



The GSMA AgriTech Toolkit for the Digitisation of Agricultural Value Chains

March 2020



1

2

3

4

5

6



The GSMA represents the interests of mobile operators worldwide, uniting more than 750 operators with nearly 400 companies in the broader mobile ecosystem, including handset and device makers, software companies, equipment providers and internet companies, as well as organisations in adjacent industry sectors. The GSMA also produces the industry-leading MWC events held annually in Barcelona, Los Angeles and Shanghai, as well as the Mobile 360 Series of regional conferences.

For more information, please visit the GSMA corporate website at www.gsma.com

Follow the GSMA on Twitter: [@GSMA](https://twitter.com/GSMA)

GSMA AgriTech Programme

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.

For more information, visit our website at: www.gsma.com/agritech

Follow us on twitter [@GSMAm4d](https://twitter.com/GSMAm4d)

Author

Panos Loukos, Insights Director,
Chapters 1-5

Lisa Chassin, Insights Manager, Chapter 6

Contributor

Daniele Tricarico, Senior Director

Published

March 2020



This material has been funded by UK aid from the UK government; however, the views expressed do not necessarily reflect the UK government's official policies.



6

The business case for farmers to participate in digitised value chain





Introduction: digitising agricultural value chains promotes financial inclusion for farmers

March 2020



Introducing the GSMA AgriTech Toolkit

The Toolkit for the Digitisation of Agricultural Value Chains is a collection of resources that illustrate how digital technologies can address pain points in the agricultural last mile for farmers and value chain¹ actors, such as agribusinesses and cooperatives.² These resources support the use of digital technologies for digital procurement by enabling the transition from paper to digital for a range of systems and processes in the last mile. The toolkit explains how digitising the last mile offers a pathway to financial inclusion for farmers.



THE TOOLKIT CONSISTS OF AN INTRODUCTION AND THE FOLLOWING SIX CHAPTERS

1	The business case for MNOs and mobile money providers to invest in last mile digitisation
2	The business case for agribusinesses to invest in last mile digitisation
3	Prerequisites to digitising the agricultural last mile
4	The GSMA Value Chain Assessment Tool (VCAT)
5	Digital footprints and economic identities for farmers
6	The business case for farmers to participate in digitised value chains

TARGET AUDIENCES



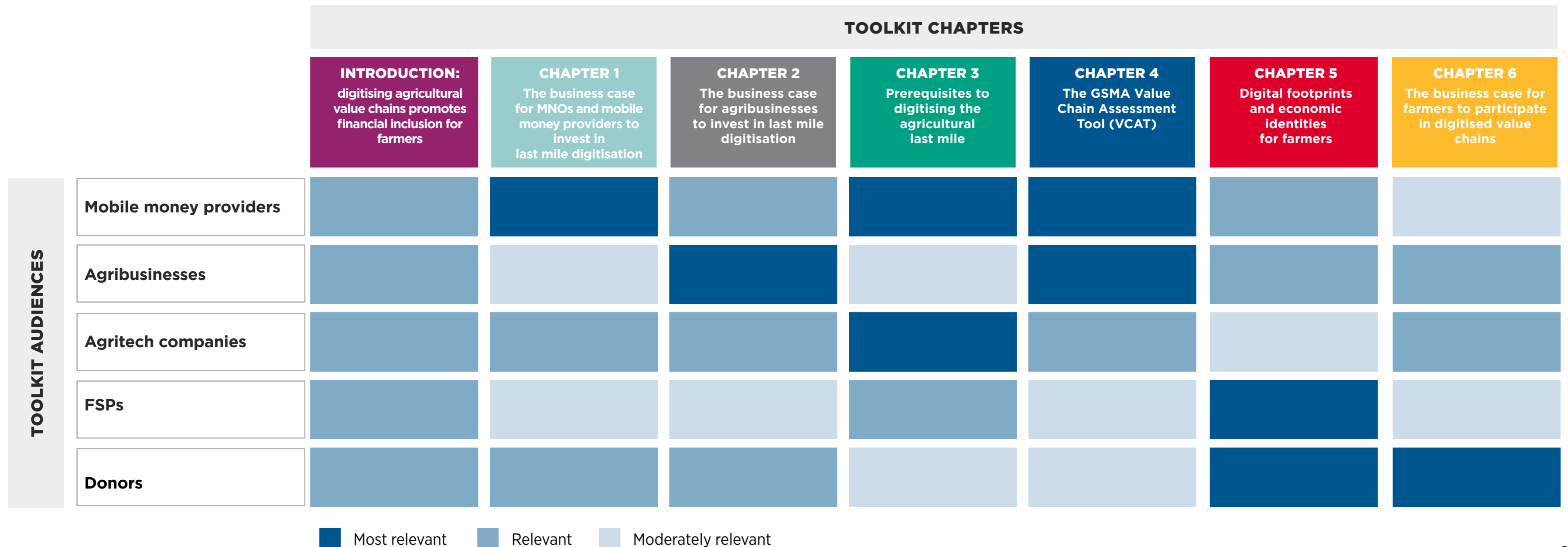
The toolkit targets diverse audiences, including mobile money providers and MNOs seeking to diversify activities and develop a rural growth strategy; agribusinesses and cooperatives interested in trialling digital technologies to address inefficiencies in their procurement activities; agritech companies looking to expand their value proposition with the integration of mobile money; financial services providers (FSPs) pursuing expansion of their business models to target farmers with customised products and services; and donors and impact investors aiming to improve financial inclusion for farmers.

1. "Agricultural value chain" refers to the full range of activities and flows of products, information and money that aim to add value to a raw agricultural product and link farmers to end consumers.
 2. In agricultural value chains, the "last mile" is the web of relationships and transactions between buyers of crops, such as agribusinesses, cooperatives and middlemen, and the farmers who produce and sell them.

Toolkit user guide

The toolkit is designed to be read either start to finish, or as individual chapters if one is working through a particular challenge. Although each chapter may be more relevant to specific audiences, readers will benefit from reading the report in its entirety.


Figure 1 **Relevance of toolkit chapters for different audiences**




Agriculture is vital to the economies of low and middle-income countries



In developing countries, agriculture is often the main employer. An average of 33 per cent of the labour force across low- and middle-income countries (LMICs) is typically employed in agriculture.³ Agriculture's contribution to total employment is significantly higher in Sub-Saharan Africa and South Asia.

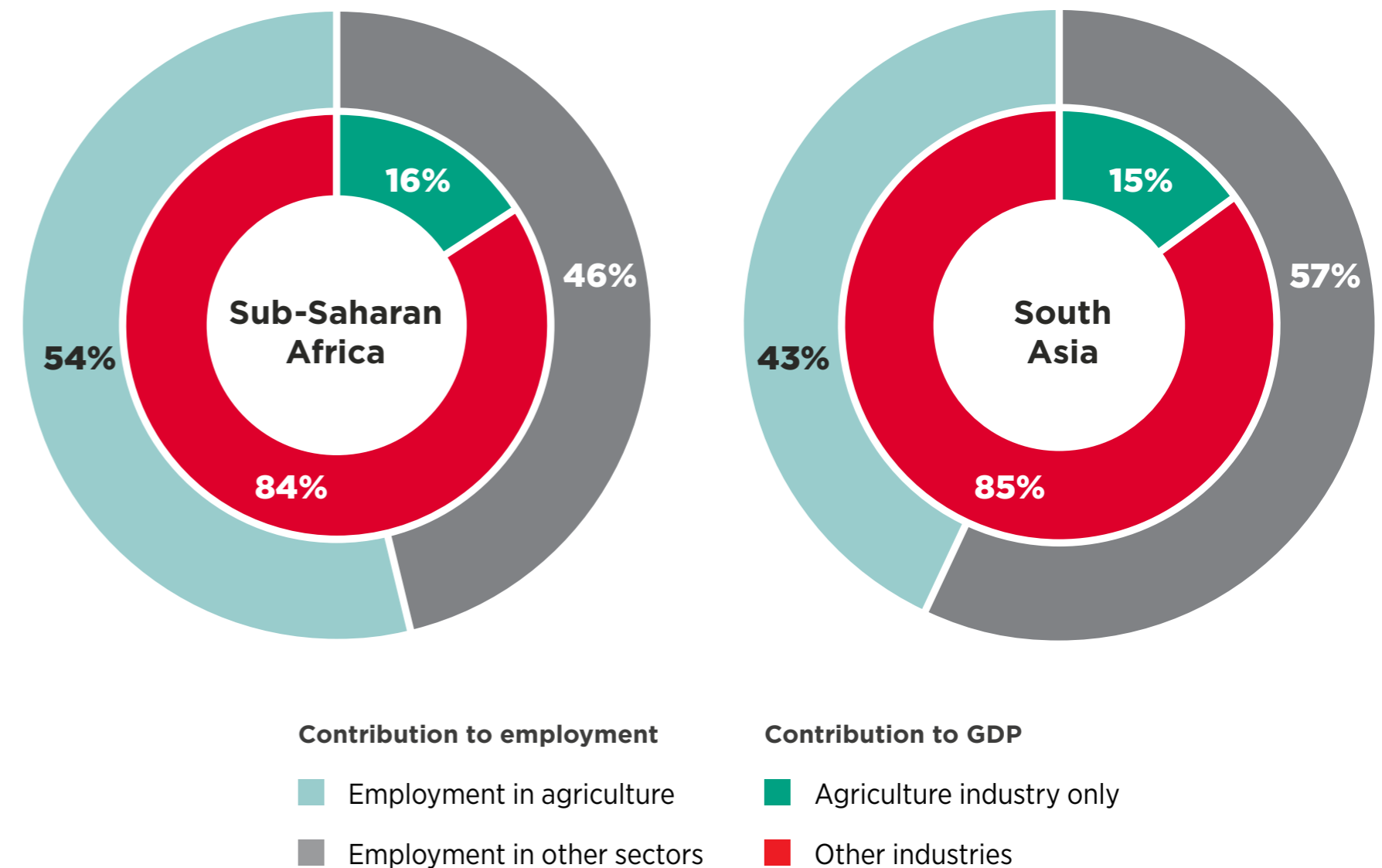


The agriculture, forestry and fishing sector is one of the main contributors to Gross Domestic Product (GDP). Although agriculture's average contribution to GDP in LMICs is eight per cent, the sector plays a greater role in economic activities in certain regions.⁴



The vast majority of agribusinesses, including major corporations in the food and beverage industries, procure from smallholder farmers in LMICs, where about 1.3 billion people are employed in agriculture and involved in the production of the majority of the world's food.⁵

Figure 2 **Agriculture's contribution to employment and GDP³**



3. The World Bank (2019). Available at: <https://data.worldbank.org/>
 4. Ibid
 5. GSMA AgriTech, (2018), *Opportunities in agricultural value chain digitisation: Learnings from Ghana*.

Smallholder farmers are still more likely to be financially excluded



There are 450 to 500 million smallholder farmer households worldwide, comprising around 50 per cent of the labour force in developing countries. Smallholder farmers are responsible for 80 per cent of food consumed in much of Sub-Saharan Africa and South Asia.

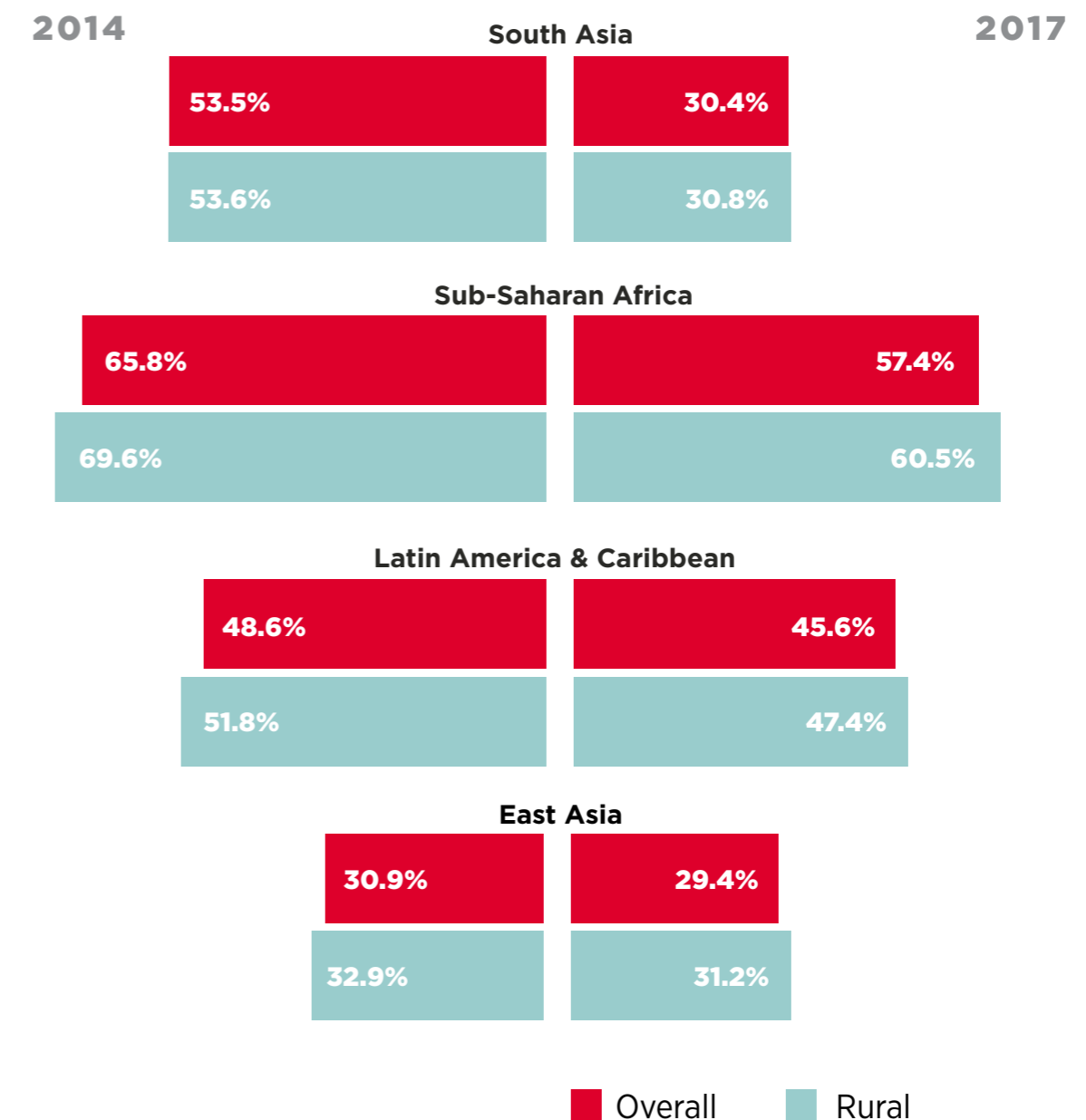


In commercial value chains, agribusinesses and cooperatives buy crops from smallholder farmers, relying heavily on cash payments for procurement. Governments tend to distribute subsidies through traditional mechanisms, such as vouchers for fertiliser or seed.



Although cash transactions are declining, there is still a wide financial access gap in rural areas in LMICs. Most smallholders who live in rural areas are still likely to be unbanked or have limited access to formal financial services.

Figure 3 **Percentage of financially excluded adults (age 15 and over)⁶**

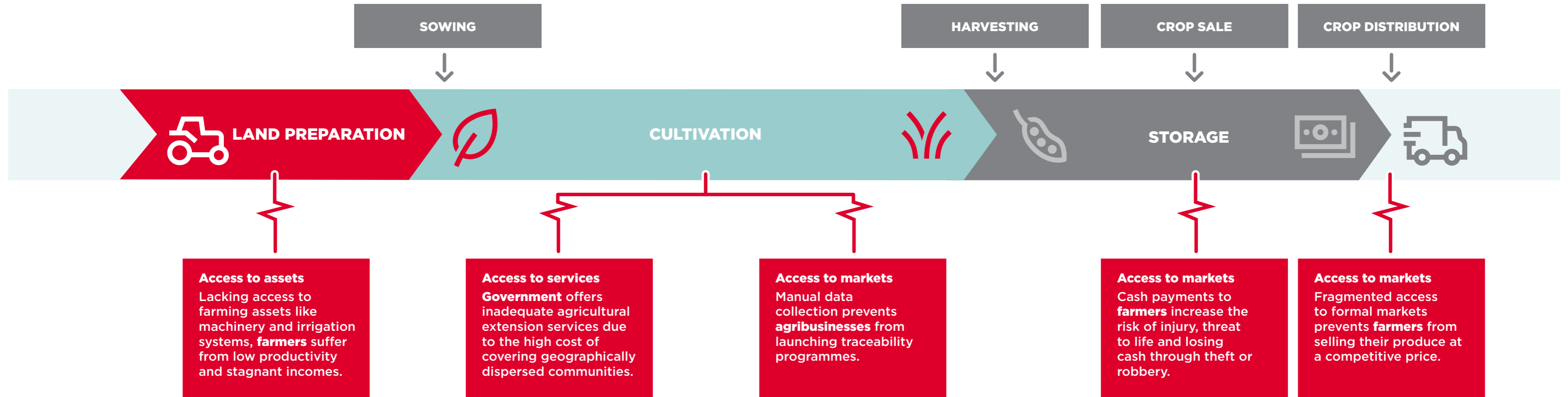


6. The World Bank, (2018), *Global Findex Database 2017*.

Value chain actors face inefficiencies at every stage of commodity sourcing

In agricultural value chains, commodity sourcing happens in the last mile where buyers of crops (agribusinesses) interact with the producers of crops (farmers). Traditionally, value chain actors have faced a wide variety of inefficiencies and bottlenecks that have affected yield, increased the cost of production and had a direct hit on farmer livelihoods. Handling procurement on paper and in cash increases the risks of theft and fraud, increases the time and travel required to receive cash payments for crops and creates an overall lack of transparency for buyers and producers. In such value chains, farmers lack a formal saving mechanism that would allow them to reinvest in their farms and improve yields and crop quality.

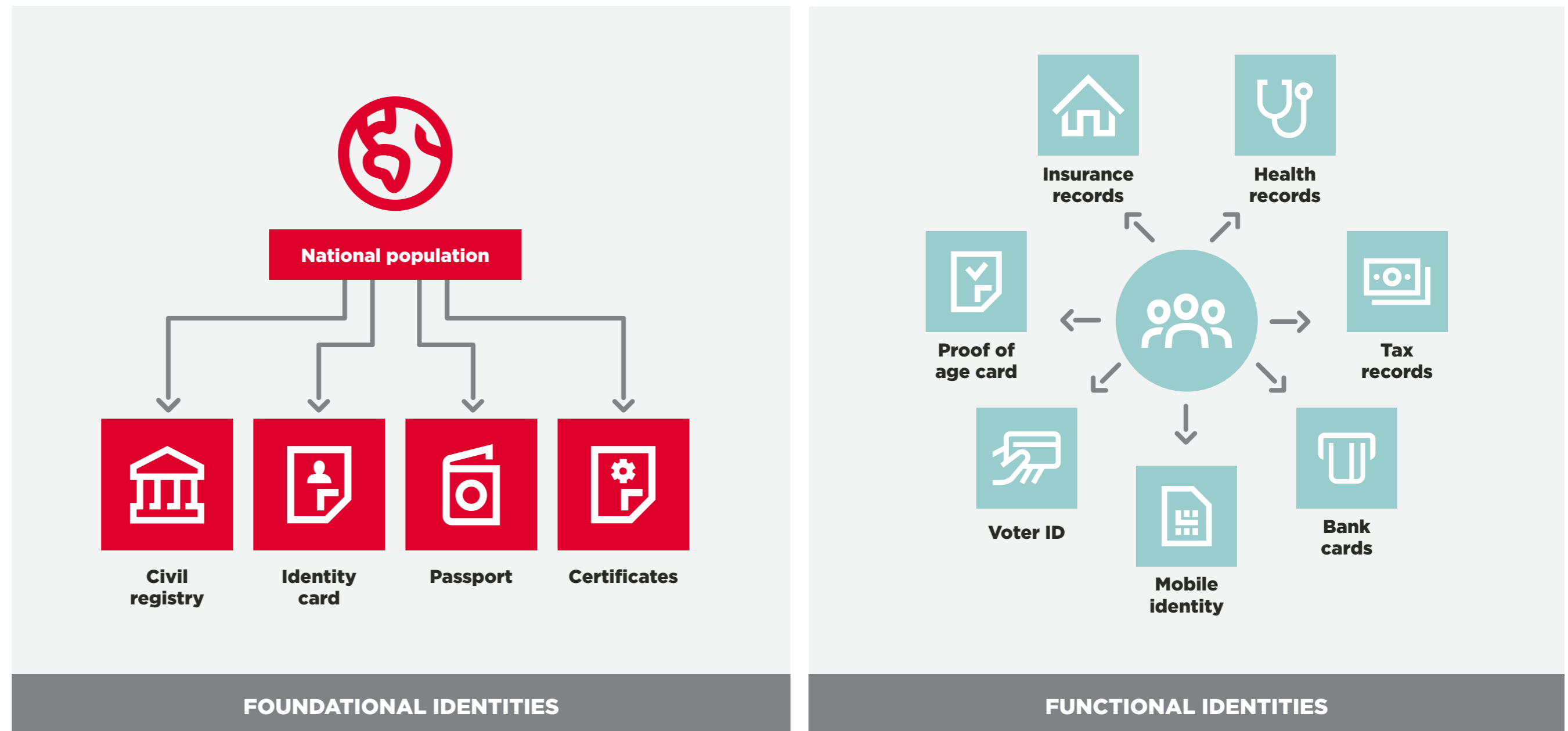
Figure 4 **Examples of inefficiencies in different stages of traditional value chains**



Lacking access to economic identities, farmers remain financially excluded

Figure 5 **Foundational and functional identities**

Without a formal saving mechanism, farmers require financing for both agricultural and non-agricultural activities. However, to access credit from formal channels, farmers need economic identities, which most do not have. In contrast to foundational identities — government-issued documents like identity cards, passports or birth certificates — economic identities are a form of functional identity that enables financial institutions to use innovative credit scoring models that assess the credit risk of previously unbanked farmers and their ability to repay loans.⁷



7. GSMA AgriTech, (2019), *AgTech Innovation Unlocks Economic Identities for Smallholder Farmers in Indonesia*.

Digital agriculture solutions: six main use cases

Digital technologies allow agricultural stakeholders to mitigate some of the challenges they face in agricultural production. The GSMA has grouped digital agriculture solutions into **three categories** based on the problem they solve for farmers.⁸ **Access to markets** improves linkages to formal crop buyers, allowing farmers to bypass multiple intermediaries and making procurement more equitable. **Access to assets**, particularly farm assets and equipment, increases productivity and farmers’ incomes. **Access to services** strengthens farmers’ resilience and improves access to financial services.

Figure 6 **Six use cases for digital agriculture solutions**

ACCESS TO MARKETS			ACCESS TO SERVICES		
	Digital procurement	Roll out of digital technologies in the agricultural last mile that enable a range of systems and processes to transition from paper to digital.		Information services	Mobile-enabled dissemination of information to farmers, such as agronomic advice, market prices and certification standards.
	Agricultural e-commerce	Online buying and selling of agricultural produce that allows farmers to reach new markets, including international buyers.		Weather and climate services	Provision of weather forecasts, weather-adaptive and climate-smart agronomic advice.
ACCESS TO ASSETS				Digital finance	Access to financial products and services via digital channels.
	Smart farming	Use of digital channels, such as the Internet of Things (IoT), to automatically and remotely access farm equipment and farming assets and track key parameters.			

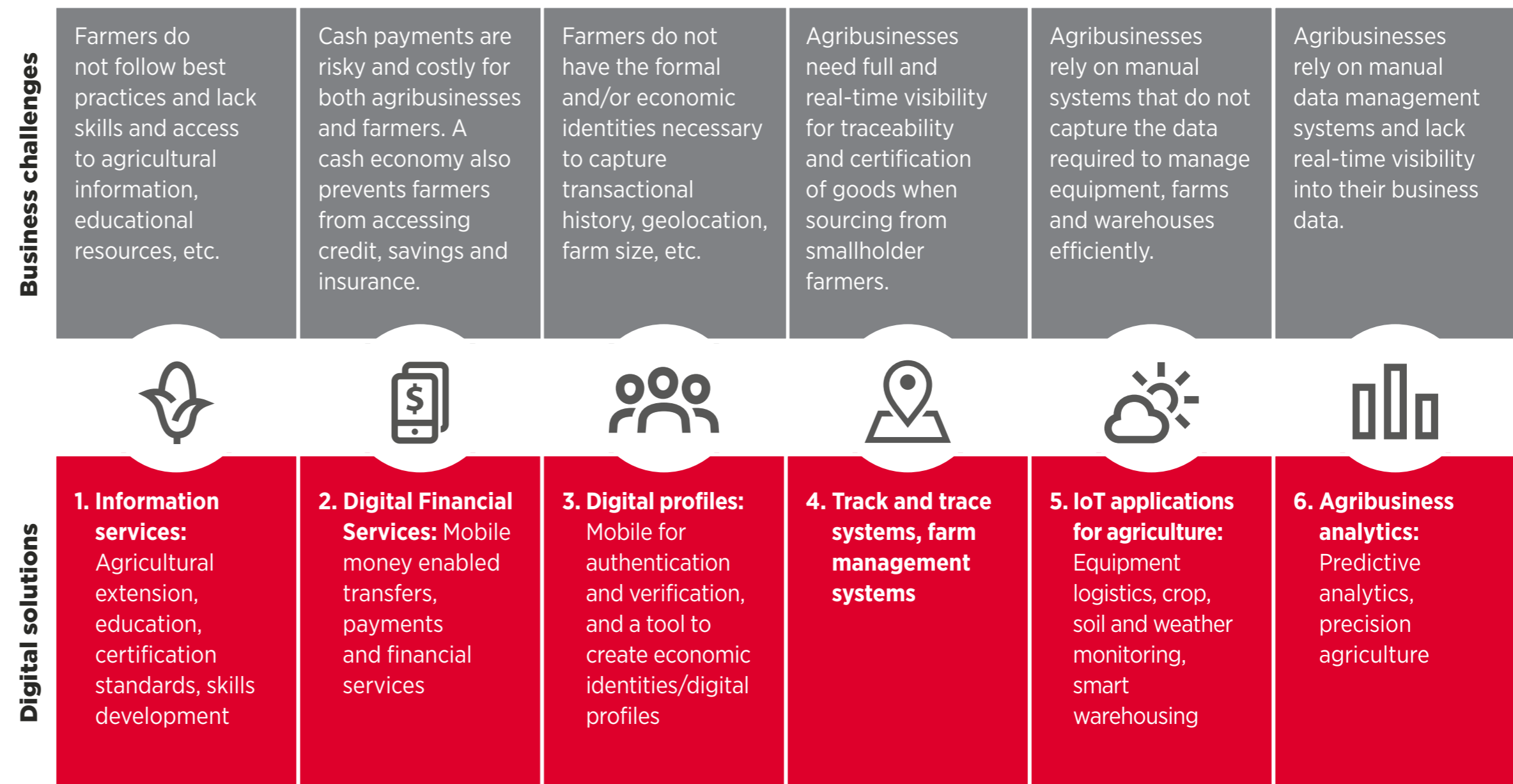
8. GSMA AgriTech, (2020), *Digital credit scoring for farmers: Opportunities for agritech companies in Myanmar*.

Digital procurement: digitisation can address the pain points of farmers and agribusinesses in the last mile

Digital procurement refers to the use of digital technologies in the agricultural last mile that enable a range of systems and processes to transition from paper to digital. Digital solutions have the potential to address various challenges for value chain actors.

For agribusinesses, digital technologies can help to make production more transparent, operations easier to monitor and supply chains more efficient (see Chapter 2). Farmers entering the digital ecosystem can also benefit from better access to formal markets, adoption of the latest agricultural practices and the empowerment that comes from clear terms of trade and transparent transactions (see Chapter 6).

