assess their financial behaviour and unlock credit. Digitisation of credit processes, value chains and embedded finance models are providing a range of short-term financing options for a growing number of farmers, in both formal and informal value chains, to meet their agricultural and non-agricultural needs. Innovative PAYG models are also unlocking access to assets for farmers and helping to close the gap in long-term financing.

Existing agri DFS business models do not cater to long-term agricultural financing needs. Long-term investments, such as plantation renovation or investment in storage infrastructure, are particularly important for farmers to build resilience to climate change. Adopting sustainable agricultural practices, such as agroforestry or planting crops that are appropriate to specific environmental and climatic conditions, can require significant investments and time to bear fruit. Some farmers, mainly in formal cash crop value chains, are accessing long-term loans

from progressive agribusinesses dedicated to building farmer relationships and improving productivity and livelihoods over time. These agribusinesses negotiate ad hoc partnerships and credit products with FSPs, often acting as guarantors for farmers.

Partnerships that unlock long-term investment finance are increasingly possible with digitised value chains business models. The widespread use of digital procurement solutions and digital payments is making it easier for agribusinesses to monitor farmers' agricultural activities and productivity. Progressive access to short-term finance will allow farmers to build a financial history and FSPs to improve their credit-scoring models.

Alternative data and satellite imagery are transforming how agri DFS providers monitor farmer productivity and loan repayments. Agritechs are working on macro-intelligence solutions that will allow FSPs to factor climate and environmental risks into their credit risk decisions. As satellite imagery becomes more accurate and affordable, agri DFS providers will be able to predict production, monitor the impact of rainfall patterns or pests on the harvest and adjust loan repayments accordingly. Combined with the digitisation of credit processes, these solutions will help FSPs extend agri DFS to a wider range of farmers.



Annex 1: Methodology

The GSMA AgriTech programme relied on a combination of primary and secondary research for this report. We conducted in-depth interviews with 46 industry stakeholders, including 15 agritech companies, five agribusinesses, eight mobile money providers (MMPs) and eight financial service providers (FSPs) in 18 low- and middle-income countries (LMICs), as well as donors and 10 industry experts, including representatives of CGAP, the Mastercard Foundation Rural and Agricultural Finance Learning Lab, the World Bank and UNCDF (see acknowledgements). Because of travel restrictions imposed by the COVID-19 pandemic, interviews were conducted remotely using web-based platforms or telephone.

The countries represented in the research include Mexico, Colombia and Haiti in Latin America and the Caribbean; Côte d'Ivoire, Ghana, Kenya, Malawi, Nigeria, Rwanda, Tanzania, Uganda and Zimbabwe in Africa; India, Indonesia, Nepal, Pakistan, Sri Lanka in South Asia; and Papua New Guinea in the Pacific.

Primary research was supplemented with internal and external secondary sources, both qualitative and quantitative. This included the extensive library of GSMA reports, toolkits and market assessments, in particular, publications from the Mobile Money, Connected Women,

and Digital Identity programmes at the GSMA; and the GSMA AgriTech services tracker that aggregates industry data for more than 700 digital agriculture services worldwide.¹⁰⁰

External, industry-recognised data sources for this report include the World Bank Global Findex Database on how adults save, borrow, make payments, and manage risk, International Finance Corporation (IFC), CGAP, Mastercard Foundation Rural and Agricultural Finance Learning Lab, USAID and Grow Asia, among others. These sources helped the AgriTech team frame the problem statement and leverage the extensive research and evidence available on smallholders' financial needs and behaviours. The team also reviewed case studies and in-depth analyses on agricultural financial services including digital financial services by Mercy Corps AgriFin and IDH, The Sustainable Trade Initiative.

The team classified the products and services identified through primary and secondary research based on the following criteria: target market and degree of formality of value chains, type of agri DFS, digital enablers, lead service provider, partnerships and data sharing requirements, and pathway to scale. The analysis allowed the team to identify common trends that were grouped under five agri DFS business models.