Figure 7 **Six main types of digital solutions to optimise procurement in the last mile⁹**

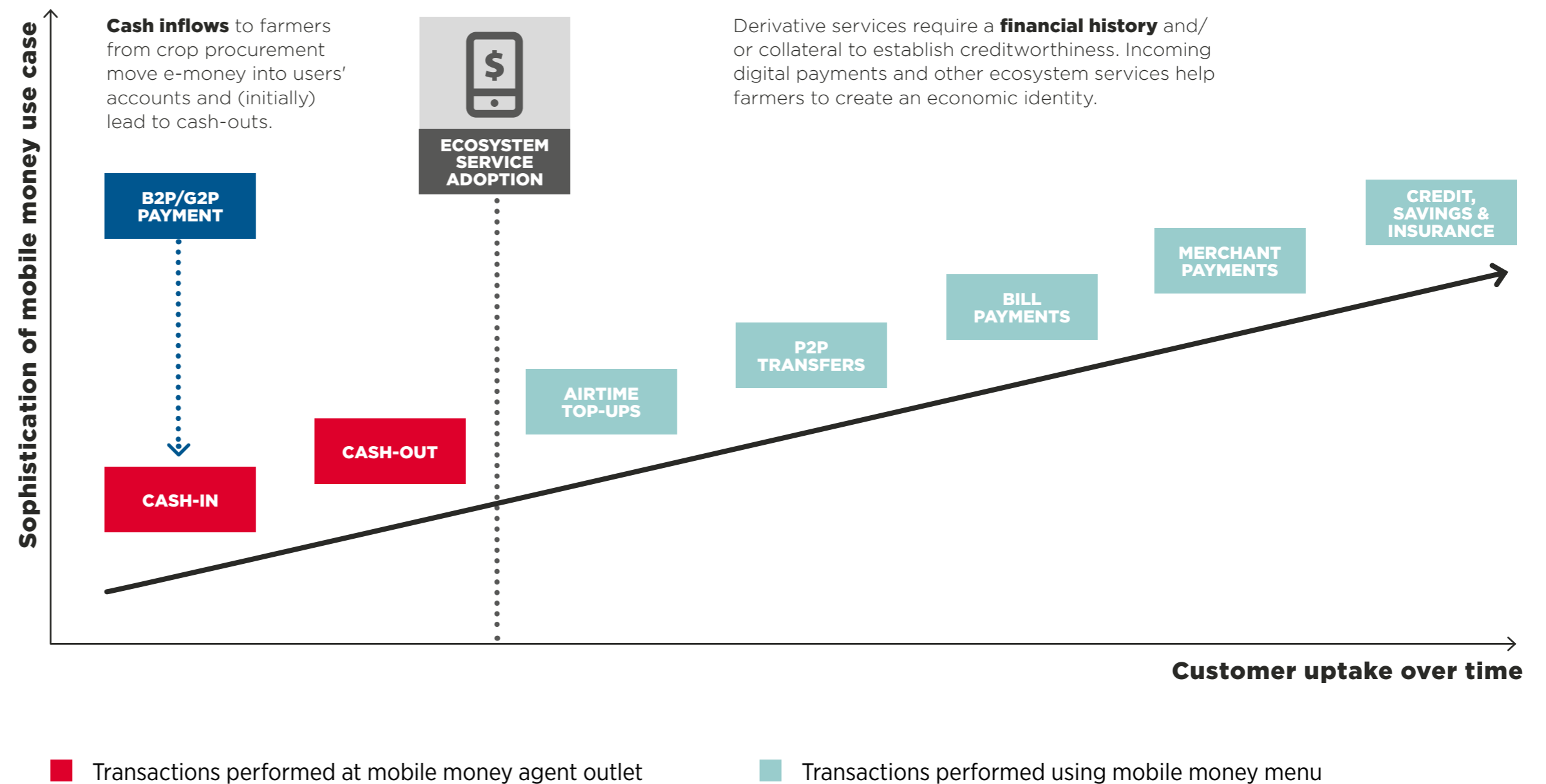


9. GSMA AgriTech, (2017), *Opportunities in agricultural value chain digitisation: Learnings from Uganda*.

Digitising payments to farmers through mobile money is an entry point to financial inclusion

Digital tools generate a significant volume of farm and farmer data, including financial transaction logs of the transition from cash to mobile money payments for crop procurement (business-to-person (B2P) payments). Digital transactional records, in conjunction with other data, can support the creation of economic identities and a pathway to full financial inclusion for farmers (see Chapter 5).

Figure 8 **The pathway to financial inclusion**

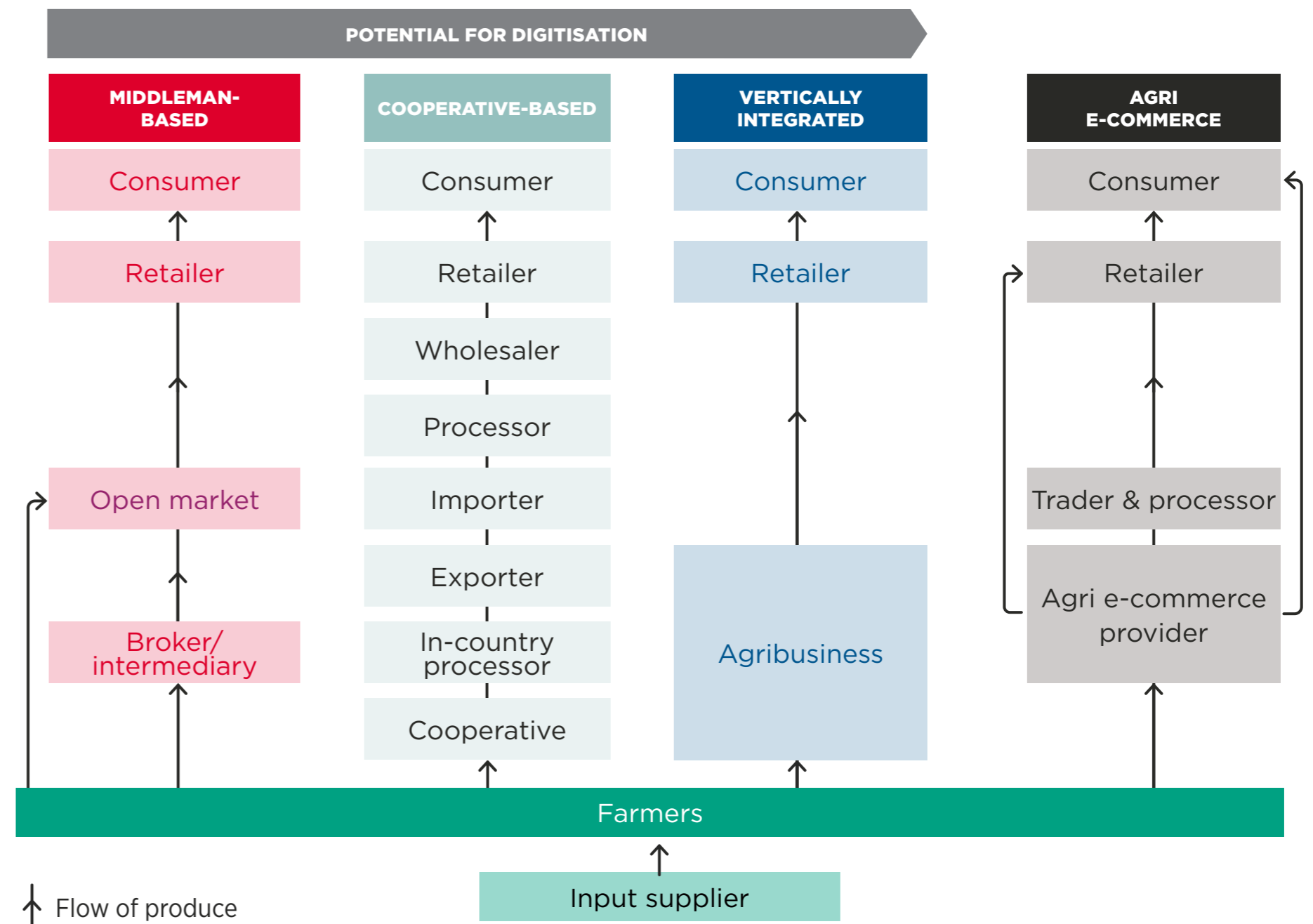


Formal value chains have the greatest potential to digitise B2P payments

In agricultural value chains, a variety of steps and actors are involved in moving crops from a farm to the end consumer. Value chains have varying degrees of formality. As opposed to informal, intermediary-based value chains that are characterised by a high degree of fragmentation in the last mile, formal value chains have stronger vertical integration and are structured around agribusinesses and cooperatives responsible for crop procurement and aggregation. In global supply chains, they provide strong incentives for buyers to improve transparency, quality and predictability of supply.¹⁰

Alongside traditional value chains, agri e-commerce solutions are emerging as entirely new value chain structures. These solutions help to establish formal relationships between buyers and sellers of crops through digital channels (see Chapter 6). Formal value chains and agri e-commerce represent ideal entry points for mobile money providers to digitise B2P procurement payments. To understand the systemic factors and conditions under which value chains operate in the last mile, value chain analysis becomes critical to planning digitisation initiatives (see Chapter 4).

Figure 9 **Types of agricultural value chains**

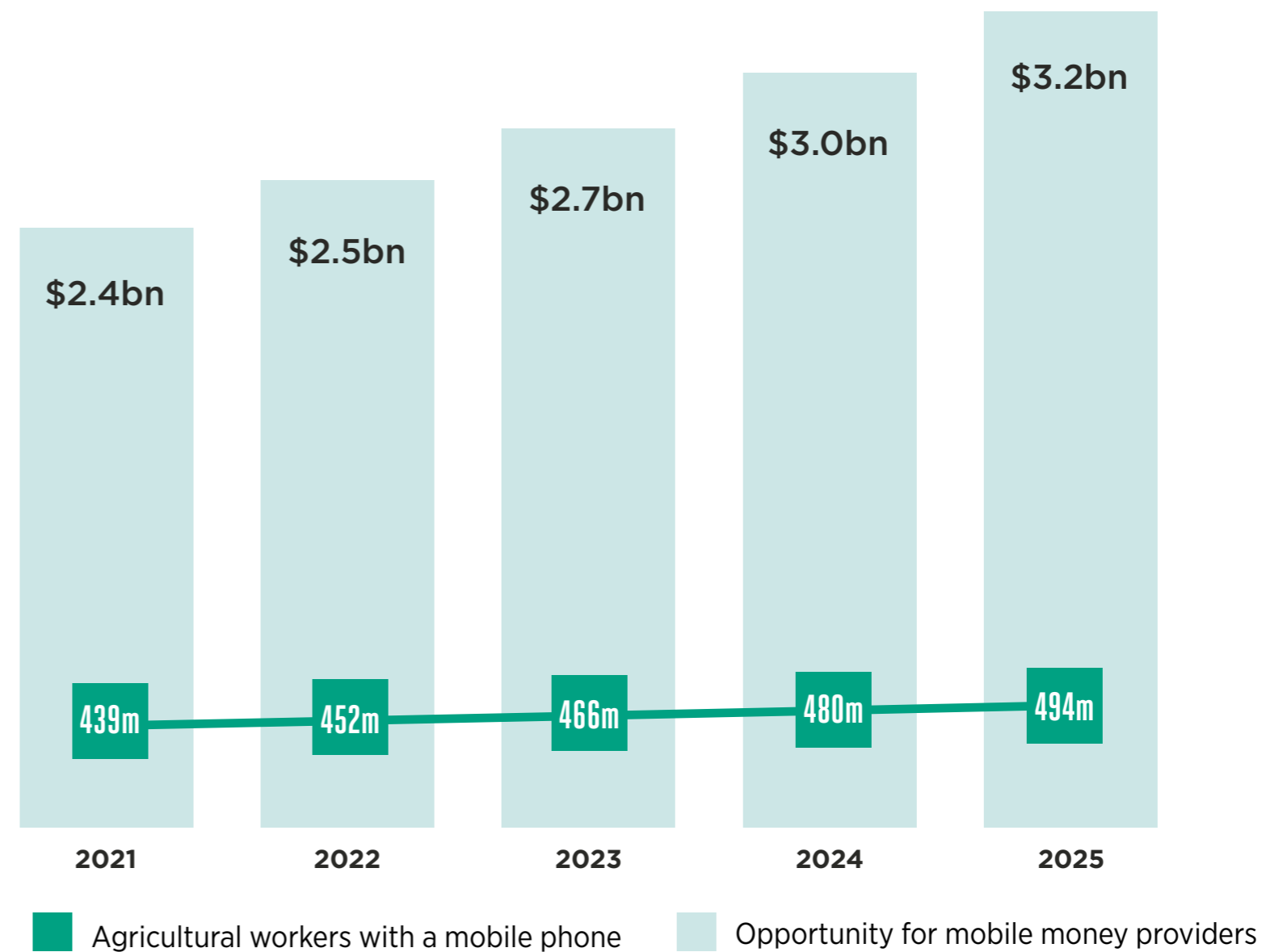


10. GSMA AgriTech, (2018), *Prerequisites to digitising the agricultural last mile*.

The potential mobile money revenue opportunity for B2P agricultural payments will rise to \$3.2 billion by 2025

Figure 10 **Potential direct revenue opportunity (USD) and potential addressable market (millions)¹²**

MNOs and mobile money providers have an important role to play in the digitisation of B2P payments to farmers. They can leverage their brand, scale and assets to support the development of digital enterprise solutions for agribusinesses. By doing so, they stand to capture up to \$3.2 billion in total direct annual revenue by 2025 through digitising B2P payments in the agricultural last mile (see Chapter 1).¹¹ This revenue opportunity represents the market ceiling — the actual revenue that could be generated if mobile money providers benefit from an enabling environment (e.g. regulation with suitable transaction limits for agricultural B2P payments), have the necessary assets in place (e.g. sufficient numbers of agents and available liquidity in rural areas) and actively pursue the digitisation opportunity (see Chapter 3).



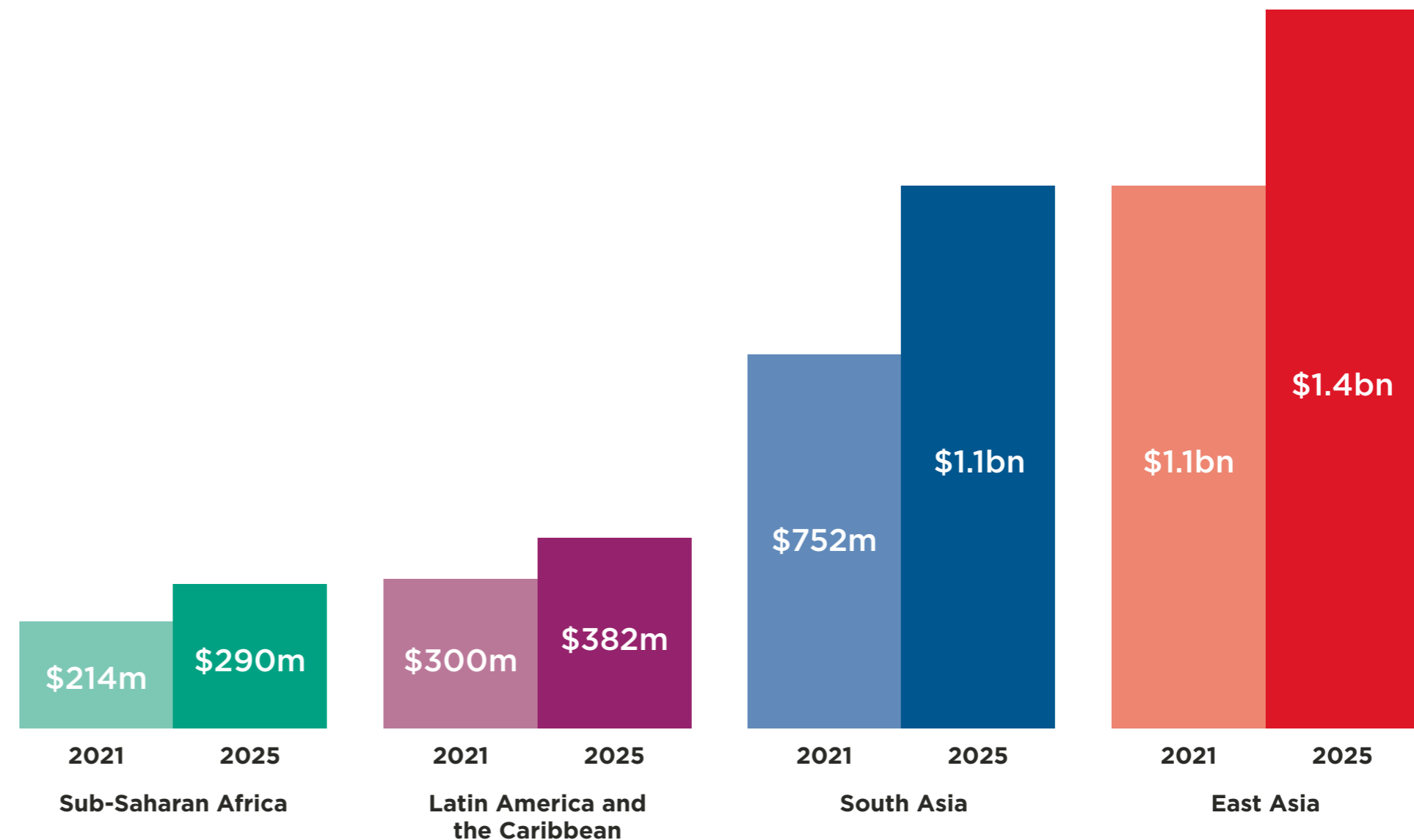
11. Across Sub-Saharan Africa, South Asia, East Asia and Pacific, Latin America and the Caribbean.

12. GSMA AgriTech, (2020), [Digitising payments in agricultural value chains: The revenue opportunity to 2025](#).

The opportunity is concentrated in Asia, but high availability of mobile money means that Sub-Saharan Africa is ripe for digitisation

Figure 11 **Potential direct revenue opportunity for mobile money providers by region, 2021 versus 2025**

East Asia and South Asia offer almost 80 per cent of the global opportunity to digitise agricultural B2P payments. This is due to the large volume of formal agricultural B2P cash payments available for digitisation in these regions. While Sub-Saharan Africa has a comparatively smaller revenue opportunity, strong mobile money uptake, especially in East Africa and in the high-growth markets of West Africa (e.g. Ghana and Côte d'Ivoire), means that the region is ripe for digital agricultural B2P payments. Many of the early examples of digital agricultural payment services emerged in Sub-Saharan Africa.



Introducing the chapters of the GSMA AgriTech Toolkit

Key questions

Chapter 1

The business case for MNOs and mobile money providers to invest in last mile digitisation

1. What is the business case for MNOs and mobile money providers to invest in the deployment of digital technologies in the last mile?
2. What Key Performance Indicators (KPIs) can be used to assess project success?
3. What are the pros and cons of various project team structures?

Chapter 2

The business case for agribusinesses to invest in last mile digitisation

1. What is the business case for agricultural organisations to invest in the deployment of digital technologies in the last mile?
2. What pain points in agribusiness-farmer engagement do digital tools address?
3. What kind of digital tools do agribusinesses use in the procurement of crops?

Chapter 3

Prerequisites to digitising the agricultural last mile

1. How can MNOs support network expansion in rural areas and ensure adequate coverage for digitisation initiatives?
2. How can mobile money providers ensure agent networks are reliable and sufficiently liquid to support last mile payments?
3. What due diligence principles and best practices should be applied to promote uptake of last mile payments?

Chapter 4

The GSMA Value Chain Assessment Tool (VCAT)

1. What is the framework for analysing value chains and supporting digital interventions in agriculture?
2. What agricultural organisations appear most suitable for the deployment of digital tools in the last mile?
3. Why is profiling of agricultural organisations important and what indicators should it capture?

Chapter 5

Digital footprints and economic identities for farmers

1. How can digital data help farmers develop economic identities?
2. What new operational models and supporting technologies are available in the sharing of data?
3. What are the key considerations in designing financial products for farmers?

Chapter 6

The business case for farmers to participate in digitised value chains

1. What is the business case for smallholder farmers to participate in digitised agricultural value chains?
2. Are digitised value chains leading to farmers capturing a higher share of the output price of the produce they sell?
3. What other benefits can farmers leverage when operating in digitised agricultural value chains?



The business case for MNOs and mobile money providers to invest in last mile digitisation

March 2020



Introduction



What is the focus of this chapter?

This chapter makes the business case for MNOs and mobile money providers to invest in the deployment of digital technologies in the agricultural last mile, particularly those that digitise procurement payments, as these promote financial inclusion for farmers.

What types of mobile money providers is this chapter aimed at?

This chapter is aimed at mobile money providers, including MNO-led and third party-led services (banks and fintech). Some financial regulators take a conservative approach, limiting the issuance of mobile money to established financial sector players, such as commercial banks. Others permit MNOs and other non-banks to issue mobile money if they apply for a licence as an electronic money issuer. Large MNO groups still dominate Africa's mobile money ecosystem, while in Asia, fintechs and tech giants have entered the payments space and operate alongside mobile money providers.

How can MNOs and mobile money providers benefit from investing in the digitisation of the last mile?

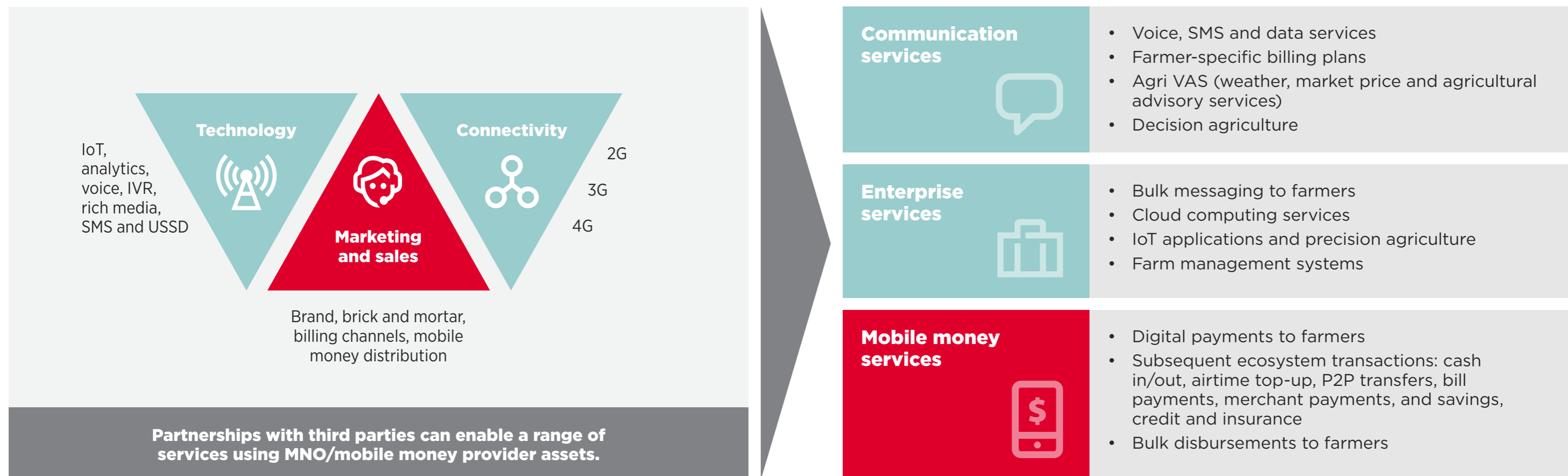
Benefits for MNOs and mobile money providers can be both direct and indirect. Examples of direct benefits include revenues from transaction fees levied for mobile money payments; the addition of new mobile money customers in rural areas and new mobile network service users; and greater loyalty or stickiness of existing users. Examples of indirect benefits include increased network use (SMS, calls, data); higher mobile money service use among existing users; and increased agent activity that can support the development of the mobile money ecosystem and uptake of adjacent products, such as loans and insurance.

MNOs and mobile money providers have a range of assets to support rural development and bridge the financial inclusion gap

Opportunity profiling

To bridge the financial inclusion gap and encourage the development of a digital rural ecosystem, MNOs and mobile money providers can leverage their existing assets. For example, they can develop services that address the challenges of procurement payments and access to financial services, as well as challenges around farmers' knowledge and transparency in the value chain.

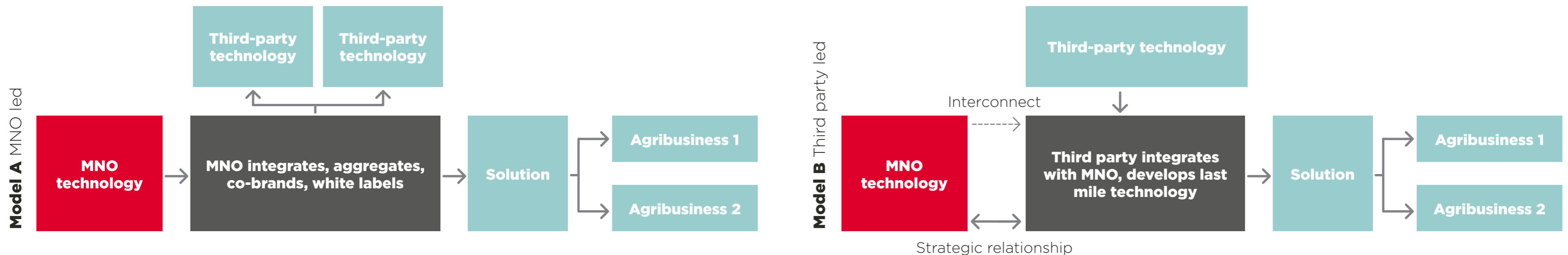
Figure 12 **MNO and mobile money provider assets**



The GSMA has identified two models for the role of MNOs in the digitisation of the agricultural last mile

Opportunity profiling

Figure 13 **Models for agricultural last mile digitisation**¹³



MNO led:

MNOs use core proprietary technology to create strategic partnerships with third parties.

- This model provides the opportunity to aggregate multiple solutions that leverage the scale and brand of an MNO to become a one-stop shop for the enterprise customer.
- However, the MNO must have the internal capacity to fund, implement and run the enterprise solution.

Third party led:

AgriTech companies use the core assets of an MNO to develop a digital solution.

- This model benefits from the agility of small agritech companies to upgrade and customise solutions to the needs of enterprise customers.
- However, agritech companies must integrate core MNO assets (e.g. cellular connectivity, mobile money) to provide the solution.

With each model offering a range of benefits for the implementing parties, the choice of model should reflect the wider MNO strategy.

13. GSMA AgriTech (2017), *Opportunities in agricultural value chain digitisation: Learnings from Uganda*.

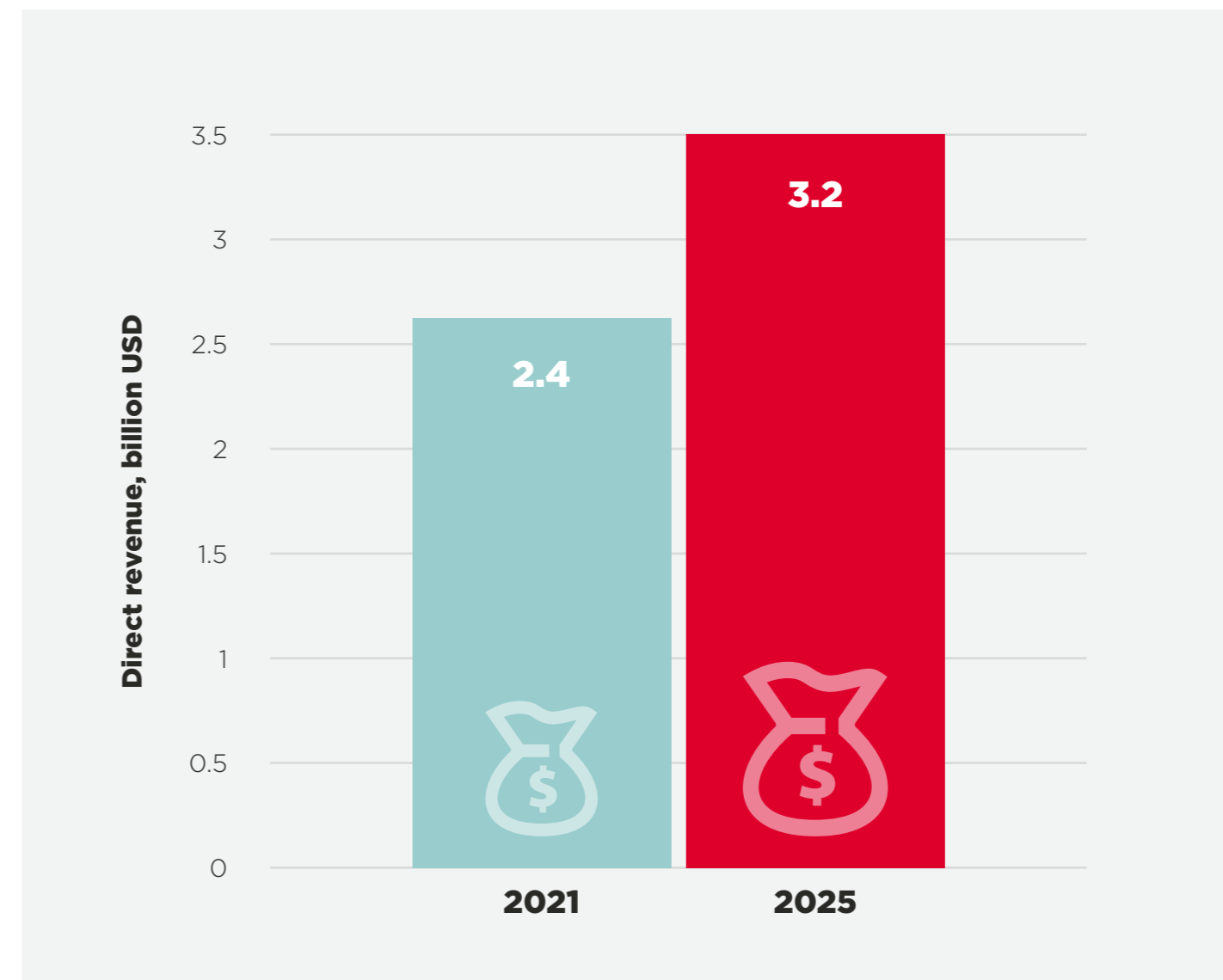
Digitising agricultural business-to-person payments could generate \$3.2 billion in revenue for mobile money providers in 2025

Benefits

Solutions for digital financial services, digital procurement and information services have emerged across Africa and Asia, led by either MNOs or third parties. MNOs and mobile money providers have typically leveraged their own assets to target the agriculture sector with bulk payment solutions. However, many MNOs, including MTN Ghana and Dialog Sri Lanka, are looking beyond bulk payment solutions to develop a more holistic suite of services, from digitised farm management systems to certification and traceability, among others. To do this, many have entered into strategic partnerships with third parties with relevant assets and expertise.

For mobile money providers, digitising business-to-person (B2P) payments for crop procurement is a significant revenue opportunity and viable entry point for the digitisation of the rural ecosystem. Cash inflows for B2P payments, and subsequent ecosystem transactions from farmers' accounts, provide an opportunity for mobile money providers to drive adoption in rural areas. Over time, digital transaction data, combined with other farmer and farm data, can support the creation of economic identities for farmers. These identities, required to perform credit risk assessments, may allow farmers to access financial services like credit and insurance.

Figure 14 **Potential direct revenue opportunity (USD), 2021 versus 2025¹⁴**

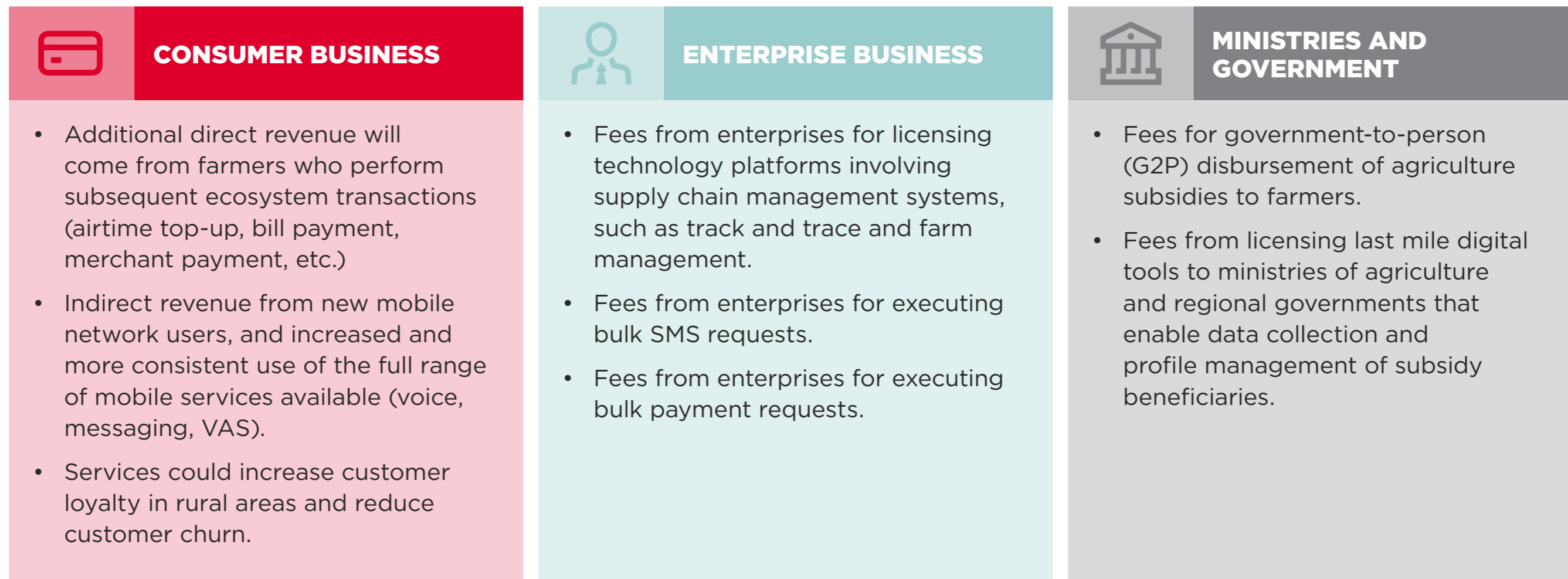


Last mile digitisation can unlock benefits for MNOs beyond B2P transfer revenues

Benefits

Digitising payments, offering a digital procurement platform and bundling information services could provide a range of benefits for an MNO. For example, existing consumers becoming more engaged with the MNO brand, existing enterprise clients receiving additional MNO services, and entirely new consumer and enterprise clients signing on with the MNO.

Figure 15 **MNO benefits from last mile digitisation**



Digital interventions stimulate mobile money adoption and build customer loyalty

Benefits

Our research shows that farmers registered on services supported by the GSMA AgriTech programme use their mobile money wallets for use cases beyond cash out, predominantly for safe storage of funds at present. By encouraging mobile adoption through digital payments, there is an opportunity for direct revenue from subsequent ecosystem transactions.¹⁵

These services also appear to build MNO brands. Greater customer loyalty and less churn translate into wider benefits from core services, such as increased use of SMS, voice and data. For example, for MTN Ghana, digitising the agricultural last mile is a way to drive mobile money uptake in rural areas and to increase stickiness to core services (see slide 28).

“

If today I have a bit of money, I can put it on my [mobile money account]. I even keep a lot of money there. If I have a problem I cash-out. I also store money there for my future project — do cattle breeding.

”

Male farmer, Côte d'Ivoire

“

I will be compelled to save a lot more of my money and use it in a wise manner.

”

Male farmer, Ghana

“

This is a geographic area that does not interest mobile operators. But [MNO] showed interest in this area. I will not hesitate to promote them to another person in the future.

”

Female farmer, Sri Lanka

“

I would recommend [MNO] because it's a good operator that does a lot for us.

”





Male farmer, Côte d'Ivoire

Intelligent KPIs are needed to measure the success of last mile digitisation

KPIs

MNOs need KPIs to measure whether a last mile digitisation project is achieving their business objectives. These KPIs must be intelligent enough to support innovation, yet put enough pressure on project teams to achieve results. While existing, ‘generic’ KPIs can be used, KPIs focused on the target market – i.e. measuring uptake and usage among targeted farmers and agribusinesses – should be agreed early on.

Figure 16 **Examples of KPIs to assess the success of last mile digitisation projects**

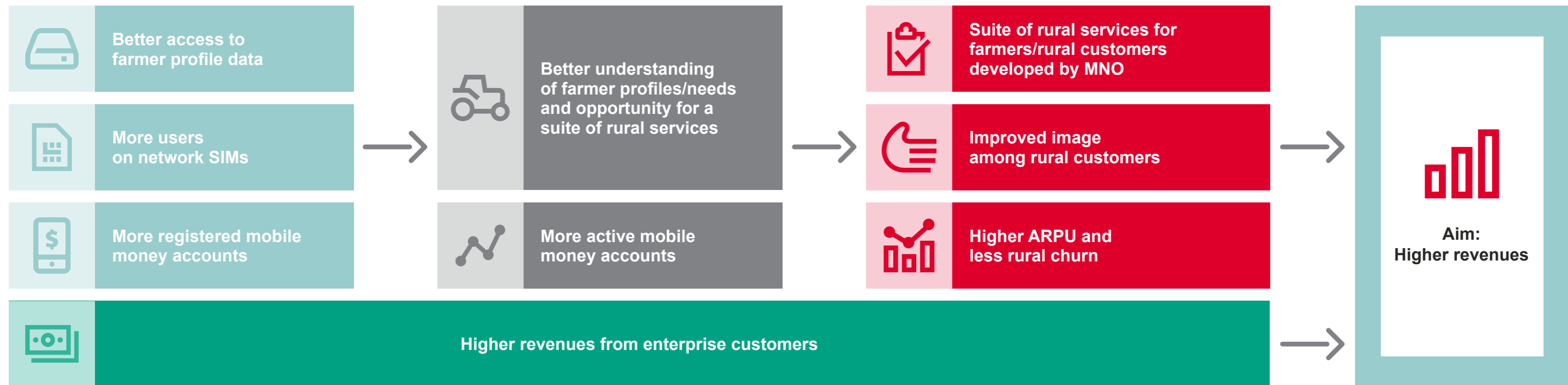
Pathway component	MOBILE MONEY GROWTH	HIGHER REVENUES	ENTERPRISE GROWTH	CUSTOMER LOYALTY AND SATISFACTION
Examples of KPIs that help quantify growth in enterprise sales and consumer revenue	 <ul style="list-style-type: none"> • Number of new registered mobile money accounts acquired thanks to the service • Number of new active (30-day) mobile money accounts acquired thanks to the service 	 <ul style="list-style-type: none"> • Revenues from enterprise clients • MNO rural revenues • Mobile money revenues • MNO market share 	 <ul style="list-style-type: none"> • Service (direct) revenue • Number of new enterprise clients joining the service 	 <ul style="list-style-type: none"> • Service user ARPU • Service user churn • Satisfaction among rural consumers

Aligning digital tool KPIs with MNO business objectives is key to the success of any last mile digitisation project

KPIs

Ensuring a project team’s KPIs are aligned with broader MNO business objectives is a key part of any digitisation initiative. Measuring business objectives against project-specific KPIs is necessary to quantify progress over time.

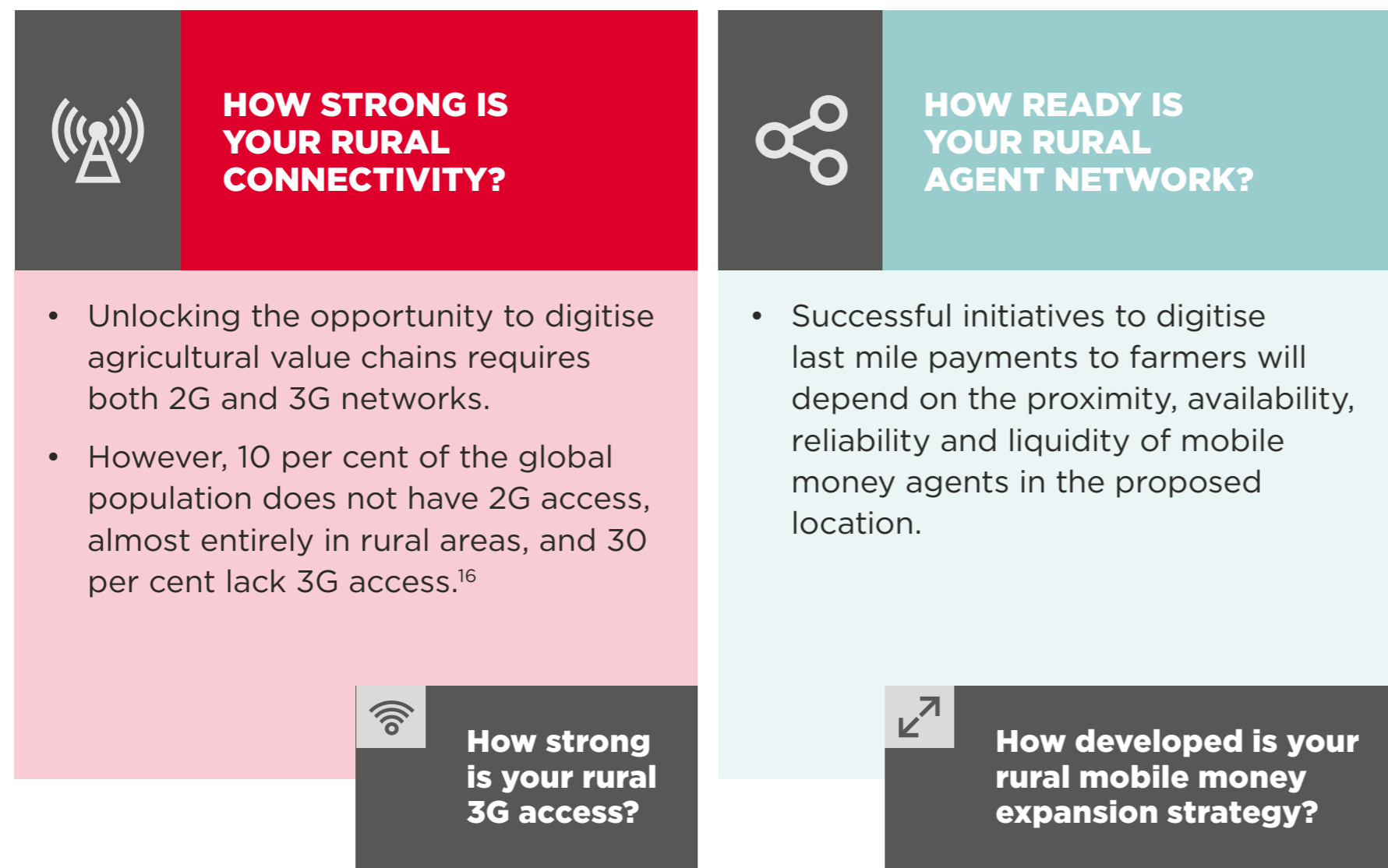
Figure 17 **Pathway to success for a last mile digitisation project**



For MNOs, assessing operations is the first step in implementing any digital tool

Capacity and skills

Figure 18 **Assessment of MNO readiness to implement a last mile digital tool**



Creating a digital tool requires an MNO to assess the strength of their connectivity and mobile money networks, as this will determine the business case for rural network expansion. By looking beyond traditional revenue streams, MNOs can build both their rural customer base and the business case for rural networks.






An MNO does not have to approach operations alone. There are opportunities to enter into strategic partnerships with third parties (e.g. aggregators) that have assets and expertise in areas such as rural mobile money liquidity. For example, in Uganda, Yo is an aggregator that manages a network of cash-out agents for coffee farmers and is responsible for the provision of liquidity.¹⁷

16. GSMA Intelligence (2015), *Rural coverage: Strategies for sustainability*.
 17. GSMA (2018), *Prerequisites to digitising the agricultural last mile*.

To develop last mile digital tools, the GSMA has worked with product managers on a variety of MNO teams

Capacity and skills

Figure 19 **Comparison of project team types**

	 Mobile money enterprise team	 Mobile money team	 Dedicated agriculture team
Pros 	<ul style="list-style-type: none"> Existing enterprise relationships and enterprise sales culture Agility of the team 	<ul style="list-style-type: none"> Strong understanding of mobile money fundamentals 	<ul style="list-style-type: none"> Cross-cutting team including mobile money, GSM and agriculture experts Aims aligned with agriculture sector
Cons 	<ul style="list-style-type: none"> Lacks connection with GSM business for bundled services 	<ul style="list-style-type: none"> KPIs strongly aligned with mobile money only 	<ul style="list-style-type: none"> Cost-heavy Business case still developing
Supporting teams are also required:	<ul style="list-style-type: none"> A dedicated sales team to drive the acquisition of new enterprise clients and market the solution to existing enterprise clients. Project management support to create KPIs that reflect the commercial motivations of the MNO and to monitor the progress of these KPIs over time. 		
A dedicated product manager with clear objectives and incentives is key to success.			

Case study: MTN Ghana launches mAgric tool to digitise crop procurement in the last mile

Case study

MTN Ghana's mAgric is a mobile app that enables an agribusiness to record crop procurement from farmers digitally, and pay farmers for their produce instantly via mobile money. The app provides a solution for inefficient cash-based payments and the challenges of paper-based systems. Mobile money reduces farmers' travel and waiting times for payments, makes payments more secure and offers financial stability through better money management. mAgric currently targets farmers in the cocoa value chain, Ghana's most important cash crop and second-largest export commodity. MTN Ghana is expanding the use of the tool to other value chains with a pilot launched in 2019 to trial mAgric in the poultry value chain.



Key findings and recommendations

- The GSMA has identified two models for offering last mile digital tools to agribusinesses: an MNO-led model in which a mobile operator uses core proprietary technology to create strategic partnerships with third parties to offer a last mile solution directly to the agribusiness; and a third party-led model in which a tech provider integrates MNO/mobile money provider assets to develop a digital solution.
- For MNOs and mobile money providers, digitising B2P payments for crop procurement is a significant revenue opportunity and viable entry point for the digitisation of the rural ecosystem. By doing so, they stand to capture up to \$3.2 billion in total direct annual revenue by 2025. However, last mile digitisation can unlock benefits beyond B2P transfer revenues, such as stimulating mobile money adoption and building customer loyalty.
- MNOs need intelligent KPIs to measure whether a last mile digitisation project is achieving their business objectives. KPIs should put enough pressure on project teams to achieve results and align with MNO business objectives to quantify progress over time.
- For an MNO, the first step in implementing any digital tool is assessing the strength of their connectivity and mobile money networks, as this will determine the business case for rural network expansion. To address operational challenges, an MNO can enter into strategic partnerships with third parties (e.g. aggregators) that have assets and expertise in areas such as rural mobile money liquidity.
- The GSMA has worked with product managers on a variety of project teams, each with their own pros and cons. No matter the set-up, a dedicated product manager with clear objectives and incentives is key to the success of any last mile digitisation project.



The business case for agribusinesses to invest in last mile digitisation

March 2020



Introduction



What is the focus of this chapter?

This chapter makes the business case for agricultural organisations (i.e. agribusinesses and cooperatives) to invest in the deployment of digital technologies in the agricultural last mile. Such investment would support the transition from paper to digital for a range of processes.

What types of digital solutions are available?

There are a wealth of digital solutions to address the pain points crop buyers and producers face with last mile sourcing. These solutions include information delivered via mobile to support better agricultural practices, mobile money payments for the procurement of crops, tools to create digital profiles for farmers, track-and-trace and farm management systems, Internet of Things (IoT) applications, precision agriculture and predictive analytics tools. Holistic digital agriculture tools integrate multiple solutions to address the challenges commodity buyers face when procuring crops from farmers.

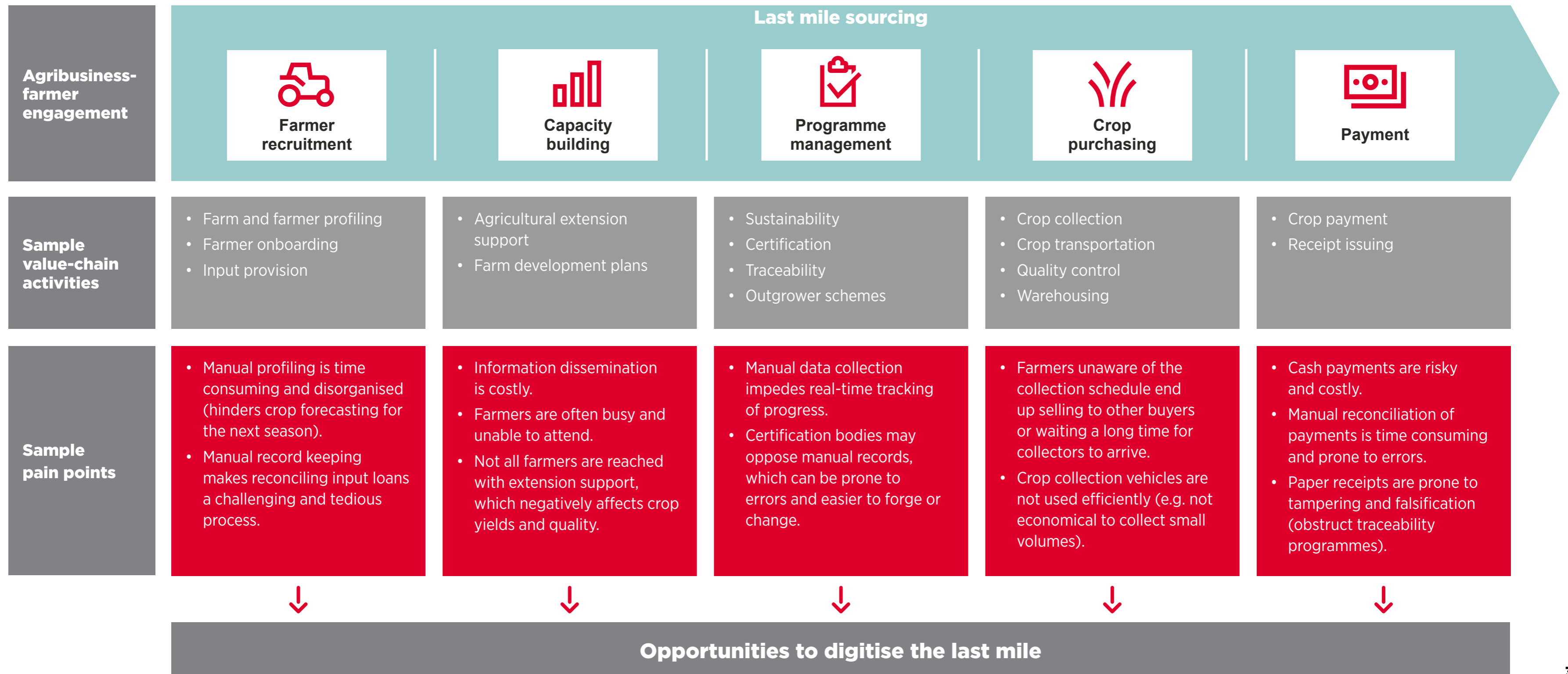
How can agricultural organisations benefit from digital technologies?

Agricultural organisations that procure crops interact with a range of actors in the value chain throughout the year. When sourcing commodities from farmers, they engage in a variety of activities, such as leading sustainability initiatives and managing end-to-end traceability of crops, rolling out field training, managing agricultural input distribution programmes and monitoring operations in the last mile. Digital solutions give agricultural organisations greater control over their operations as they allow them to monitor them more closely, provide more transparent transactions and create effective communication channels, both internally and with smallholder suppliers.

Business challenges emerge at every stage of last mile sourcing

Challenges

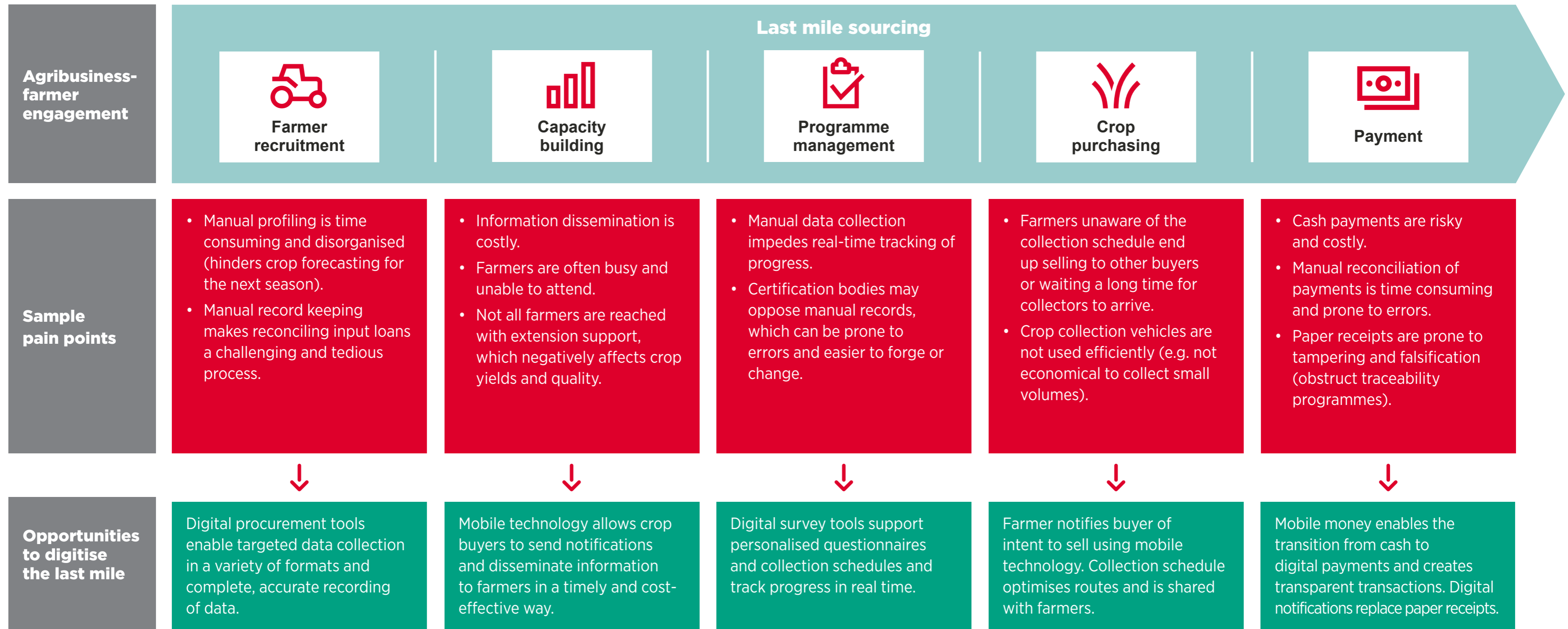
Figure 20 **Sample pain points across agribusiness-farmer engagement**



Holistic digital tools can help agricultural organisations address multiple pain points at once

Benefits

Figure 21 **Opportunities to digitise the last mile across agribusiness-farmer engagement**



Digitising value chains improves operational efficiencies and business performance

Benefits

Figure 22 **Agribusiness benefits from last mile digitisation**



Relevant KPIs are needed to measure the success of any digital tool implementation project