100 GSMA AgriTech. (2020). *Digital Agriculture Maps*



Annex 2: Glossary

Agribusiness: Formal buyers, traders or exporters of agricultural produce, as well as input suppliers.

Agricultural value chain: The set of actors and activities that bring a basic agricultural product from production in the field to final consumption, where at each stage value is added to the product. It can involve processing, packaging, storage, transport and distribution.¹⁰¹ Value chains can be formal or informal depending on the strength of the relationship between farmers and buyers.

Agricultural value chain actors: Organisations that perform different activities within agricultural value chains such as purchasing, aggregating, processing and distributing agricultural outputs, as well as producing and distributing inputs.

Agri DFS provider: Commercial organisations that provide digitally-enabled financial services to farmers. These include agribusinesses, FSPs, MMPs and agritech.

Agritech: A company providing technology-based solutions to increase efficiency, transparency and profitability in agriculture. In this report we refer to agritech companies or agritechs as the providers of digital agriculture services. Fintech companies providing digital financial services to farmers or other players in the ecosystem are also included in this category.

Alternative data: Data captured by digital agriculture solutions that are not commonly used for credit risk assessments.

Application Programming Interface (API): A software program that makes it possible for the application programs of different organisations to speak a common technical language, interact and share data and functionality.

Credit history: A set of records kept for a borrower that shows their credit use, including borrowing and repayment.

101 FAO (2010). *Agricultural value chain development: Threat or opportunity for women's employment?*

Credit processes: Steps in a credit cycle from loan origination and credit assessment to disbursement, monitoring and collection.

Credit scoring: A process that creates a numerical score reflecting a borrower's creditworthiness.

Digital financial services (DFS): Digitally enabled financial services that include electronic payments and money transfers, savings, borrowing, insurance, investments and financial management solutions. Agri DFS are DFS that are tailored to address farmer needs.

Digital platform: A platform that facilitates direct interactions between service providers and end users or between multiple users for the purpose of exchange.

Economic identity: A form of functional identity created for a specific purpose, such as enabling farmers to access financing and other services.

Embedded finance: The use of API-driven banking and payments services to integrate financial services in other environments and ecosystems.

Financial inclusion: Access and use of useful and affordable financial products and services – transactions, payments, savings, credit and insurance – that meet farmers' needs and are delivered in a responsible and sustainable way.

Financial service provider (FSP): An institution engaged in the delivery of financial services and products. FSPs can be formal or informal. Formal financial institutions are regulated organisations, such as commercial banks, state banks, MFIs and SACCOs, while informal financial institutions are unregulated organisations, such as savings groups and other community-based institutions.

Foundational identity: Government-issued documents like birth certificates or national IDs that are typically universally available to citizens and used for multiple purposes.

Functional identity: A form of identity that enables access to certain services, such as credit, insurance and savings.

Know Your Customer (KYC): The regulatory requirement to conduct customer identification, verification and due diligence at the time of account opening, and to understand, on an on-going basis, who a customer is and how they are using their account.

Long-term financing: Loans with a tenure of more than 12 months.

Partnership: An arrangement in which parties agree to cooperate to advance their mutual interests.

Pay-as-you-go (PAYG): Digitally enabled business models in which services are paid for remotely with small, frequent payments such as daily or weekly instalments, over a fixed period.

Remote-locking technologies: Technologies applied to digital assets that allow a service provider to shut the device off remotely and interrupt the service, for instance, electricity or irrigation, if certain conditions are not met (e.g., instalment payments are not made).

Short-term financing: Loans with a tenure of less than 12 months.

Smallholder farmers: Farmers in LMICs who produce crops or livestock on two-hectare plots of land or less.

Savings groups: Traditional savings methods that include rotating savings and credit associations (ROSCAs) and accumulating savings and credit associations (ASCAs).

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