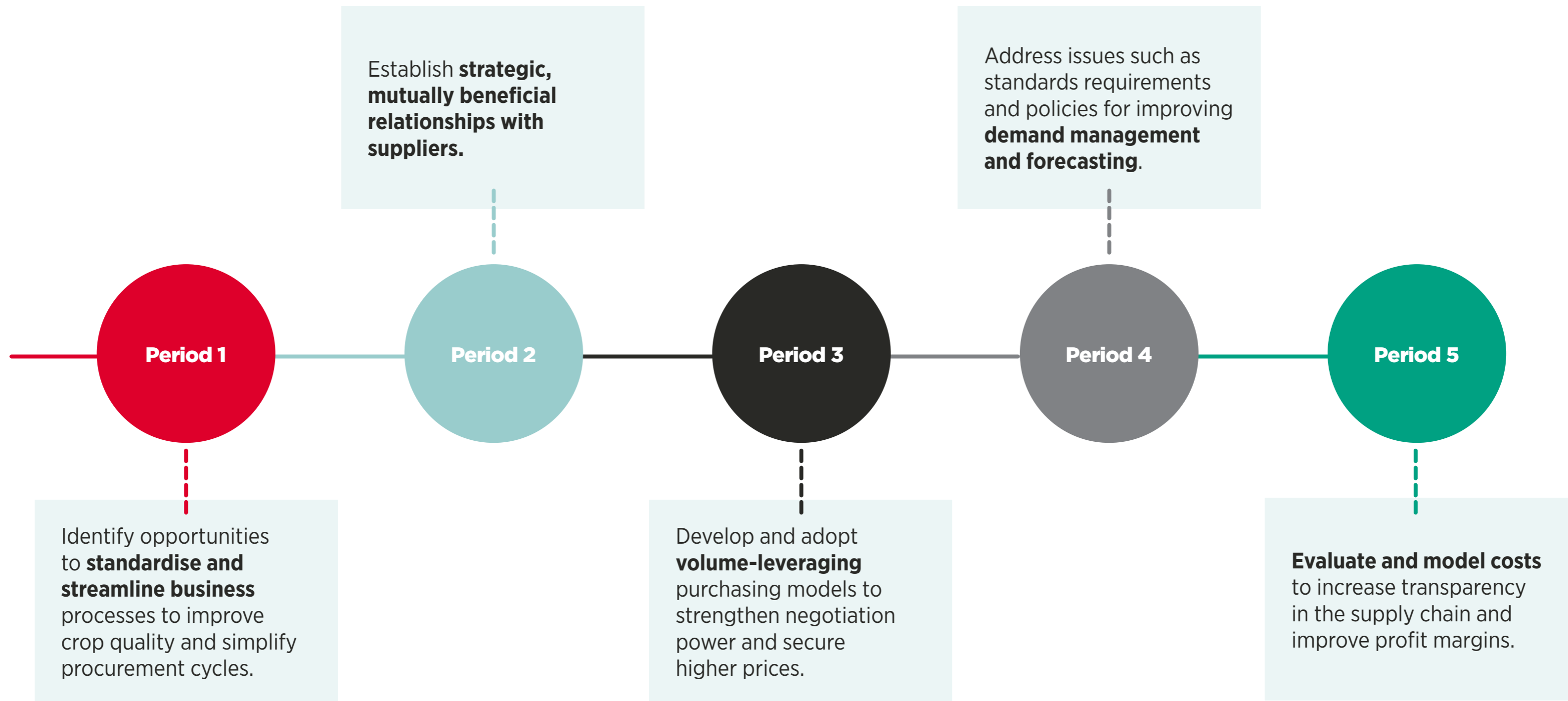
Measuring success

Figure 23 **Digital tool implementation phases**



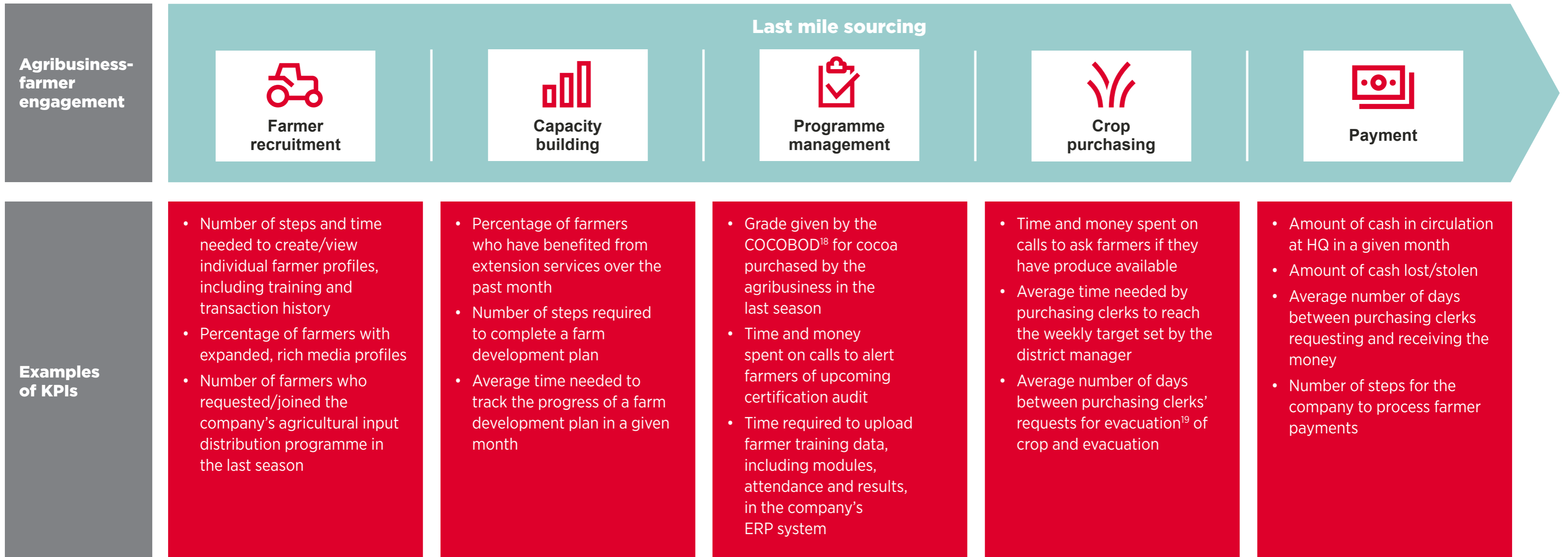
Examples of business objectives that drive digital agriculture projects, mapped against clear timelines

Business objectives



Examples of KPIs for measuring the success of digital projects in Ghana's cocoa value chain

KPIs



18. COCOBOD: Ghana's Cocoa Marketing Board

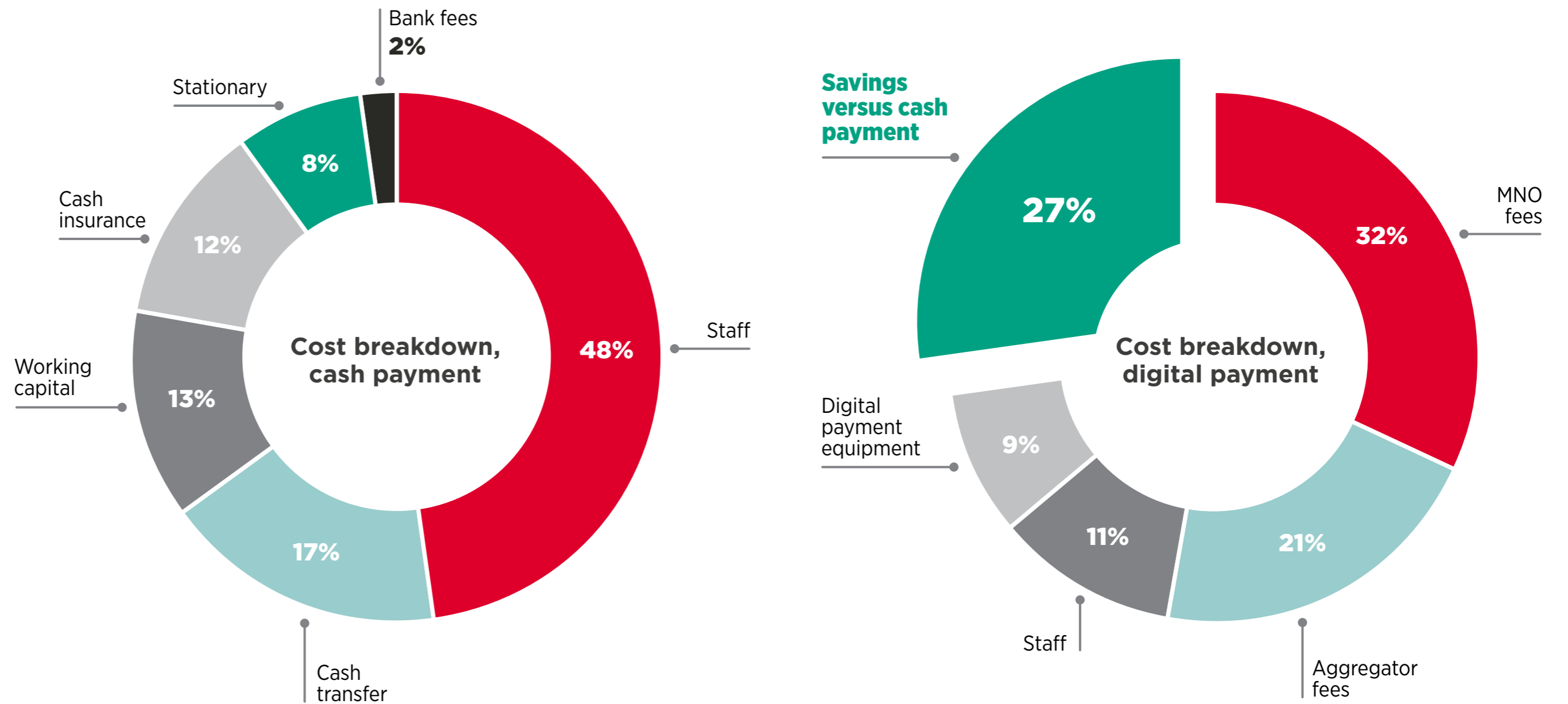
19. Evacuation: transfer of procured cocoa from purchasing clerk locations to a cocoa buyer's central warehouse

Case study #1: coffee buyer Kyagalanyi improves value proposition after shifting to digital payments

Case studies

Figure 24 **Cost breakdown, cash payment versus digital payment**

Kyagalanyi Coffee Limited (KCL), a member of ED&F MAN Volcafe Coffee Division, conducted an agricultural payment digitisation pilot along the coffee value chain in Uganda. Farmers and traders²⁰ supplying coffee beans to KCL could opt to receive their payments in cash, mobile money or a combination of the two. A cost comparison of cash payments and digital payments revealed that **digital payments are 27 per cent less expensive than cash payments.**



Source: CGAP (2017), [Digitising bulk payments in agriculture: is mobile money cheaper than cash?](#)

20. In addition to procuring directly from farmers, KCL also sources coffee beans from about 900 traders.

Case study #1: coffee buyer Kyagalanyi improves value proposition after shifting to digital payments

Case studies

In addition to the direct cost savings Kyagalanyi saw from shifting to digital payments, the transition to digital payments also resulted in indirect benefits. Value Proposition Mapping revealed that **digital payments actually become 45 per cent less expensive than cash when its direct and indirect benefits are taken into account.**²¹ Figure 25 below shows the breakdown of total cost reduction as a result of direct and indirect benefits.

Figure 25 **Direct and indirect benefits of digital payments (percentage of total cost reduction)**



21. Sourced from: CGAP (2017), Digitising bulk payments in agriculture: is mobile money cheaper than cash?

Case study #2: Olam International embraces digital with a range of last mile tools

Case studies

OLAM DIRECT²²

- Digital Origination
- OFIS
- Olam Traceability
- Digital Warehouse
- Digital Procurement

OLAM INSIDE

- AtSource
- E-Commerce

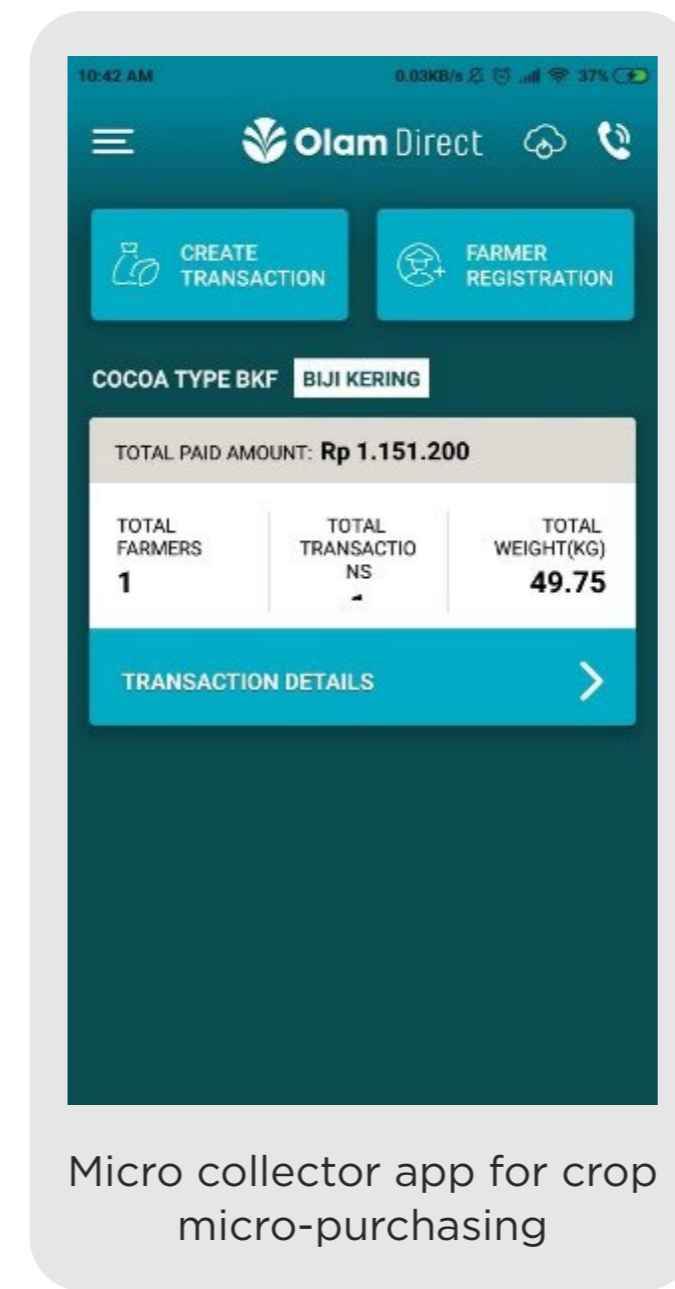
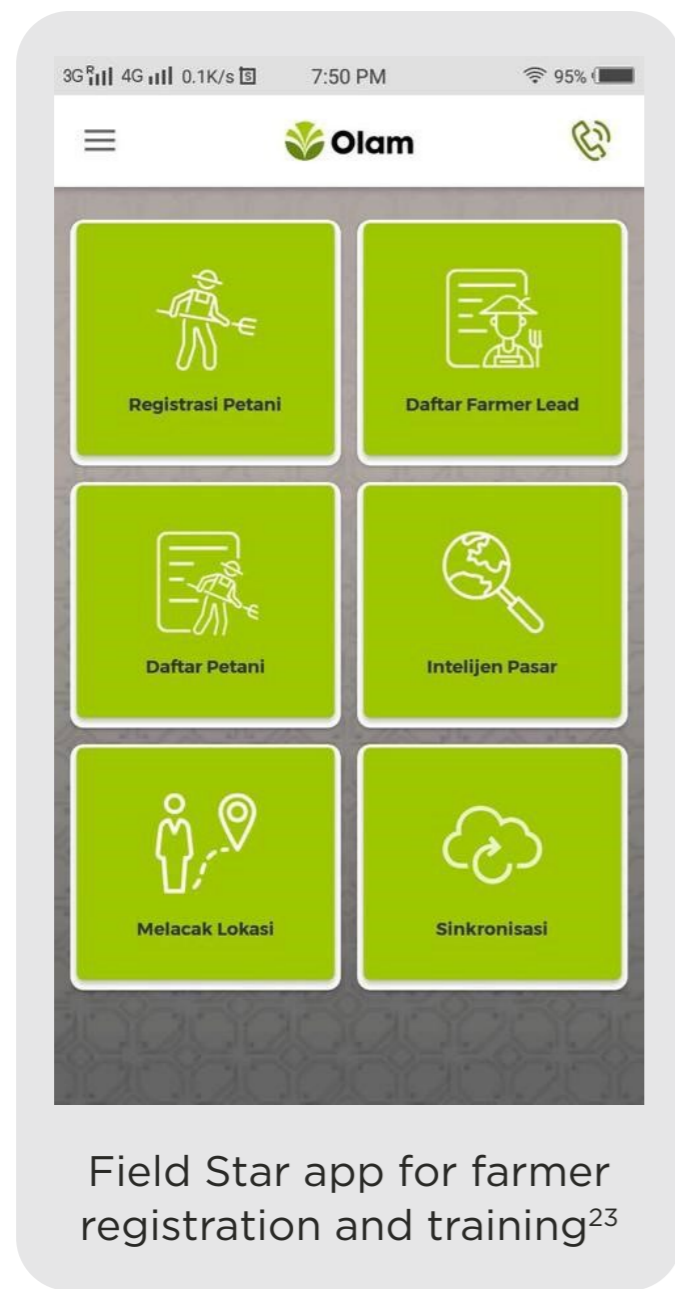
OLAM FORWARD

- Smart Factories
- Smart Farms
- E-trade Finance

22. Olam (2019), Re-imagining Olam: Offering tomorrow's products & services, Strategic Plan 2019-2024.

Case study #2: Olam Direct deploys Digital Origination suite of apps

Case studies



23. Sourced from: GSMA (2019), *AgTech Innovation Unlocks Economic Identities for Smallholder Farmers in Indonesia*.

Case study #3: Barry Callebaut uses Katchilè app for traceability in the cocoa supply chain

Case studies

Katchilè²⁴ is a cloud-based last mile digital tool for tracing cocoa beans and managing sustainability data. Using technology solutions from SAP, it combines desktop and mobile access and allows information on farmers, their farms and communities to be digitally recorded at every level of the supply chain.

Farmer registration, cocoa buying, processing and transportation records enable cocoa beans to be traced from the farmer to Barry Callebaut's warehouse. Sustainability-related activity records also help to assess and analyse the needs of individual farmers and communities, resulting in higher quality of beans and impact.



Key findings and recommendations

-
- Agricultural organisations face pain points in processes and systems related to agribusiness-farmer engagement, farmer recruitment, programme management and farmer payment. These pain points affect a wide range of value chain activities, such as farm and farmer profiling, agricultural extension support and crop payment and receipt issuing.
-
- Holistic digital agriculture tools integrate multiple solutions and can help address multiple pain points at once. They give agricultural organisations greater control over their operations as they allow them to monitor them more closely, provide more transparent transactions and create effective communication channels, both internally and with smallholder suppliers.
-
- Agricultural organisations involved in a digital tool implementation project need to 1) define business objectives and attach clear timelines to the delivery of the project; 2) identify metrics of project success that can help measure progress and the extent to which strategic objectives have been achieved; and 3) identify project implementation partners and assign them specific activities to achieve the business objectives.
-
- Evidence shows that the transition to digital payments can have both direct and indirect benefits for agribusinesses. For a commodity buyer in the coffee value chain in Uganda, for example, a cost comparison of cash payments and digital payments revealed that digital payments were 27 per cent less expensive.



Prerequisites to digitising the agricultural last mile

March 2020

3



Introduction



What is the focus of this chapter?

This chapter explores the challenges facing mobile network operators (MNOs) and mobile money providers in rural areas, and the range of initiatives they can pursue to address the prerequisites to digitise agricultural value chains. It highlights why the participation of MNOs is crucial to unlocking the opportunity to digitise the agricultural last mile, namely, by enabling coverage and connectivity in rural areas. It also explains the role of mobile money providers in supporting functioning and liquid mobile money networks.

What is the structure of the chapter?

This chapter consists of three sections. With a focus on network connectivity, the first section makes the case for expanding rural networks. The second section examines the need to support liquid and functioning mobile money networks. The chapter concludes with a section on due diligence and the need to implement flexible yet rigorous practices.

Who is this chapter aimed at?

The chapter is aimed primarily at MNOs, which we argue are well positioned to develop holistic enterprise solutions for the agricultural vertical. However, this chapter will also be of interest to mobile money providers, agritech companies, donors and regulators, which must all work together to create enabling environments for the uptake of mobile money services in rural areas.

Key questions addressed in this chapter



Connectivity

Expanding coverage to rural areas

- 1** How can mobile operators support network expansion into rural areas and ensure adequate coverage for digitisation initiatives?



Liquidity

Supporting liquid and functioning mobile money networks

- 2** How can mobile money providers ensure agent networks are reliable and sufficiently liquid to support last mile payments?



Due diligence

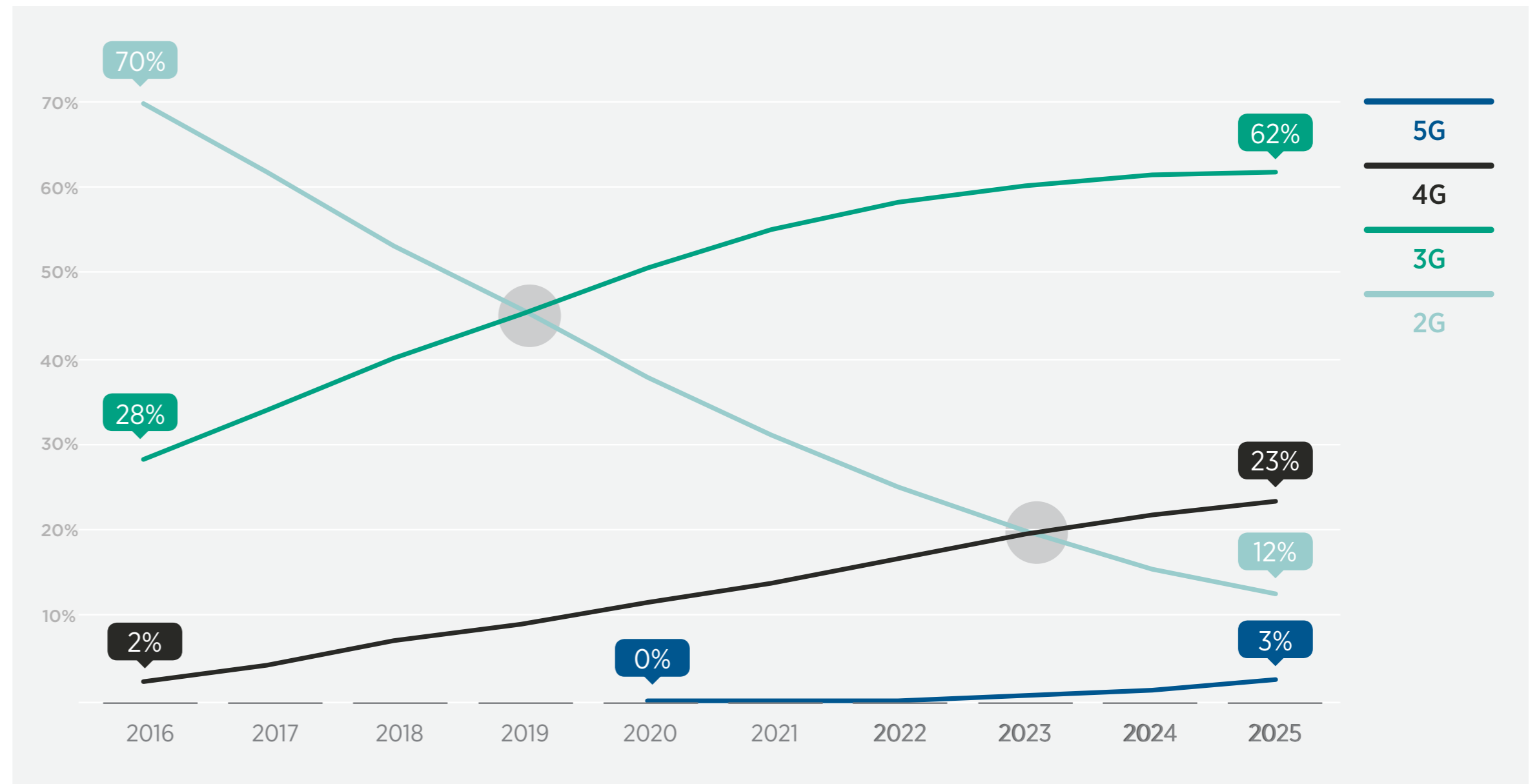
Implementing flexible yet rigorous practices

- 3** What due diligence principles and best practices should be applied to promote uptake of last mile payments?

Despite advances to 3G technology take-up, 2G accounts for the majority of connections in developing markets

Connectivity

Figure 26 **Percentage of connections (excluding licensed cellular IoT) by mobile technology type in Sub-Saharan Africa**



Unlocking the opportunity to digitise agricultural value chains will require both 2G (SMS, STK, USSD and IVR) and 3G networks (software-based enterprise solutions and rich media services). However, only a small proportion of connections use 3G technology, almost entirely in urban areas. The vast majority of connections in rural areas still rely on 2G.²⁵

25. GSMA Intelligence (2019), *The Mobile Economy Sub-Saharan Africa*.

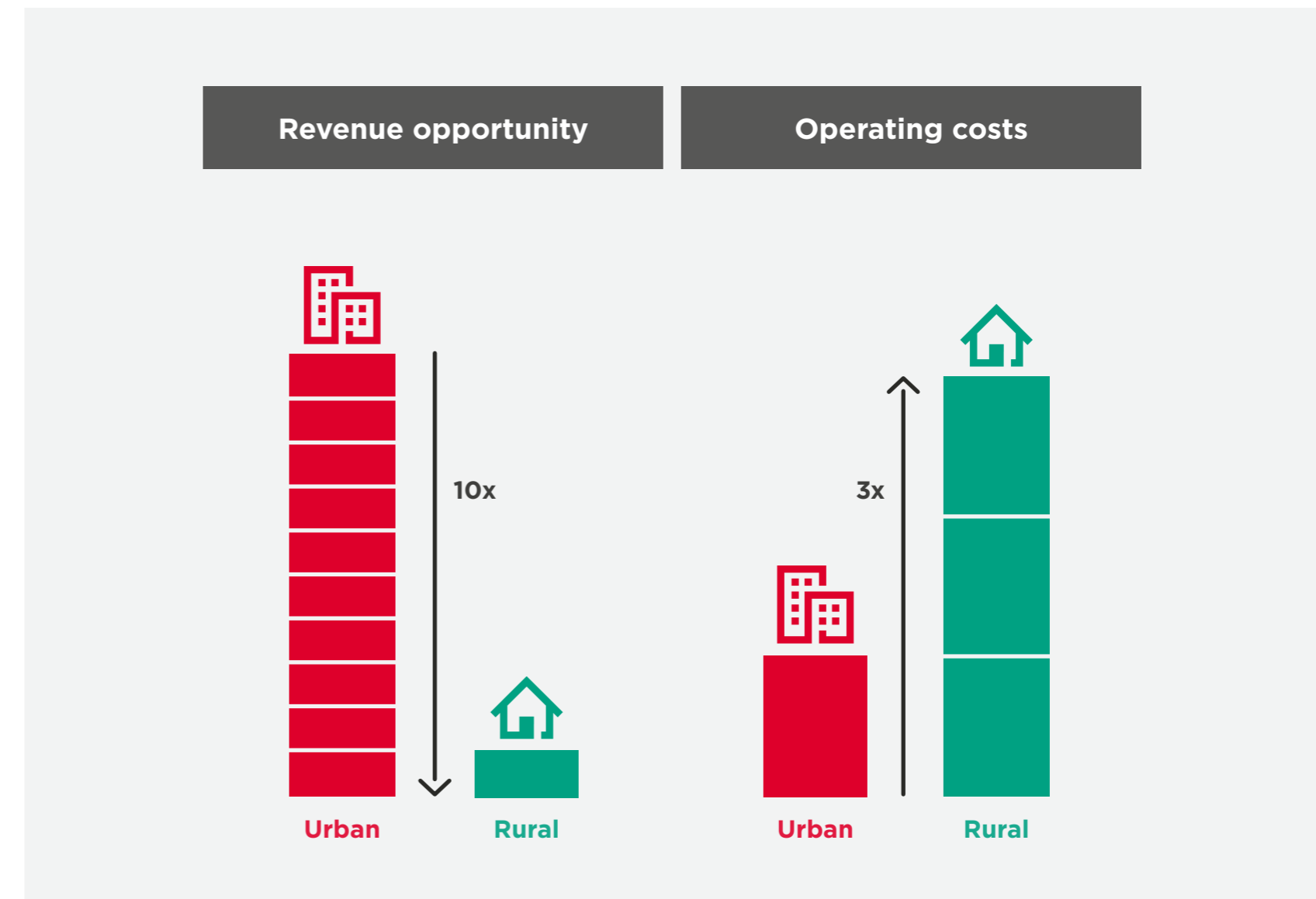
The business case for rural network expansion is challenging

Figure 27 **Business case for rural versus urban base stations²⁷**

Closing the coverage gap in remote areas is not a technical challenge but an economic one. The cost of deploying infrastructure can be up to three times higher than in urban areas, while revenue opportunities can be up to 10 times lower due to lower population density (often fewer than 100 people per square kilometre) and income levels (less potential revenue from each customer). This combination has a major influence on the business case for rural network expansion.²⁶

A commercially sustainable rural network requires:

- 1. Lowering** the capital expenditures (CapEx) and operating expenditures (OpEx) of cell sites and infrastructure, which will increase the return on investment (RoI) of extending coverage.
- 2. Reducing** the risks of investing in mobile infrastructure (i.e. lowering the cost of capital).
- 3. Enhancing** demand for mobile services in rural areas, which will unlock new revenue opportunities to make these new investments more profitable and attractive.



26. GSMA Connected Society (2017), *Unlocking rural coverage: Enablers for commercially sustainable mobile network expansion*.

27. GSMA (2018), *Enabling rural coverage: Regulatory and policy recommendations to foster mobile broadband coverage in developing countries*.

Rural network expansion depends on innovation in the private and public sectors

Connectivity

Strategies and policies to improve the business case for rural network expansion



MOBILE OPERATORS

- Network sharing (passive and/or active models);
- Drawing on targeted government support (subsidies, universal service funds);
- Software-based networks; and
- Aerial (i.e. drones).



PUBLIC SECTOR

- Ensure cost-effective access to low-frequency spectrum;
- Support for spectrum refarming;
- Offer flexible licence conditions for service quality in rural and remote locations;
- Provide regulatory support for all forms of infrastructure sharing;
- Ensure non-discriminatory access to public infrastructure;
- Streamline planning approval processes;
- Eliminate sector-specific taxation on operators, vendors and consumers;
- Adopt a realistic position on competition policy, especially concerning market structure; and
- Support multi-sided business models, such as zero rating and sponsored data.

CASE STUDY



Progressive policies help MNOs extend rural network coverage in India

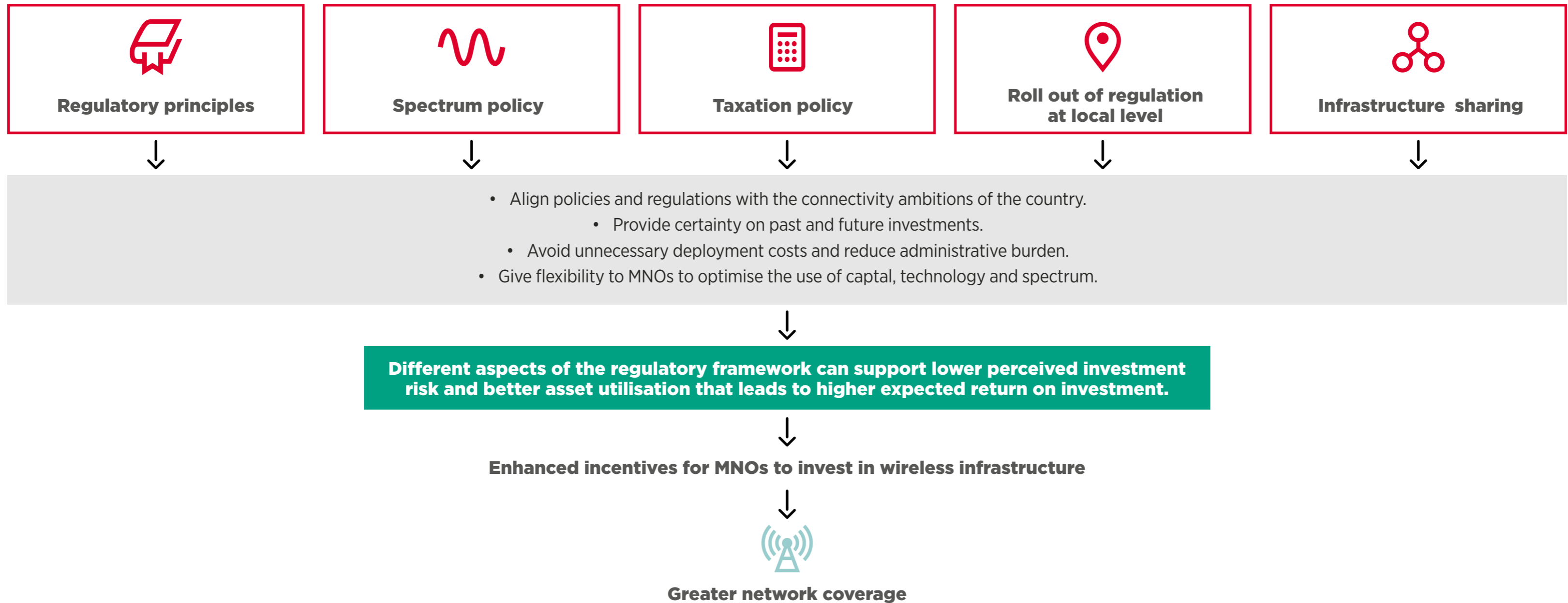
In 2007, there were about 100,000 base stations in India covering 40 per cent of the country's land area. This left an estimated half a billion people without mobile coverage.

Since then, the Telecom Regulatory Authority of India (TRAI) has modified licence agreements to allow MNOs to share both passive and active network infrastructure. The regulator also approved subsidies for tower deployment in rural areas using funds from the Universal Service Obligation Fund (USOF).

Tower sharing has stimulated investment and competition in India, with the overall base station count rising to 450,000 at the end of 2014, a 4.5-fold increase from 2007. As a result, 87 per cent of the population has 2G network coverage, with mobile services available to many communities for the first time.

Enabling regulatory frameworks support investment in rural areas

Figure 28 **Elements of a regulatory framework supporting investment in rural areas²⁸**



Rural network expansion offers opportunities beyond traditional revenue streams

Connectivity

MNOs should prioritise specific regions for network expansion based on an analysis of the entire revenue opportunity – not only voice, messaging and data, but also mobile financial services and the broader suite of enterprise solutions.

The agricultural vertical offers an opportunity for mobile money services and enterprise services, as demonstrated by the potential direct revenue opportunity from the digitisation of business-to-person (B2P) payments to farmers using mobile money. Digitising payments for large agribusinesses can provide the transaction volumes necessary to support rural network expansion.

To sustain this opportunity, MNOs must identify and prioritise network expansion in rural areas with greater potential to generate new revenue streams from the agricultural sector. To shed light on these growth opportunities, MNOs must invest in research at a regional or district level.

CASE STUDY



MTN Uganda makes rural base stations profitable by supporting an agricultural payments pilot²⁹

Before it launched a pilot to digitise payments for a target market of 12,000 farmers in the coffee value chain, MTN Uganda strengthened its network coverage in the Mount Elgon region.

To reduce the initial investment risk in a new base station, which farmers needed to receive payments at the point of sale (coffee washing stations), the operator received a \$100,000 loan from The Bill & Melinda Gates Foundation. After it was deployed, the base station became profitable within three months of the pilot launch.

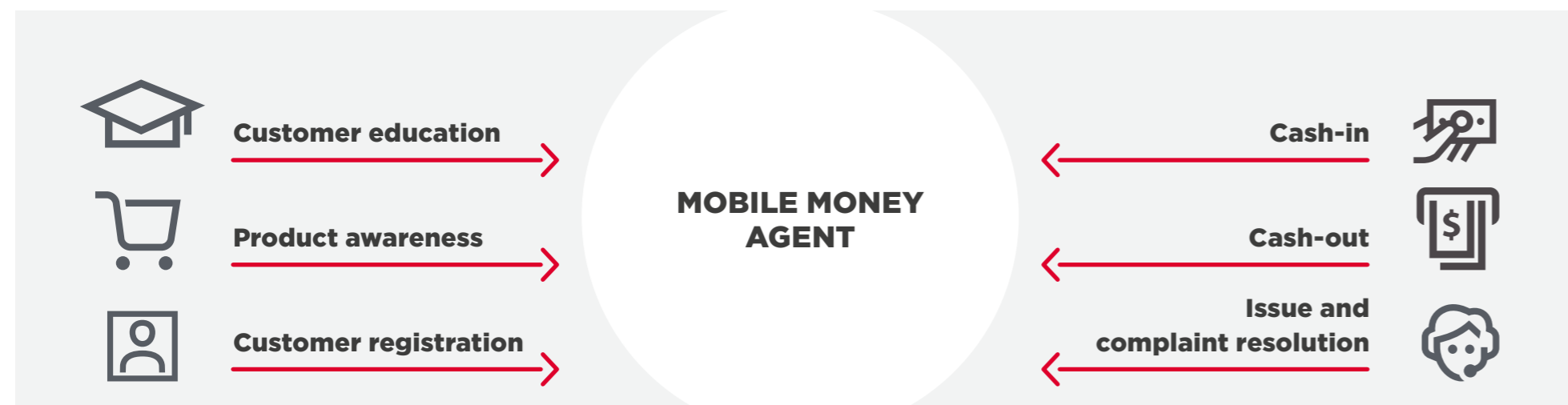
A reliable, liquid agent network is essential to support last mile agricultural payments

Liquidity

Successful initiatives to digitise last mile payments to farmers will depend on the proximity, availability, reliability and liquidity of mobile money agents in the proposed location.

Mobile money providers have invested heavily in expanding the reach of agent networks. In Kenya in 2017, there were over 170,000 registered mobile money agents who helped increase the penetration of formal financial services (banking and mobile money) in rural households.³⁰

When transactions (e.g. value chain payments) are performed via third parties such as aggregators, it is crucial they have strategic partnerships with mobile money providers that manage the actual sales and distribution channel and are responsible for the provision of liquidity.



CASE STUDY



Yo Uganda builds its own sustainable cash-out agent network³¹

In Uganda, third parties (aggregators) have tried to directly support the disbursement of payments to farmers. Yo Uganda, for example, recruited 75 agents to perform cash-outs for coffee farmers participating in a value chain payment digitisation initiative with agribusiness Kyagalanyi. This has been challenging and costly for Yo Uganda, which had no previous knowledge of setting up agent networks. Managing cash liquidity has been the most challenging aspect since farmers chose to cash-out their payment immediately after receiving the funds.

30. GSMA (2017), *State of the Industry Report on Mobile Money: Decade Edition 2006-2016*.
 31. GSMA (2017), *Opportunities in agricultural value chain digitisation: Lessons from Uganda*.

Agent liquidity is crucial, but challenging in rural areas

Liquidity

Due to the seasonality of agriculture, farmers in the same value chain in the same region will receive payments at the same time, putting pressure on agents to have large amounts of cash available at certain times of the year.

Early on, when a rural mobile money ecosystem is still maturing, spikes in demand for cash will exacerbate the liquidity burden for agents, as farmers will want to access some or all their income in cash at the same time. Insufficient float or cash will likely cause agents to turn clients away, who will then lose faith in the agent and potentially the entire mobile money service.

Given the challenges of ensuring liquidity in rural areas, success with rural and agricultural payments requires significant innovation and appetite for investment on the part of mobile money providers.

Figure 29 **Example of daily cash-out demands on an agent**

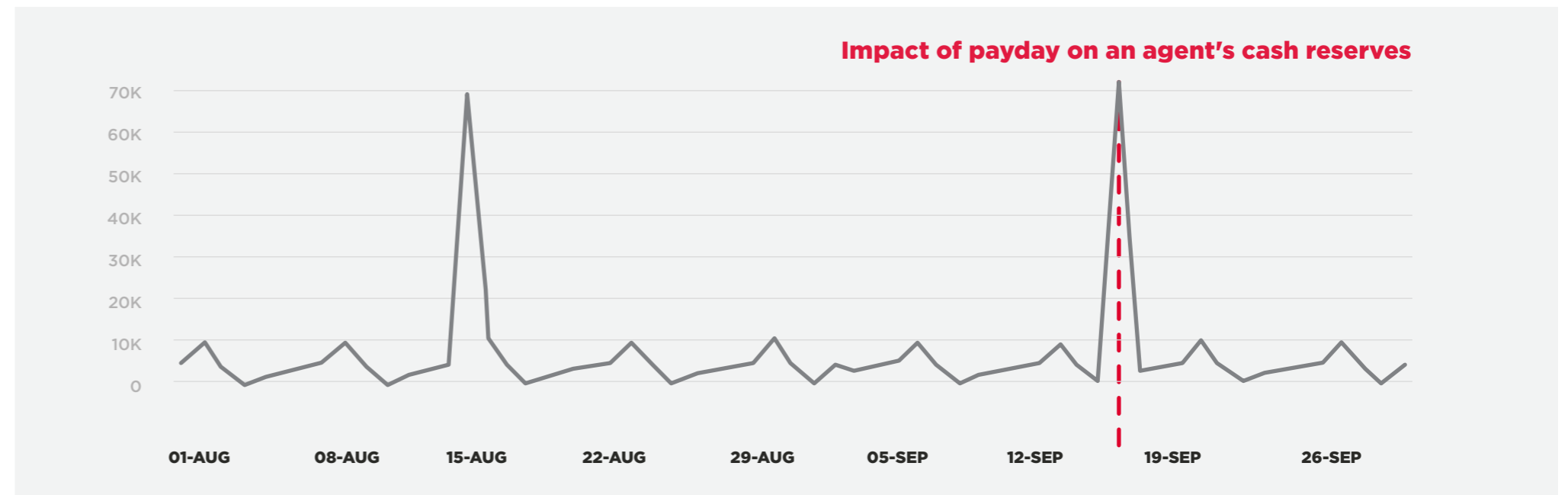
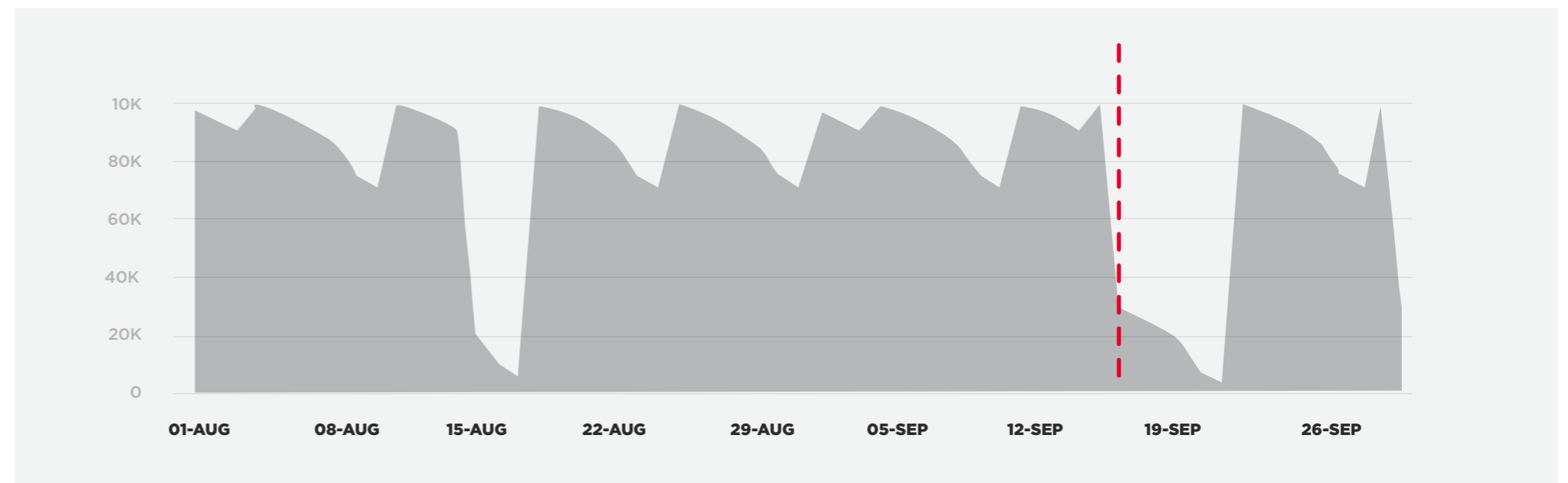


Figure 30 **Example of an agent's daily cash supply**



Initially, agent incentives will be needed to support cash-outs to farmers

Liquidity

Agents are paid commissions (tiered or percentage-based) for performing transactions (cash-in, cash-out and over-the-counter transactions) and registering new customers. In rural areas, the operational challenges of ensuring agents have capital, physical cash and float are heightened by the presence of, or proximity to, basic infrastructure, such as banking, electricity and transport.

To support the digitisation of last mile agricultural payments, mobile money providers will need to consider setting their commercial arrangements (commissions) to incentivise agents and support cash-outs. This will require:

- 1** Investing in e-money (float);
- 2** Rebalancing e-money and cash as necessary; and
- 3** Learning the processes for registering and educating new users, as well as serving existing customers.

Given the importance of agent commissions for the mobile money business model (see case study), it is unlikely that mobile money providers will be able to offer more generous commissions.

Key lessons from activating rural mobile agents:

- 1** Link commissions to quality parameters (e.g. customer loyalty and listening behaviour) to encourage agents to attract high-quality farmers.
- 2** Ensure agents understand the commission structure and benefits on offer, as well as the processes required to register new customers.³²
- 3** Provide “soft” non-financial incentives, such as offering best performers the opportunity to move up the ladder and sell other products, or providing agents with gadgets (e.g. branded clothing, sun umbrellas) to give them a sense of pride and belonging in the service community.

CASE STUDY



The importance of agent commissions to the mobile money business

Agents are still the backbone of the mobile money industry, so the cost structure of mobile money providers continues to be driven by OpEx like agent commissions, marketing and personnel. In 2016, mobile money providers reported that, on average, 68 per cent of their costs were OpEx.³³

³². In Malawi, agents are reluctant to offer new account registration because it is time consuming and claiming the commission requires significant paperwork that tends to get lost. The commission structure should therefore be clear and trusted by agents, otherwise they will not follow the process.

³³. GSMA (2018), *State of the Industry Report on Mobile Money 2017*.

Master agents play a key role in selecting, training and incentivising rural agents

Liquidity

Master agents have proved essential to rapid distribution network expansion in remote regions, provided the right incentives are in place. Master agents buy float from the mobile money provider and then resell it to agents.

To encourage sales and transactions at the local level, master agents are typically paid a share of the percentage earned on agent commissions (generally an 80/20 split with 20 per cent retained by the master agent).³⁴

Key tasks of master agents in rural areas³⁵

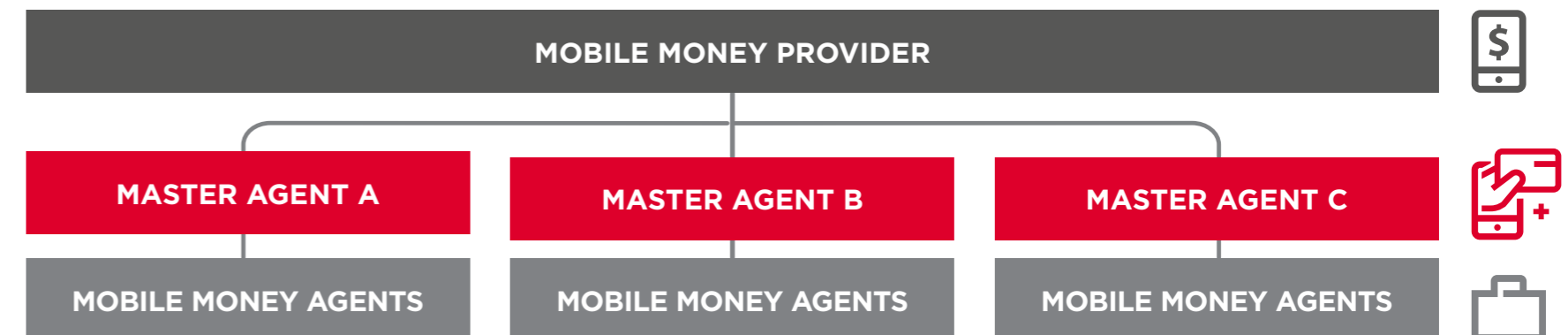
Agent selection: Should be able to recruit new agents and identify suitable new locations based on their prior knowledge of the region.

Agent onboarding: Should have an excellent understanding of the documentation required by the mobile money provider when recruiting new agents, and should be able to support new agents in gathering the correct documentation.

Liquidity management: Should be physically mobile, visiting their agents in person to supply them with liquidity (physical cash or e-money).

Monitoring and compliance: Research shows successful master agents have relationships with the majority of their agents before managing them.

Agent training: Should be able to provide assistance on queries about training, branding and technical issues.



CASE STUDY

MTN Zambia's early onboarding of master agents ensures rural agents are supported when making agricultural payments

When it is acquiring new agribusiness clients, MTN Zambia's mobile money unit provides details of the agreement to master agents in target rural areas, including the number of farmers who will be involved and the average value of payments. This way, master agents can see agribusiness recruitment as a business opportunity and commit to liquidity management. Typically, master agents are required to guarantee at least \$400 in float per agent at the time agricultural payments are made.

³⁴. GSMA (2015), *Spotlight on rural supply: critical factors to create successful mobile money agents*.

³⁵. Information adapted from: <http://www.helix-institute.com/blog/demystifying-role-master-agents>

Expansion into rural areas requires rethinking agent profiles and selection criteria

Liquidity

Evidence from primary research in Chad and Mali suggests the need to rethink agent profiles in rural areas.³⁶ Industry best practice suggests that agents should be recruited based on the following five characteristics:

Agent selection criteria ³⁷	 Ability to maintain cash and e-float balance	 Strategic retail	 Literate staff	 Trusted by the community	 Potential customer reach
Key considerations for agent selection in rural areas	<ul style="list-style-type: none"> • A master agent model becomes a crucial rebalancing mechanism in rural areas where traditional financial infrastructure is lacking. • Agent interoperability may be considered to reduce the liquidity burden in remote locations. 	<ul style="list-style-type: none"> • Successful rural agents tend to have a broad product portfolio (selling SIMs and scratch cards as well as mobile money). • Successful rural agents tend to be well-established businesses rather than new kiosks. • Agents should have sufficient demand for transactions. Too many agents in one area with too little demand will cause some or all to leave the business. 	<ul style="list-style-type: none"> • Customer awareness building and education are key activities of agents and require digital and financial literacy, often in multiple languages. • Having agents that are sufficiently literate is key to success. In rural areas, barriers to mobile money use are likely to be higher due to lower literacy rates and awareness of mobile money. 	<ul style="list-style-type: none"> • Rural customers are more likely to return to the same agent repeatedly. • Rural customers are more likely to visit agents that already have established businesses, rather than new kiosks. • Rural agents must be trained to be farmer friendly because serving rural populations requires more time and patience. 	<ul style="list-style-type: none"> • Successful rural agents perform transactions on behalf of more than one mobile money provider. This creates a better business case for the agent. • The mobile money provider should identify locations where demand for mobile money services will be high enough to create a sustainable business case for agents. • There should be a good ratio of agents to customer demand.

36. GSMA (2015), *Spotlight on rural supply: critical factors to create successful mobile money agents*.

37. Information adapted from: <http://www.helix-institute.com/blog/demystifying-role-master-agents>.

Effective communication is critical to digitising agricultural payments in the last mile

Liquidity

Clear lines of communication must be established between the agribusiness, aggregator (where relevant), mobile money provider, master agents and individual agents, so that all stakeholders understand when, who and how many farmers are going to be paid.

A breakdown in communication will likely lead to insufficient cash liquidity and force agents to turn farmers away, breeding distrust in the service.

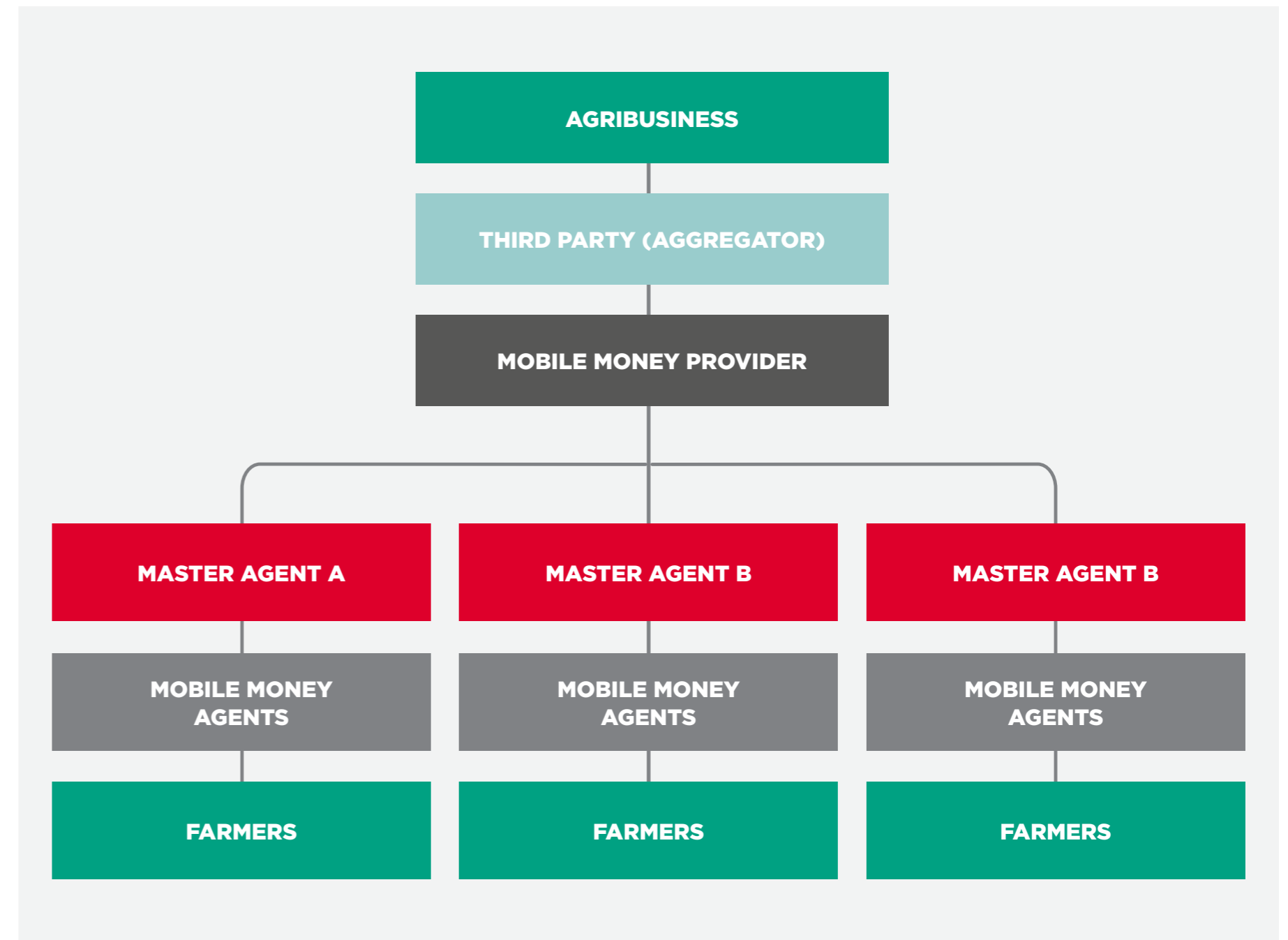
SMS notifications or call centres can be used to ensure effective communication between mobile money providers, master agents and individual agents before, during and after last mile payments.

CASE STUDY



Consistent communication is key for MTN Ghana to maintain good customer service

In Ghana, when agribusiness Cargill makes a procurement payment to farmers via MTN’s bulk payment platform, it promptly communicates its intention to MTN, which in turn contacts master agents. The master agents are incentivised to ensure individual agents have sufficient liquidity, even travelling to visit individual agents and rebalance their float. This official channel of communication, coupled with adequate incentives, are key to effective disbursement of bulk payments.



Flexible due diligence promotes rural uptake of mobile money services

Due diligence

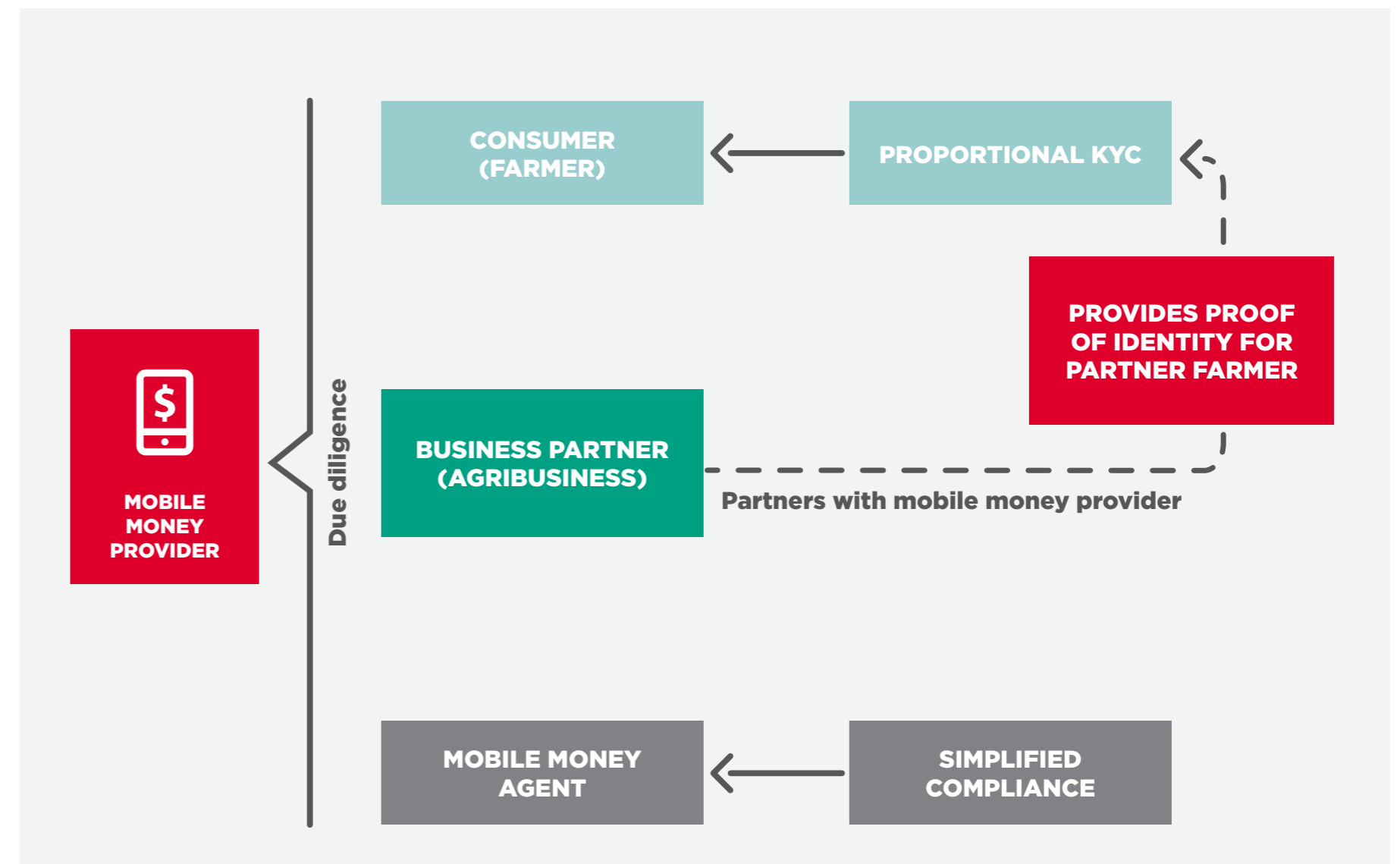
Conducting due diligence enables a financial services provider (e.g. mobile money provider) to evaluate relevant (past, present and future) aspects of potential customers and business partners, and protect itself from risk.³⁸

Complex due diligence processes impede service uptake, especially since many rural customers (farmers) and agents are not likely to have the official documentation required to sign up for a mobile money account.

To enable uptake of mobile money services in rural areas, it is important to minimise due diligence requirements while also maintaining the integrity of the financial system. Proportional Know Your Customer (KYC) for farmers and simplified compliance for agents can help to overcome this systemic challenge.

Agribusinesses and cooperatives have an important role to play, not only because as formal entities they are more likely to be able to open a corporate account, but also because they can support service providers by providing proof of identity for the farmers they work with.

Figure 31 **Agribusiness role in farmer KYC**



Proportional KYC requirements can boost mobile money adoption among the rural poor

Due diligence

KYC requirements for opening a mobile money account can be challenging, especially for the rural poor, including farmers, who are most likely to lack the necessary ID.

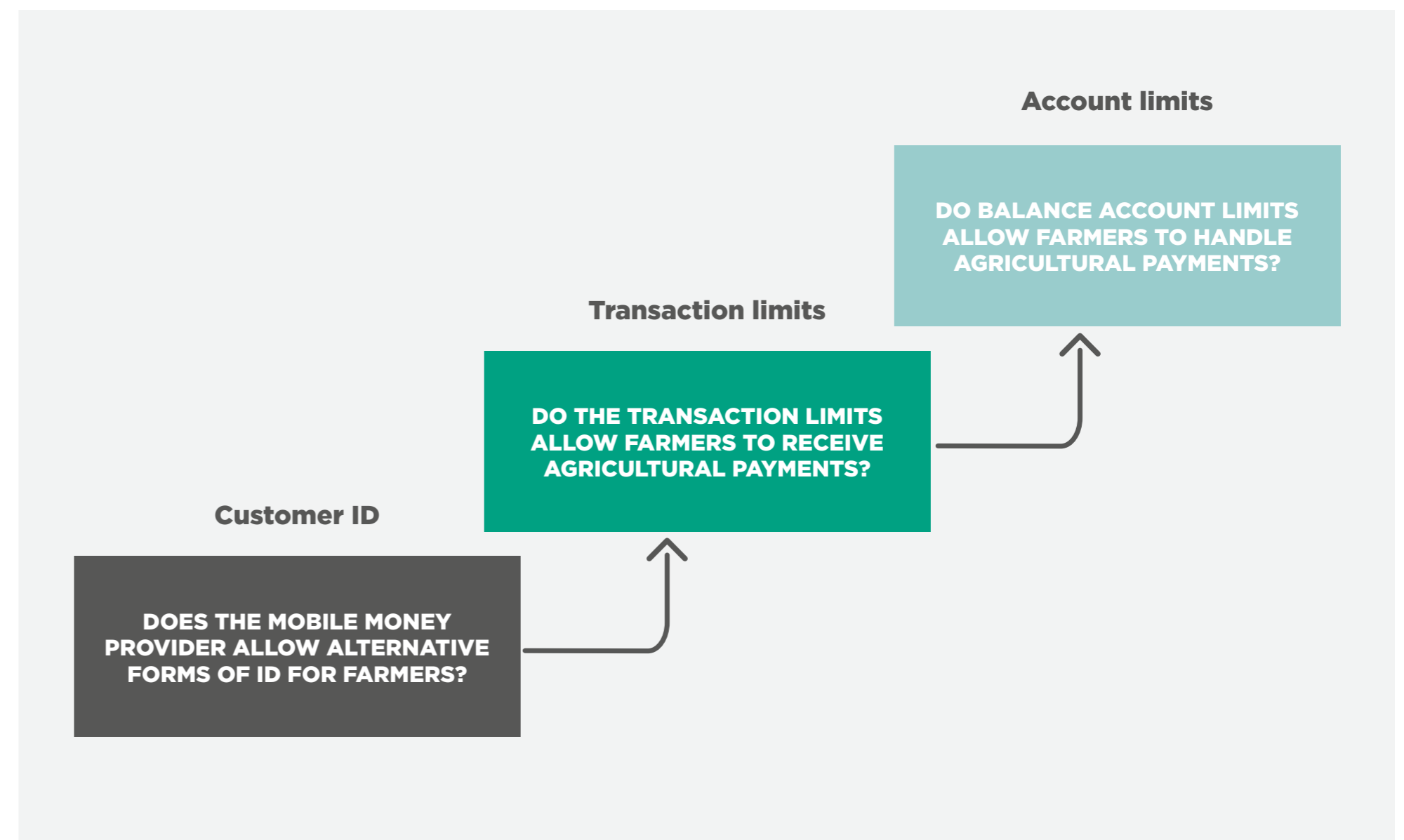
To address onerous due diligence requirements, regulators are increasingly applying the principle of proportionality: if a product is deemed to be low risk, simplified KYC permits easier customer identification and verification.

The principle of proportionality allows alternative forms of ID to be accepted (e.g. letter from employer) and sets ad hoc transaction limits on accounts where less formal or no ID is provided.

To support the digitisation of the last mile, proportional KYC must allow:

- 1** Alternative forms of customer identification for farmers;
- 2** Suitable (inbound) individual and daily transaction value limits to allow farmers to receive agricultural payments; and
- 3** Suitable maximum account balance limits to allow farmers to handle agricultural payments in their accounts.

Figure 32 **Value chain digitisation: building blocks of proportional KYC**



Agribusinesses and cooperatives can help provide proof of identity for farmers

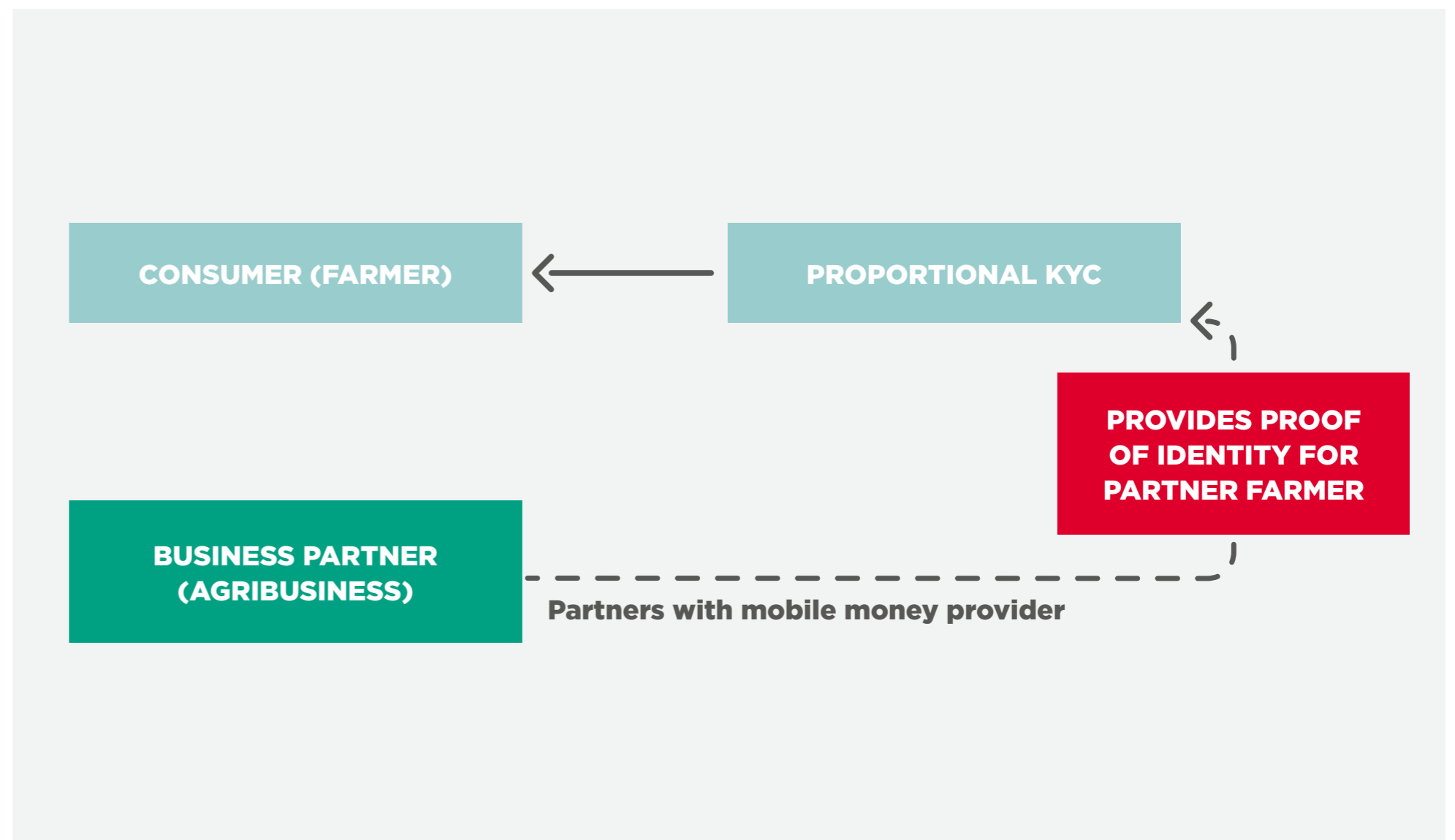
Due diligence

The introduction of alternative forms of customer identification can be challenging because even progressive financial regulators typically require mobile money providers to request some form of formal ID to access entry-level mobile money accounts.

Where national ID schemes are particularly weak, some financial services regulators have allowed providers to accept alternative forms of documentation to open mobile money accounts (e.g. India, Fiji, Somaliland).

When a prospective customer does not possess formal documentation, alternative forms of ID may include reference letters confirming the identity of the individual. Referees can be village elders, regional government/administration officials (e.g. social welfare office, healthcare centre) or employers.

As entities that pay farmers even when they are not directly employing them, agribusinesses and cooperatives can play an active role in ensuring farmers can open mobile money accounts. For example, by providing proof of ID as set out by the regulator, such as an employer ID and/or a reference letter.



Accounts must accommodate the size and frequency of value chain payments

Due diligence

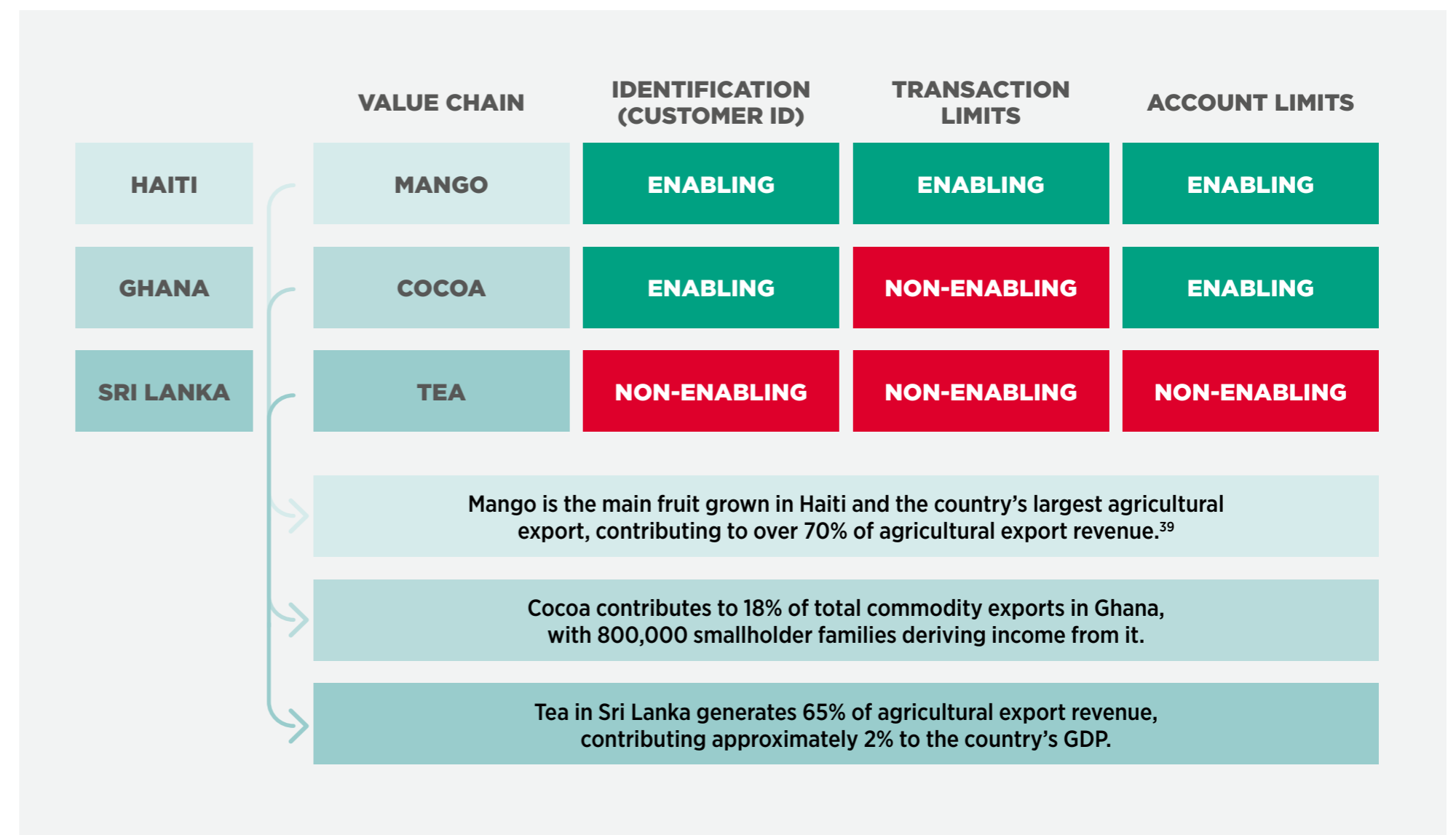
Mobile money providers must comply with the transaction value and account size limits mandated by financial sector regulators in their markets.

The average size and frequency of transactions vary widely depending on the value chain. Mobile money providers must therefore consider whether account sizes and transaction limits can handle payments in the targeted value chains.

To allow a full breadth of opportunities in the digitisation of agricultural payments, it is imperative that mobile money providers understand the unique nature of the agricultural sector.

In countries such as Haiti, Ghana and Sri Lanka, where mobile money providers are digitising last mile payments for the procurement of key cash crops, the transaction value and account size limits mandated by regulators have been challenging to implement.

Figure 33 **KYC requirements and implications for digitising last mile payments in selected countries**



39. See: <https://knoema.com/jjpyxgb/haiti-agriculture-trade-statistics>

Case study #1: cash-out fees have been an obstacle to the digitisation of cocoa payments in Ghana



Due diligence

The Bank of Ghana permitted mobile money providers to issue a minimum KYC account (no proof of address required) with a balance limit of GHS 1,000 (\$226) and an aggregate daily transaction limit of GHS 300 (\$68). The Bank’s mid-level KYC account, which corresponds with the maximum balance account offered by MTN’s mobile money service MoMo, has a maximum balance limit of GHC 10,000 (\$2,260) and an aggregate daily transaction limit of GHC 2,000 (\$453).

During Ghana’s main cocoa season (October to January), a cocoa farmer delivers an average of sixteen 64-kilo bags of cocoa beans (\$108 per bag at 2017 prices) to buyers.⁴⁰ However, daily transaction limits on minimum KYC accounts have meant farmers must withdraw cash several times during the cocoa season and ensure that their next payment does not exceed their account balance limit.

Withdrawal fees became the greatest barrier to mobile money adoption among farmers, with every transaction over GHS 50 incurring a one per cent fee.

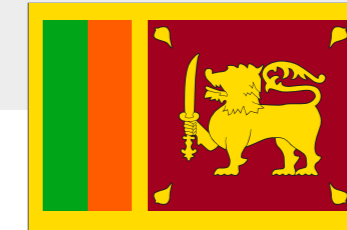
MTN and agribusiness Cargill partnered to digitise cocoa procurement in Ghana. However, given the challenge of withdrawal fees, their initial focus was on digitising only premium payments for cocoa farmers registered in certification schemes (on average \$5.50 per bag). Since 2017, MTN has partnered with several agribusinesses to digitise cocoa procurement in Ghana, including Royal Commodities.

MTN MOMO ⁴¹ (MID-LEVEL KYC ACCOUNT ALLOWED BY THE BANK OF GHANA)		IMPLICATIONS FOR COCOA VALUE CHAIN PAYMENTS	
Account balance limit	GHS 10,000 (\$2,260)		Account balance limits are unlikely to be an issue for farmers receiving mobile money payments.
Aggregate daily transaction limit	GHS 2,000 (\$453)		Farmers need to perform multiple cash-outs to retrieve their funds during the cocoa season and to ensure the next payment does not exceed their account limit.
Withdrawal fee per transaction	GHS 0.50 (FOR GHS 1-50) (\$0.10)		Farmers bear the cost of multiple withdrawals, increasing the burden of digital payments. Even the smallest possible payment incurs a one per cent withdrawal fee.
	1% OF TOTAL (FOR GHS 50 AND ABOVE)		

40. GSMA (2018), *Opportunities in agricultural value chain digitisation: Learnings from Ghana*.

41. MTN Ghana - MoMo: <https://mtn.com.gh/insight/momo-tariffs/>.

Case study #2: caps on mobile money have limited the opportunity to digitise Sri Lanka's tea sector



Due diligence

When Sri Lanka's central bank capped the size of mobile money accounts at LKR 25,000 (\$160), agribusinesses were prevented from implementing digital payments in the tea value chain, by far the largest agricultural export in the country and widely produced by smallholder farmers.

Typically, a single agribusiness-to-farmer payment for tea crops in Sri Lanka ranged from LKR 25,000 to 50,000 (\$160-\$320). These payments, made on a monthly basis, significantly exceeded the maximum account size limits permissible in the market. The only option for an agribusiness was to send payments to farmers' accounts in multiple instalments.

Additionally, the maximum withdrawal allowance mandated by the financial regulator was LKR 5,000 (\$32) per transaction. This has meant tea farmers must cash-out multiple times to retrieve their full funds and pay fees of LKR 100 (\$0.60) per withdrawal – an additional cost and inconvenience.

MOBILE MONEY LIMITS AND FEES ⁴²		IMPLICATIONS FOR TEA VALUE CHAIN PAYMENTS	
Maximum account size	LKR 25,000 (\$160)		On average, a single tea value chain payment is twice the amount a mobile money account can hold.
Withdrawal transaction limit	LKR 5,000 (\$32)		Farmers have to perform multiple cash-outs – an inconvenient process.
Withdrawal transaction fee	LKR 100 (\$0.60)		Farmers bear the cost of multiple withdrawals, increasing the burden of digital payments.

42. Dialog Sri Lanka – EzCash: <https://www.ezcash.lk/pricing.php>

Simplified compliance requirements for agents support rural network expansion

Due diligence

Placing heavy compliance or financial constraints on potential agents will limit their ability to scale the distribution network in rural and underserved areas, where businesses are often less formal and less likely to have official business documentation.

Maintaining the integrity and financial sustainability of the agent network must therefore be balanced with proportionate due diligence.

PROSPECTIVE MOBILE MONEY AGENTS MUST GENERALLY:

PROVIDE DOCUMENTATION

- **Submit** formal documents (e.g. certificate of incorporation, VAT and tax certificates, company profile, business plan, copies of IDs of directors and key staff, business permits, proof of trading).
- **Prove** they have sufficient working capital.
- **Complete** an application form.

COMPLETE TRAINING

- **Commit** to completing a training programme for agents to perform anti-money laundering (AML) and combating the financing of terrorism (CFT) checks on clients.

STRATEGIES FOR SIMPLIFIED COMPLIANCE INCLUDE:

Reducing the complexity of documents required to sign up agents, ensuring proportionality. Mobile money providers should consider more flexible processes, for example, only asking prospective agents to provide business permits, proof of trading and evidence of sufficient working capital.

Empowering mobile money providers to conduct their own AML/CFT training so that agents can be trained in their own environments without having to travel to major urban centres.

Key findings and recommendations

- While there are still significant challenges in ensuring network coverage in rural areas, last mile digitisation initiatives can focus initially on regional clusters where there is demand from agribusiness clients in suitable value chains and adequate network coverage.
- When opportunities arise in regions without adequate network coverage, it is crucial that MNOs assess the business case for rural network expansion based on the full revenue opportunity of rural base stations, not only voice, messaging and data, but also mobile financial services and a broader suite of enterprise solutions.
- Early efforts by mobile money providers to digitise payments for last mile procurement have proved there is no secret formula to efficiently deploy mobile money agents in rural areas. Mobile money providers are unlikely to offer more favourable commissions to agents given the already pressing burdens of commissions on the mobile money business model.
- There is mounting evidence that efforts to activate rural agents should focus not on changing commission structures, but rather on a) ensuring agents understand the commission structure, the benefits on offer and the registration processes for new customers; and b) providing agents “soft” non-financial incentives, such as offering best performers the opportunity to move up the ladder and become a trusted community member.

Key findings and recommendations

- Rural agent selection and recruitment should be based on five key criteria: 1) the agent's ability to maintain cash and e-float balance; 2) identify strategic retail locations (established businesses); 3) basic and digital literacy for the agent to support their business and the needs of rural customers; 4) "farmer friendliness" and trust from the community; and 5) customer reach based on selecting locations where demand for mobile money services will be strong enough to support a sustainable business case.
- Master agents play a key role in identifying suitable rural agents and incentivising and training them. Early experience in digitising last mile procurement payments for farmers also shows that master agents play a critical role in ensuring liquidity for agricultural payments by maintaining an open line of communication between the mobile money provider, the aggregator (if involved) and individual agents. For mobile money providers, the deployment of master agents should focus on ensuring they are ready and liquid when the season for agricultural payments arrives.
- Proportional yet rigorous KYC is needed to digitise last mile procurement payments and, when formal IDs do not exist or are lacking, formal agricultural buyers like agribusinesses and cooperatives can play an important role in providing alternative proof of identity for the farmers they work with.
- Given the KYC challenge, the ability of mobile money accounts to handle agricultural payments (both the size of single transactions and overall account size) is the single biggest challenge to implementation. Given the significance of agricultural payments for rural economies, financial regulators must consider the needs of the agricultural sector and, if they are willing to take full advantage of mobile money for financial inclusion, they must adapt due diligence regulations to support these transactions.



The GSMA AgriTech Value Chain Assessment Tool (VCAT)

March 2020

4



Introduction



What is the focus of this chapter?

The GSMA Value Chain Assessment Tool (VCAT) is a framework for analysing value chains and supporting digital interventions in agriculture, particularly the digitisation of agricultural procurement payments. The focus of the tool is providing instructions, recommendations and examples to help analyse value chains for poverty reduction. The VCAT is primarily aimed at providers of digital financial services seeking to develop a better rural growth strategy, including mobile operators and other non-MNO mobile money providers. The tool would also be useful for agritech companies and other digital agriculture implementers working to digitise the last mile.

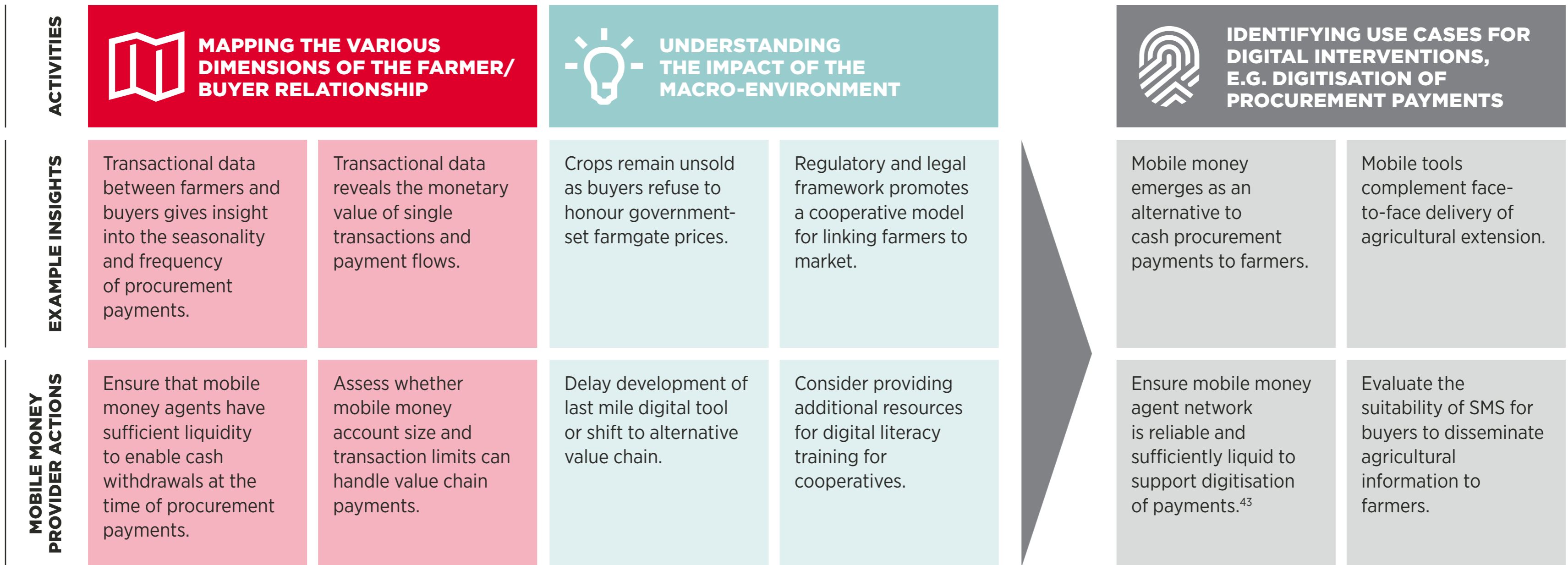
The GSMA VCAT provides a framework for:

Understanding the systemic factors and conditions under which value chains operate in the last mile; identifying value chains and use cases suitable for last mile digital interventions, especially digital payments; and building a pipeline of agricultural organisations operating in suitable value chains.

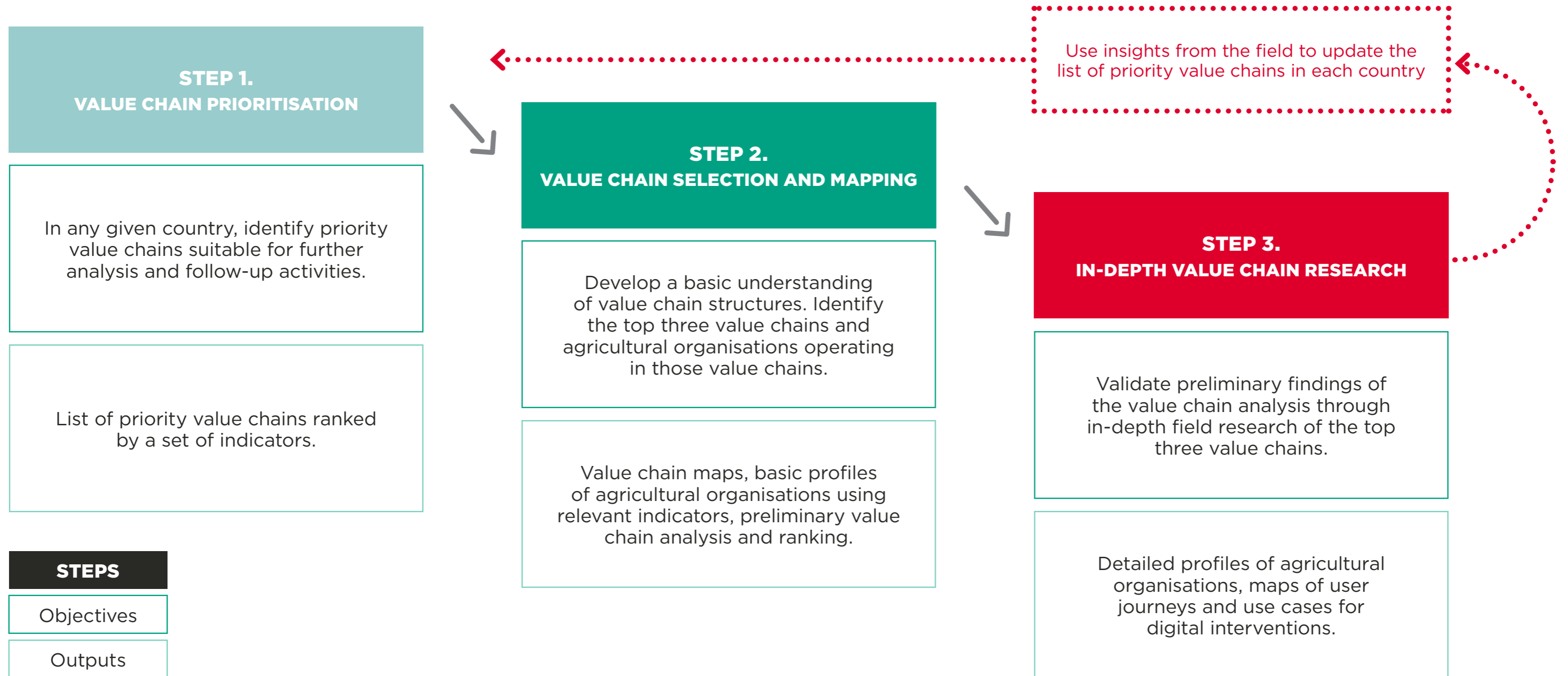
How to use the tool:

The VCAT employs a process used by the GSMA in engagement countries to advise mobile money providers on selecting suitable value chains and identifying agricultural organisation partners to digitise agricultural procurement payments. The step-by-step approach provides a structured way to analyse value chains and can be adjusted as necessary to align with your research objectives.

VCAT: three main activities guide the actions of mobile money providers



The VCAT is a step-by-step guide to understanding agricultural value chains



STEPS
Objectives
Outputs

Value chain prioritisation begins with aggregating and analysing value chain data

STEP 1. Value chain prioritisation

The GSMA has developed a model for identifying priority value chains for agricultural payment digitisation. The model calculates the weighted average score (1 to 5) of a value chain against seven indicators, by country. The data for these indicators comes from well-known sources, such as the FAO and The World Bank, or from estimates provided by the GSMA.

	FORMAL PROCUREMENT SCORE		GROWTH POTENTIAL SCORE		TRANSACTION DATA SCORE		INTERLINKAGES	WEIGHTED AVERAGE SCORE (1 TO 5), BY VALUE CHAIN	
SCORING INDICATORS	Value of agricultural formal sector procurement by value chain (\$)	Formal sector procurement by value chain	Volume of production by value chain (tonnes)	Value chain growth potential	Average size of transactions by value chain (\$)	Frequency of transactions by value chain	Interlinkages of value chains		 100%
WEIGHTS	10%	25%	10%	10%	5%	30%	10%		
DATA SOURCES	FAO, ⁴⁴ THE WORLD BANK ⁴⁵	GSMA ESTIMATE ⁴⁶	FAO	GSMA ESTIMATE ⁴⁷	GSMA ESTIMATE	GSMA ESTIMATE	GSMA ESTIMATE ⁴⁸		

44. Local production quantity (by country), FAOSTAT. Available at: <http://www.fao.org/faostat/en/#data>

45. Local value of procurement (by country), The World Bank. Available at: <https://data.worldbank.org/indicator>

46. Weighted average of three global sub-indicators for each value chain estimated by GSMA: share of exports, commercial activity and level of formality in the value chain. This score does not change between countries.

47. Growth of historic volume and value of total agricultural output in the value chain, by country.

48. Level of intersection with other value chains, which is defined by the probability that a farmer cultivates one or more crops. This score does not change between countries.

Formal value chains with high growth potential and transaction frequency are best suited to digital payments

STEP 1. Value chain prioritisation

	FORMAL PROCUREMENT SCORE		GROWTH POTENTIAL SCORE		TRANSACTION DATA SCORE		INTERLINKAGES	WEIGHTED AVERAGE SCORE (1 TO 5), BY VALUE CHAIN
SCORING INDICATORS	Value of agricultural formal sector procurement by value chain (\$)	Formal sector procurement by value chain	Volume of production by value chain (tonnes)	Value chain growth potential	Average size of transactions by value chain (\$)	Frequency of transactions by value chain	Interlinkages of value chains	
WEIGHTS	10%	25%	10%	10%	5%	30%	10%	100%
HOW IS THIS RELEVANT?	<p>Formal value chains with established structures and well-defined roles and economic relationships are more likely to offer mobile money providers opportunities to digitise procurement payments, which can be a pathway to financial inclusion for farmers.</p>		<p>Value chains with higher growth potential are more likely to support mobile money-enabled business-to-person (B2P) digital payments that are sustainable over the long term and help larger farmer groups scale and become more resilient.⁴⁹</p>		<p>Mobile money services are best suited to small ticket transactions due to the transaction and wallet size limits for customers and the liquidity challenges of agents. Large payments may require farmers to upgrade their mobile money account through an often complex customer due diligence process.</p>		<p>Value chains that score high in interlinkages with other value chains are more likely to offer opportunities for services to scale.</p>	

Output example: oil crops and cocoa top list of priority value chains for payment digitisation in Ghana

STEP 1. Value chain prioritisation

SCORING INDICATORS	FORMAL PROCUREMENT SCORE		GROWTH POTENTIAL SCORE		TRANSACTION DATA SCORE		INTERLINKAGES	FINAL SCORE (WEIGHTED AVERAGE) ⁵⁰
	Value of agricultural formal sector procurement by value chain (\$)	Formal sector procurement by value chain	Volume of production by value chain (tonnes)	Value chain growth potential	Average size of transactions by value chain (\$)	Frequency of transactions by value chain	Interlinkages of value chains	
WEIGHTS	10%	25%	10%	10%	5%	30%	10%	100%
OIL CROPS	4	4	5	5	4	4	3	4.2
COCOA	5	5	4	4	2	3	4	3.9
TROPICAL FRUITS	4	4	4	4	4	4	3	3.8
NUTS	4	4	4	4	4	4	2	3.7
PALM OIL	2	3	3	3	4	5	4	3.7
RUBBER	3	4	2	2	4	4	4	3.6
EGGS	3	2	2	3	5	5	4	3.5
SPICES	4	5	3	3	2	3	3	3.5
MILK	2	2	2	2	5	5	5	3.5
ROOTS AND TUBERS	5	3	5	5	4	3	2	3.5









50. All scores range between 1 and 5. The higher the score, the more suited the value chain is to digitising agricultural procurement payments.

Value chain selection improves stakeholders' understanding of agricultural procurement

STEP 2. Value chain selection and mapping

Value chain selection focuses on the list of priority value chains identified in the first step. If you are a mobile money provider, select value chains from this list based on their suitability for digital payments and create basic profiles of agricultural organisations that include insights from semi-structured interviews with stakeholders in these organisations. In these profiles, include key procurement data and information on activities in the last mile that help you understand the potential to digitise particular value chains.

To evaluate this potential:

- | | | | |
|---|---|---|---|
|  <p>Assess mobile network coverage in areas where farmers are located.</p> |  |  <p>Evaluate the suitability of transaction value limits and account balance limits to allow farmers to receive agricultural payments.</p> |  |
|  <p>Estimate the proximity, availability, reliability and liquidity of mobile money agents in areas where farmers are located.</p> |  |  <p>Determine whether current Know Your Customer (KYC) requirements will enable digital payments in that value chain.</p> |  |

Value chain mapping makes value chain structures and activities more visible

STEP 2. Value chain selection and mapping

Use value chain mapping to develop a basic understanding of value chain structures and create maps of the most suitable value chains.

In your value chain maps, include:

- 

Actors participating in value addition with a focus on those interacting with smallholder farmers (e.g. agribusinesses, cooperatives, intermediaries).


- 

Core processes in a value chain and the interactions between the main actors involved in these processes (e.g. collection, processing, certification).


- 

Product, information and money flows in the value chain (e.g. agricultural extension services, procurement payments, certification premium payments).


- 

Crop sourcing by procurement channel (e.g. direct procurement, via intermediaries own plantations).


- 

Total addressable market in the country (i.e. total number of farmers engaged in the value chain nationwide).



Create profiles of agricultural organisations engaged in direct crop procurement

STEP 2. Value chain selection and mapping

CRITERIA FOR SELECTING AGRICULTURAL ORGANISATIONS

DIRECT PROCUREMENT

Loose and fragmented informal value chains that rely on intermediaries make it challenging for mobile money providers to digitise procurement payments and promote financial inclusion for farmers. Create profiles and seek partnerships with agricultural organisations involved in direct procurement and operating in more formal value chains that show a higher degree of crop aggregation in bulking groups (in a cooperative-based model) and at the field clerk level (in vertically integrated agribusinesses).

LARGE SUPPLIER BASE

In any digitisation initiative, mobile money providers may have to commit significant capital expenditures (CapEx) and operating expenditures (OpEx) to improve their mobile network infrastructure and maintain the liquidity of their rural agent network. Focus on agricultural organisations that procure from a significant number of farmers (typically several hundred or more) as they are likely to offer the highest direct revenue opportunity for mobile money providers and economies of scale.

HIGH TRANSACTION FREQUENCY

As farmers are likely to cash out their payments immediately, managing cash liquidity often becomes the biggest challenge for mobile money providers in last mile digitisation initiatives. Focusing on agricultural organisations operating in value chains with high transaction frequency across a longer harvest season allows mobile money providers to ensure liquidity in rural areas and reduces the need for repeated digital literacy training between payments. Small numbers of large payments are likely to put a strain on the agent network at the peak of the harvest season and cause spikes in demand for cash.

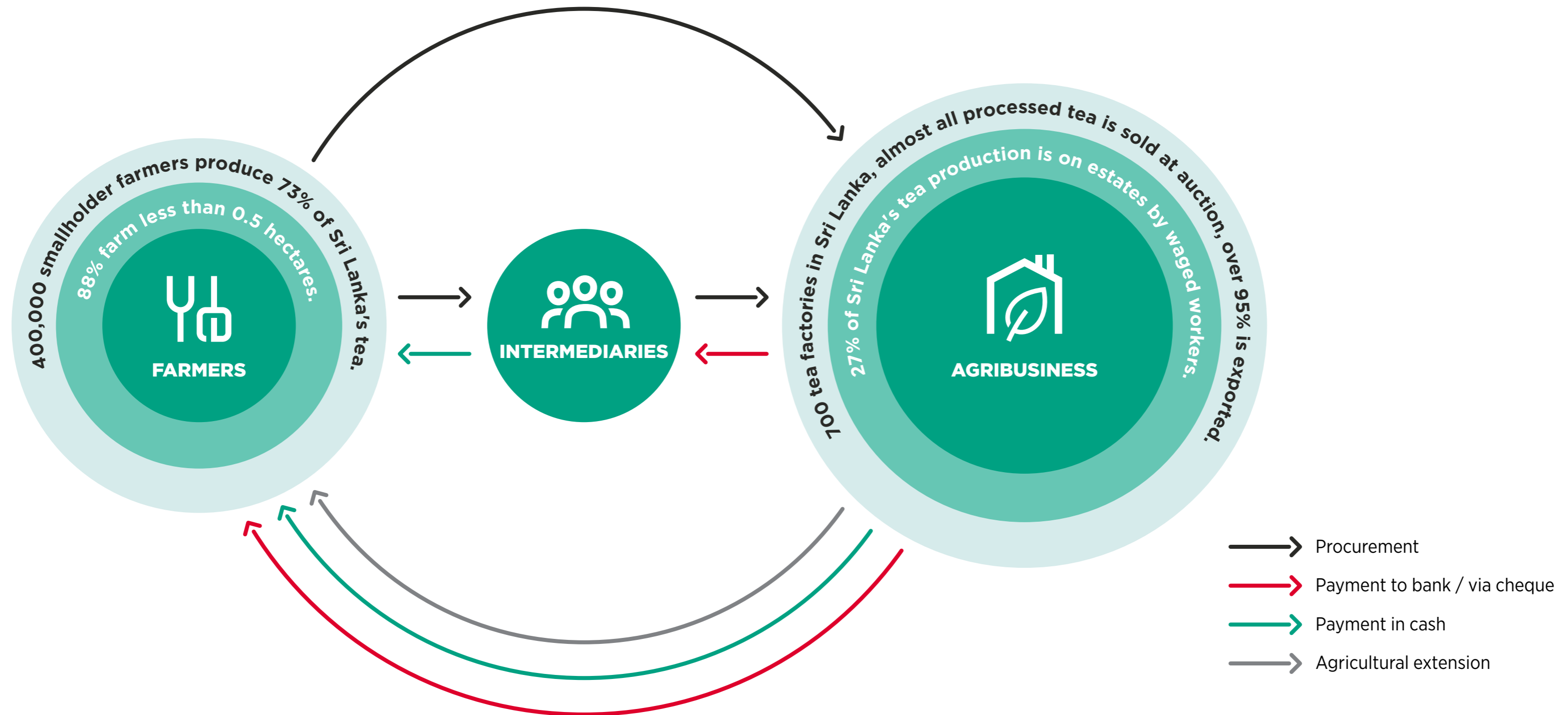
Output example: template for profiling agricultural organisation and its procurement activities

STEP 2. Value chain selection and mapping

ORGANISATION DETAILS	Organisation name	Organisation type	Contact details
VALUE CHAIN DETAILS	Primary value chain	Location and number of farmers in direct procurement	Crop seasonality
PROCUREMENT ACTIVITIES	Number of direct payments to individual farmers	Single transaction value	Current payment method
KEY VALUE CHAIN ACTIVITIES	Details of contract farming	Description of farmer profiling process	Participation in certification or export schemes

Output example: map of Sri Lanka's tea value chain shows total addressable market for last mile digital tool

STEP 2. Value chain selection and mapping



In-depth value chain research can identify suitable use cases for digitisation

STEP 3. In-depth value chain research

In-depth value chain research focuses on the agricultural organisations and value chains selected in Step 2. It allows digital agriculture implementers to assess the barriers to improved procurement performance and the competitiveness of farmers and buyers, as well as the potential role of mobile money and agritech companies in addressing some of these limitations.

As part of your in-depth research, use semi-structured interviews with key stakeholders in the value chain, including farmers, office staff of agricultural organisations, buying agents and extension officers, among others, to generate the following outputs:

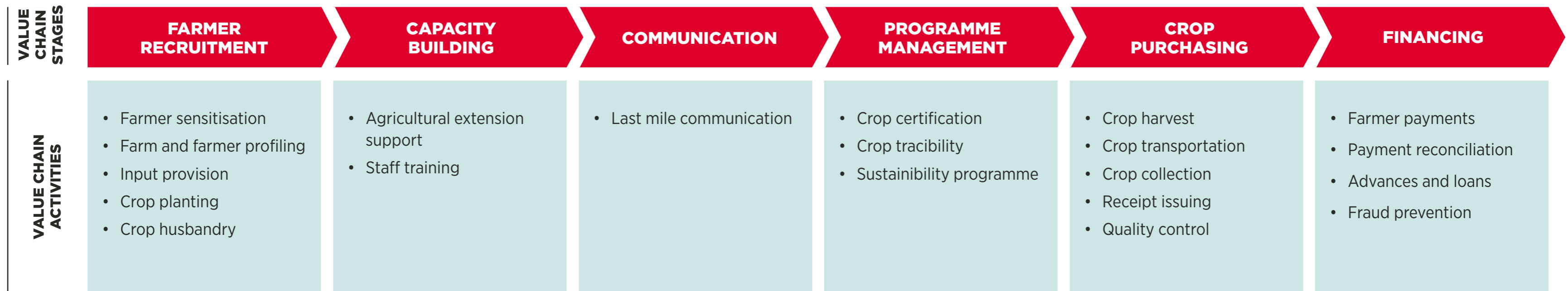
-  Detailed profiles of selected agricultural organisations based on insights from a range of topics, such as digital literacy rates, integration of smallholder farmers in the supply chain and farmer training tools.
-  Description of key activities with an emphasis on those involving farmers and buyers, such as crop collection, receipt issuing and farmer payments.
-  Mapping of key pain points for farmers and agricultural organisations against these activities.
-  Assessment of agricultural organisations' readiness to adopt last mile digital tools.
-  Identification of mobile use cases for digital interventions, for example, digitising last mile payments.

Digital tools can address inefficiencies in many last mile systems and processes

STEP 3. In-depth value chain research





Field observations and semi-structured interviews with stakeholders in the value chain empower digital agriculture implementers to understand the full range of activities occurring in the last mile, and identify inefficiencies affecting systems and processes involved in value addition. Expand the scope of your research beyond agricultural payments using the diagram below.

Inefficiencies often result from opportunity costs, which are the costs of employing production resources in a particular way rather than pursuing alternative business options. For example, assigning a realistic estimated value to the time it takes farmers and agribusiness staff to process cash payments for crop procurement allows project stakeholders to make the case to switch from cash to mobile money. If these costs are not assigned, value chain research will unintentionally treat these as free resources.



Output example: a map of activities and pain points in the tea farmer journey unlocks opportunities for digitisation beyond mobile money

STEP 3. In-depth value chain research

	HARVEST 	CROP HANDOVER 	QUALITY CONTROL AT FACTORY 	PAYMENTS 
Activity description	Farmer stores plucked green tea leaf in 22-kilo natural fibre sacks.	Farmer hands over leaves to collector at field edge.	Farmer's harvest is weighed using digital scales and deductions are made based on moisture, leaf quality and weight of sacks.	Farmer receives advances and balance payments based on recent supply history.
Pain points	Unpredictable weather patterns affect harvest and yield.	Farmer unaware of collection time (farmer must be physically present all afternoon while truck is collecting from farmers).	Farmer does not know how much is being deducted at factory; only discovers upon receipt of remittance advice. Latest green leaf price only known via word of mouth/if farmer visits the factory.	Farmer is required to travel to the factory to receive cash advances or to a bank to cash out. Individual factory policies limit how much they are prepared to pay in cash. Farmer potentially carries a large amount of cash (cash-handling risks).
Opportunity areas	Weather forecast tool.	Collection schedule shared with farmers.	Instant push notifications to farmers.	Mobile money solution as the entry point to last mile digitisation.

Key findings and recommendations

-
- The GSMA's model scores value chains against key indicators affecting the digitisation of agricultural procurement payments and ranks them in order of priority.

-
- The potential to digitise agricultural procurement payments is greater in formal value chains experiencing high transaction frequency and transaction values that are compatible with mobile money transaction and wallet size limits.

-
- Creating profiles of agricultural organisations based on key procurement indicators and last mile activities give mobile money providers a basic understanding of value chain structures and allows them to assess the suitability of particular value chains for digital payments.

-
- To maximise benefits for farmers, mobile money providers should profile and seek partnership opportunities with agricultural organisations involved in direct procurement from a significant number of farmers.

-
- In-depth field research helps to create detailed agricultural organisation profiles, map user journeys and identify use cases for digital interventions that extend beyond digital payments.

-
- Field observations and semi-structured interviews with value chain stakeholders help digital agriculture implementers to recognise inefficiencies in agricultural value chains that can be addressed with holistic digital solutions.



Digital footprints and economic identities for farmers

March 2020



5

Problem statement, key questions and audience

Introduction

With a rising global population (8.5 billion by 2030), a huge increase in smallholder financing is needed to meet the global demand for food. However, the total credit provided to smallholder farmers by informal and formal financial institutions, as well as value chain actors, only meets about 30 per cent (\$68 billion) of the estimated need. Specifically, farmers lack access to long-term capital for asset financing and crop improvements essential for growing higher quality crops, increasing productivity and becoming resilient to climate change. In Sub-Saharan Africa, only one per cent of the need for long-term capital is met by informal and formal lenders.

Farmers struggle to access financial services because they lack important data, in digital or paper form, to prove their creditworthiness to financial services providers (FSPs). The emergence of mobile-based digital agriculture tools that generate digital footprints for farms and farmers offers huge potential to bridge the data gap in smallholder financing. Digital tools that enable farmers to access markets, such as digital procurement solutions and e-commerce services, are especially useful for generating rich data sets, such as transactional data from the sale of crops. For commercial farmers, these tools can open a pathway to financial inclusion.

To unlock the opportunity to build economic identities for farmers and advance financial inclusion, effective data-sharing partnerships must be created between those that have the data: agribusinesses, agritechs and MNOs. These actors also have a shared interest in enabling financial services for farmers. This chapter focuses on the supply side to highlight how valuable farmer and farm data are generated, as well as emerging models for data-sharing partnerships. The chapter also looks at the demand side, including the financial needs of farmers and key considerations for product design.



This chapter is aimed at value chain actors, agritechs, MNOs and FSPs keen to build data-sharing partnerships that support financial inclusion for farmers. It also aims to support the decision making of social impact and agritech investors.

Access to finance remains largely informal for three main segments of smallholder farmers in the developing world

Introduction

Characteristics of smallholder segments ⁵¹						
	Land	Crops	Market engagement	Access to technology	Access to finance	
<p>Commercial smallholders in tight value chains</p> <p>33 million</p>	7% of total smallholders >2 ha	Cash crops, some staple	Little subsistence, surplus sold to formal buyer	Good	Informal, some formal, some through buyers	
<p>Commercial smallholders in loose value chains</p> <p>157 million</p>	33% of total smallholders 1-2 ha	Staple crops, some cash	Some subsistence, surplus sold to intermediary or formal buyer (co-op agribusiness)	Limited	Limited and informal	
<p>Non-commercial smallholders</p> <p>285 million</p>	60% of total smallholders <1 ha	Staple crops	Mostly subsistence, little surplus	Very limited, if at all	Limited, informal if at all	

51. Framework adapted from ASFG and CGAP (2015), *Inflection point: Unlocking growth in the era of farmer finance*.

The economic lives of smallholder farmers are complex and their financing needs are varied

Introduction

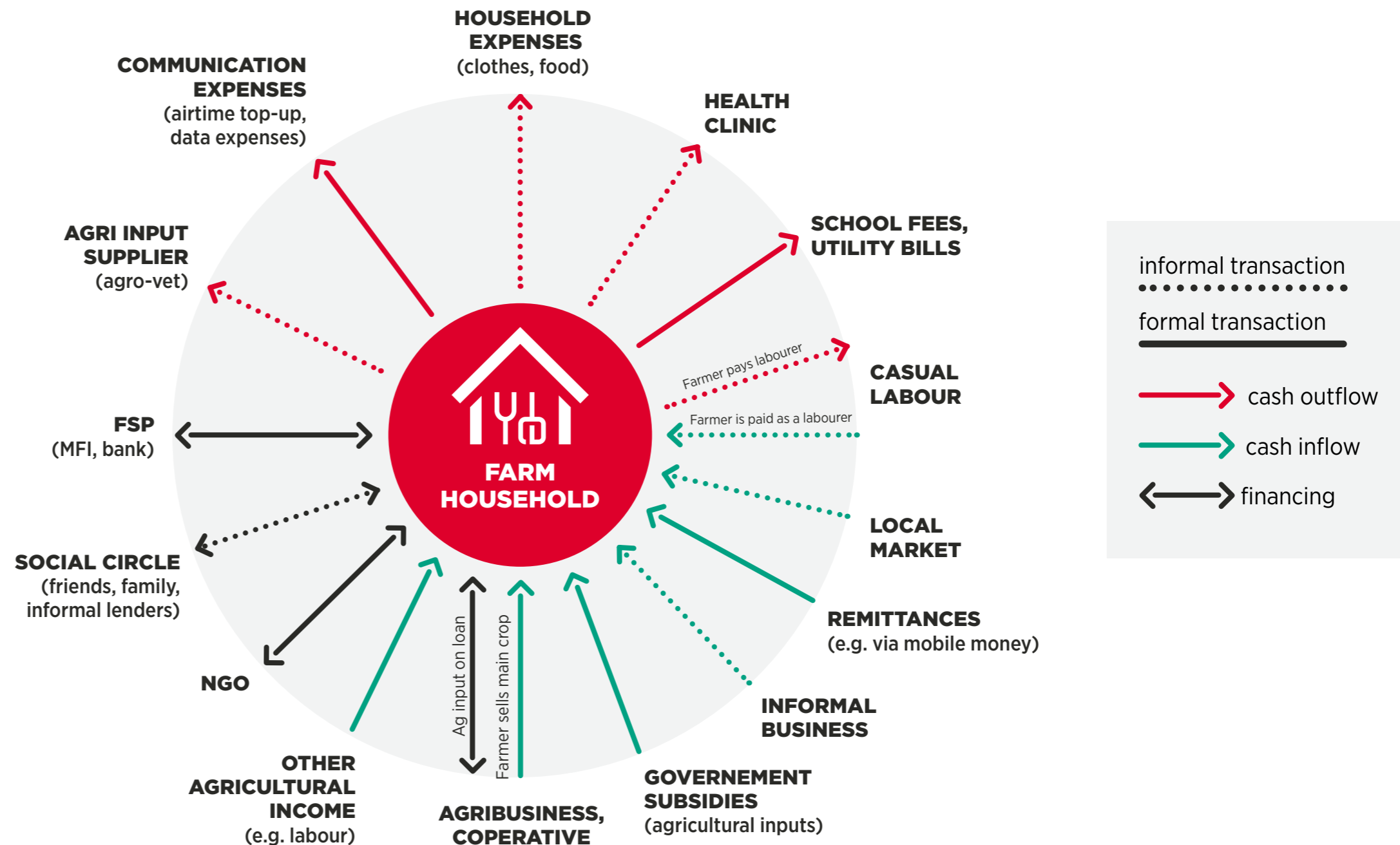
Figure 34 **Cash inflows and outflows of farmers**

Smallholder households have many cash inflows and outflows from formal and informal activities. For farmers in formal value chains, business-to-person (B2P) procurement payments represent 50 to 80 per cent of household income.

Commercial smallholder households often have sources of income from non-agricultural activities, for example, from informal work (e.g. street vending).

Farmers' primary financing needs are:

- **Short-term working capital** for inputs such as seeds and fertiliser;
- **Long-term capital** (more than a year) for crop improvements, irrigation systems and other farm investments; and
- **Non-agriculture related financing** for a range of expenses (e.g. health costs, weddings, funerals).



A farmer's financing needs depend on many factors

Introduction

Value chain, farm location, time of year and farm size all dictate a farmer's agriculture-related financing needs. For agricultural activities, there is a significant outlay of cash at the start of the growing season, for example, to pay for seeds and hire labourers to till the land. Farmers then have negative cash flow until they can harvest and sell their crops.

Non-agriculture related financing needs can be less predictable. They are based on the needs of a farmer's household or on other economic activities.

Agriculture-related financing needs		Non-agriculture related financing needs
<p>Short term:</p> <ul style="list-style-type: none">  Inputs (e.g. seeds, fertilisers, seedlings)  Hired labour (e.g. at time of sowing)  Livestock feed (e.g. fodder) <p>Long-term:</p> <ul style="list-style-type: none">  Farming machinery (e.g. rice harvester)  Farming tools (e.g. spades and hoes)  Irrigation system (e.g. water pumps)  Livestock (e.g. calves) 		<ul style="list-style-type: none">  Emergency expenses (e.g. in the aftermath of an extreme climate event)  Business expansion (e.g. village shop)  Medical expenses (e.g. hospitalisation)  Education expenses (e.g. school fees)  Living expenses (e.g. food)  Repayment of another loan (e.g. informal loan)

To realise the full potential of agriculture, a huge surge in agricultural lending is needed

Introduction

The high perceived risk of lending to farmers, the lack of collateral they can offer to lenders and the challenges they face in providing an accurate picture of their financial history all contribute to a gap in smallholder financing.

The total credit provided to smallholder farmers by informal and formal financial institutions, as well as value chain actors, only meets about 30 per cent (\$68 billion) of the estimated need (≈\$238 billion) in Sub-Saharan Africa, Latin America and South and Southeast Asia.

With a rising global population (8.5 billion by 2030), a significant increase in smallholder financing is needed to meet global food demand.

To realise their commercial potential, smallholders in formal value chains typically require about \$1,500 in short-term financing and \$1,500–\$2,000 in long-term financing (amortised over multiple years).

Figure 35 **Smallholder credit provided by formal and informal institutions, 2019⁵²**

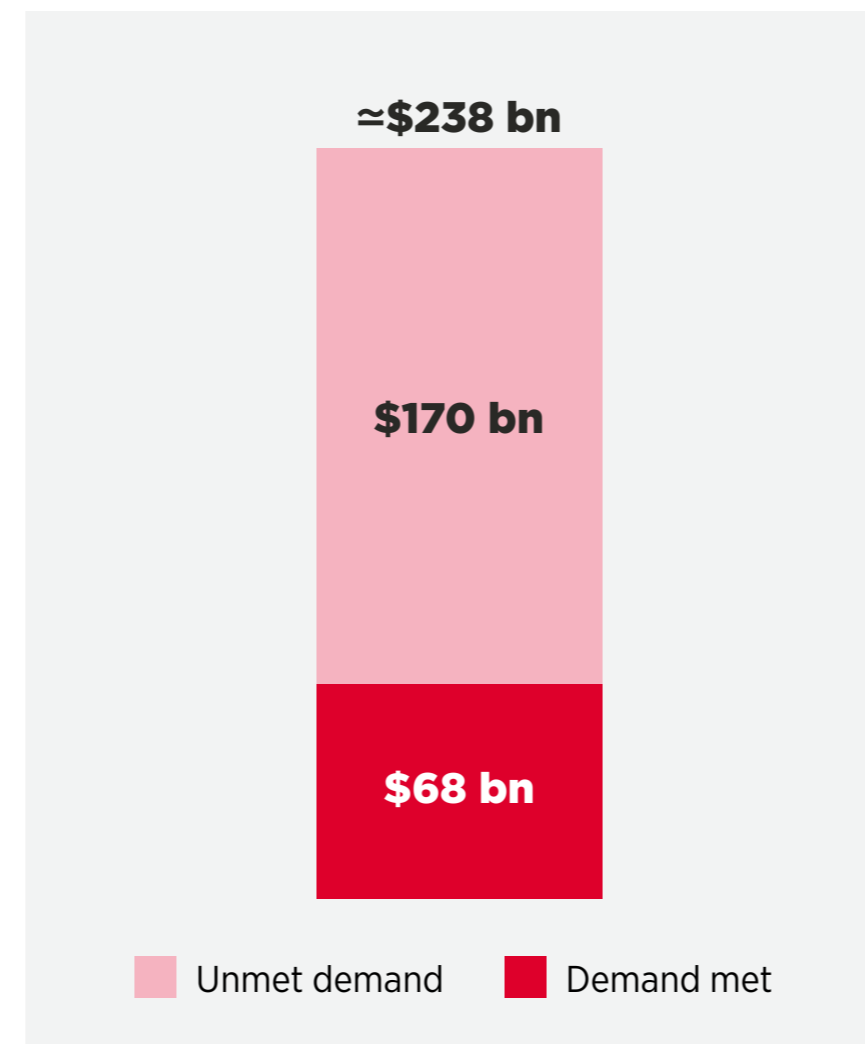
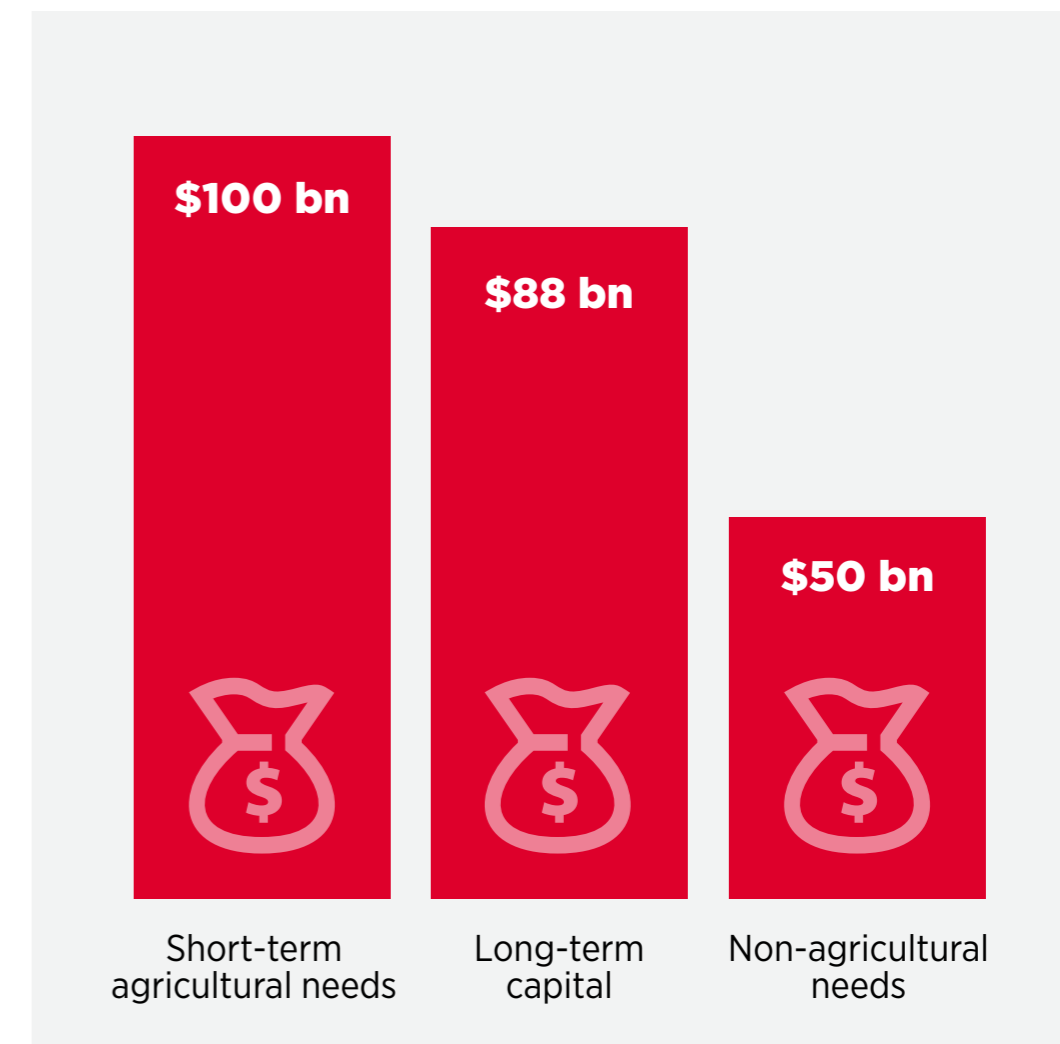


Figure 36 **Breakdown by type of financing need, 2019**

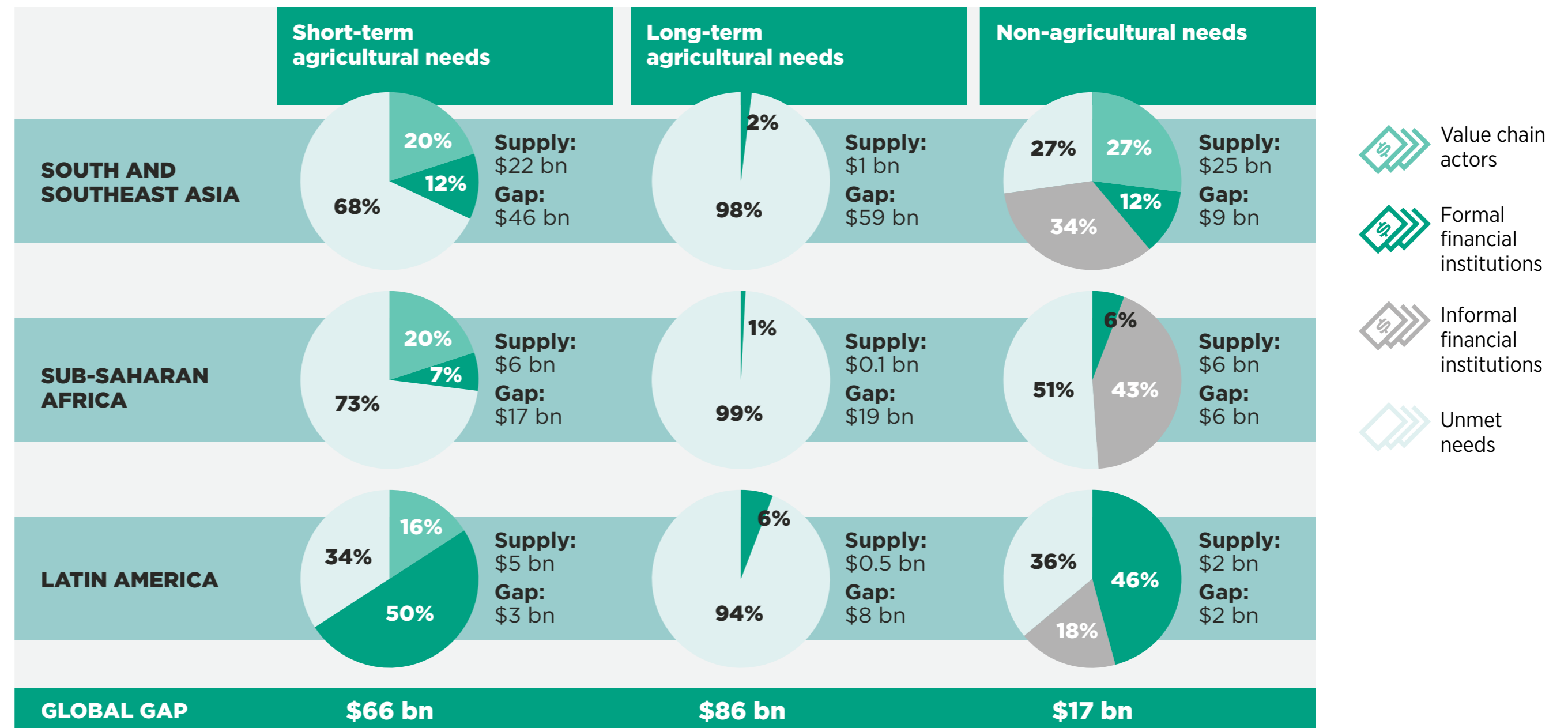


52. Source: Mastercard Foundation Rural and Agricultural Finance Learning Lab and ISF Advisors (2019) *Pathways to Prosperity*.

Globally, the main financing gap is for long-term working capital

Introduction

Figure 37 **Financing gap by region and type of financing need (~\$170 billion)⁵³**



The key agricultural financing gap is long-term capital for agricultural needs. Long-term financing enables farmers to invest in assets and expand and improve their agricultural activities, but this hinges on the availability of transactional footprints, such as recordkeeping, either digital or paper-based. However, even when farmers have records, such as physical receipts for the sale of crops to agribusinesses, the absence of standardised records and formats to present this information to FSPs makes it difficult for them to issue credit. Globally, there is a significant financing gap for all agricultural and non-agricultural needs. The gap is greater in Sub-Saharan Africa, largely because a smaller percentage of the population has a bank account.

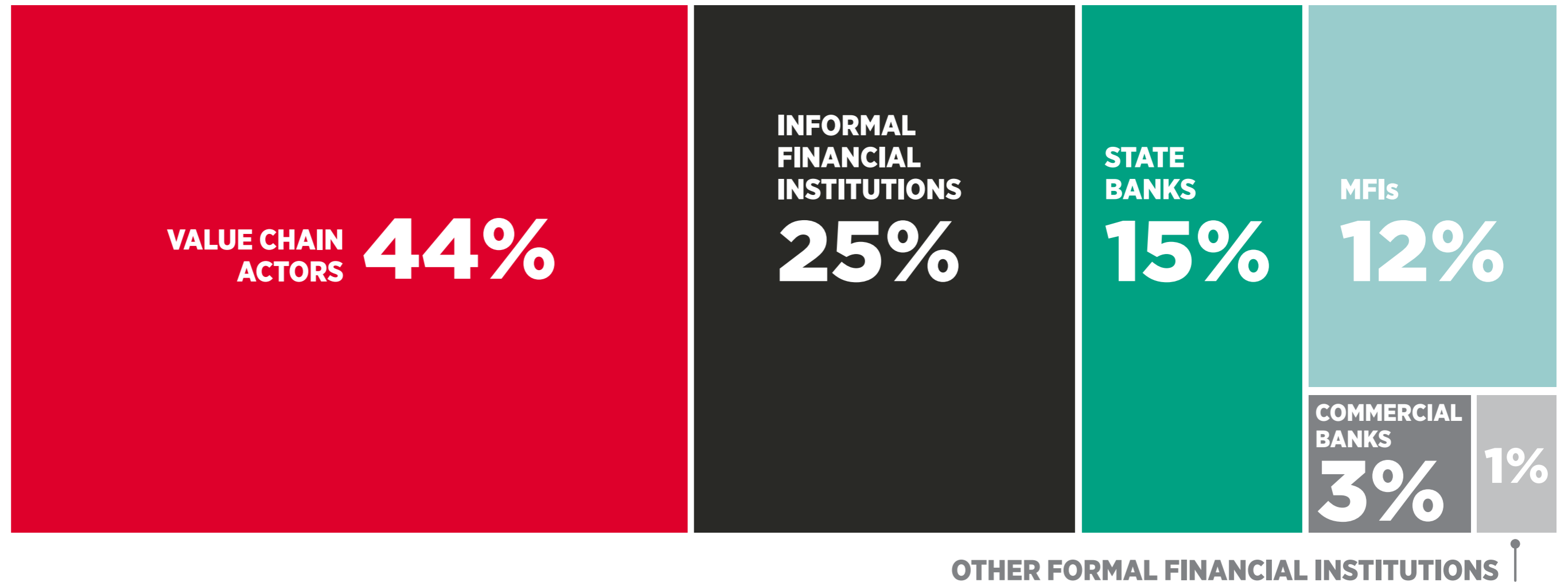
53. Source: Mastercard Foundation Rural and Agricultural Finance Learning Lab and ISF Advisors (2019), *Pathways to Prosperity*.

Globally, value chain actors provide 44 per cent of the total supply across all financing needs of farmers

Introduction

Figure 38 **Current supply of financial services to smallholder farmers (~\$68 billion)**

Value chain actors are the main providers of financial services for commercial farmers in tight value chains, and focus primarily on short-term financing for inputs (in-kind or cash advances). NGOs and MFIs address some of the needs of non-commercial smallholders, but still focus mainly on short-term financing. Few commercial FSPs cater to the financial needs of farmers due to the perceived risk of lending to the sector and the lack of collateral and financial histories.



Case study: Ibero Farmer Financing Unit, Uganda

Introduction

Figure 39 **The agribusiness as an FSP: Ibero Uganda's Farmer Financing Unit**

Registration	QR code on a paper card given to all farmers.
Application	Farmer applies for a loan with the QR code. Agribusiness checks the farmer's records.
Agribusiness assessment	Agribusiness performs its own credit scoring using proprietary software. If the farmer is deemed too risky, agribusiness staff perform a site visit to check against risk criteria (farming practices, pesticide use).
Contract signing	Paperless contract signing (SMS-based) between farmer and agribusiness via FieldBuzz last mile digital tool.
Disbursement	Disbursement via mobile money, interest charged at 45 per cent per year (declining balance).
Monitoring	Monitoring via FieldBuzz last mile digital tool (i.e. checks whether farmer has purchased inputs).
Farmer repayment	Repayment in coffee with confirmation messages sent to farmers via SMS on percentage of loan repaid in-kind.

In 2017, Ugandan coffee agribusiness Ibero, the local unit of international group NKG, set up a fully fledged Farmer Financing Unit under the NKG Bloom⁵⁵ programme to provide fertiliser and seasonal cash advances to farmers. Ibero aimed to increase farm-level productivity by at least 75 per cent in two years.

As part of the NKG Bloom programme, the agribusiness performs credit risk analyses to assess whether to disburse credit to farmers. The agribusiness partners with agritech FieldBuzz, which has a smartphone tool to support loan disbursement (loan contract signing, farmer monitoring).

With annual repayment rates for cash advances at 70 per cent, the agribusiness initially took a considerable risk financing farmers, in addition to bearing the operational costs of running the Unit. As of 2019, the repayment rate was over 99 per cent.

Ibero's Farmer Financing Unit is part of a global effort by agribusinesses to provide working capital to farmers. Ibero approached the challenge with a technology-based solution, which had the added benefit of greater transparency in the supply chain.

55. See: <https://uganda.nkgbloom.coffee/>

How to generate, share and use farmer data for financial inclusion?

Key questions



Data generation

1. What digital data is available to help farmers create an economic identity?
2. How does the digitisation of the agricultural last mile generate data that can be used to offer financial services to farmers?



Data ownership

1. Who owns the farmer and farm data that can unlock financial inclusion? Agribusinesses, farmers, MNOs?
2. How and to what extent is farmer consent being sought and obtained?



Data sharing

1. As digital data becomes available, what partnerships are emerging between stakeholders (value chain actors, agritechs, FSPs) to share data that can unlock financial inclusion for farmers?
2. What new operational models and supporting technologies are available to share data?
3. What new approaches to innovative credit scoring models are emerging?



Data use

1. What financial products are required to meet the needs of farmers?
2. What are the key considerations in designing financial products for farmers?

Digital agriculture solutions generate a range of data that can improve the provision of financial services for farmers

Data generation

Agri-tech companies capture a wealth of digital agriculture data that can support farmers in developing an economic identity. A digital footprint consists not only of farmer-level data (e.g. transactional data generated by mobile money); it may also extend to farm-level data (e.g. farming record data in a digital procurement tool) and location-based data (e.g. satellite-based data from a smart farming tool). Data can be structured, semi-structured or unstructured, and may not always be directly relevant for use in financial services. For example, satellite-based data used for disease monitoring, when combined with weather forecasting data, could be used for damage assessment and crop insurance payouts to eligible farmers.

	USE CASE	EXAMPLE DATA POINTS		
		KYC measures	Regular sources of income	Loss mitigation
ACCESS TO ASSETS	Smart farming	<ul style="list-style-type: none"> • Basic information • Farm information 	<ul style="list-style-type: none"> • Ability to pay (mobile money transactional data) 	<ul style="list-style-type: none"> • Machinery rental • Asset utilisation rate
ACCESS TO MARKETS	Agricultural e-commerce	<ul style="list-style-type: none"> • Basic information 	<ul style="list-style-type: none"> • Net income (mobile money transactional data) • Production data 	<ul style="list-style-type: none"> • Account ownership
	Digital procurement	<ul style="list-style-type: none"> • Basic information • Farm information 	<ul style="list-style-type: none"> • Cultivation practices • Production data • Mobile money transactional data 	<ul style="list-style-type: none"> • Expense tracking

FSPs require a variety of agriculture and non-agriculture related data to support their credit decisions

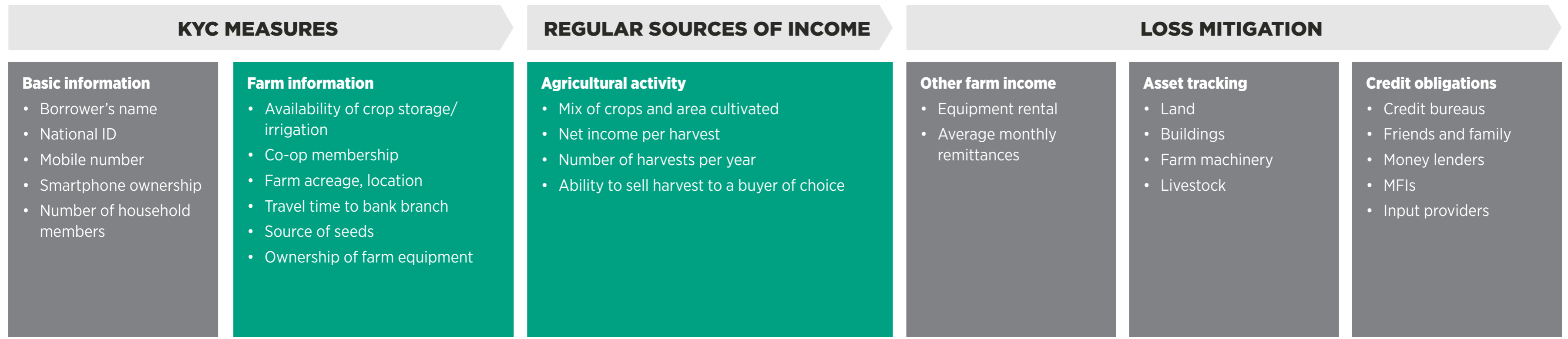
Data generation

The FSPs actively targeting the agricultural sector require both agriculture- and non-agriculture related data to provide financial services to farmers. These include basic KYC measures, data on regular sources of income and data on collateral owned by the farmer.

Availability of data is a challenge across all categories. Lack of collateral is the primary data challenge, but acquiring KYC data and data proving regular income is also difficult, as agricultural production cash flows are inherently more difficult to estimate accurately and most procurement transactions are still made in cash and paper.

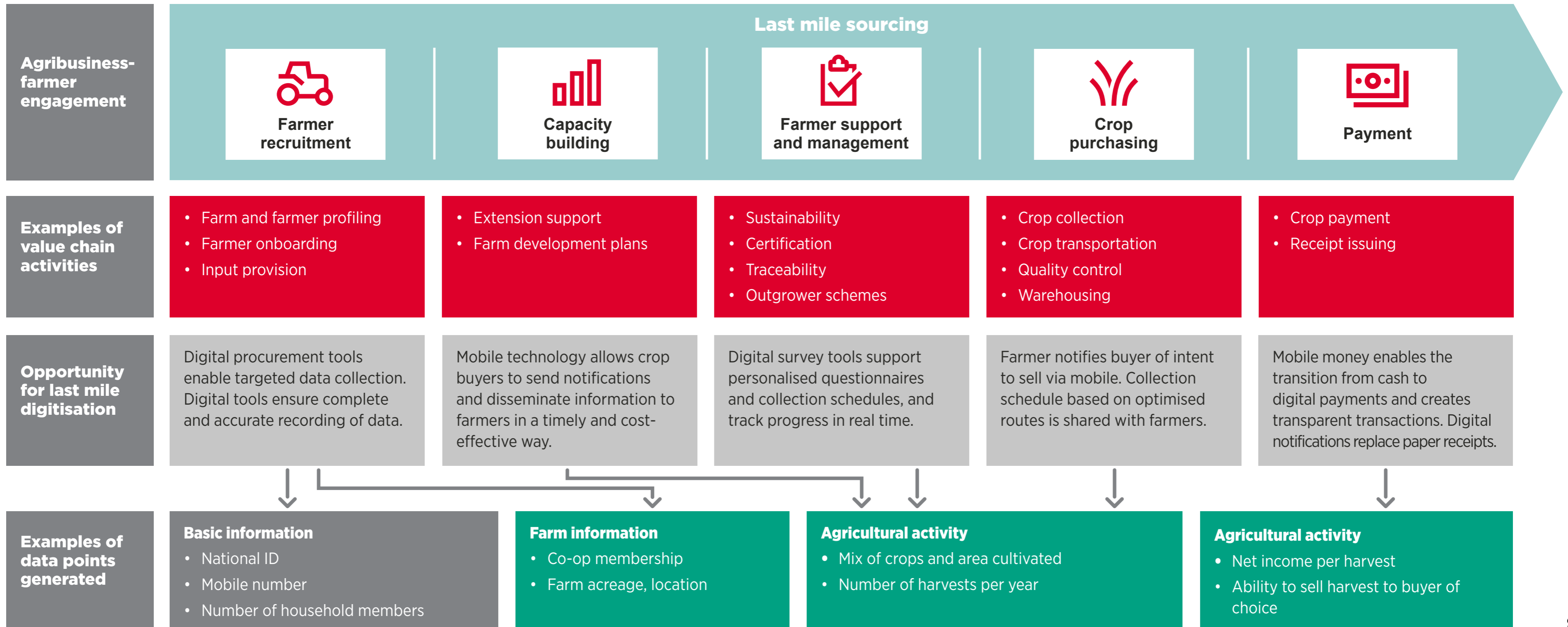
Figure 40 **Data needed for a loan application (example from Yoma Bank's Hire Purchase Scheme, Myanmar)**

■ Agriculture-related data ■ Non-agriculture related data



Digital procurement: farmer, farm and agricultural data generated in the last mile help to build economic identities

Data generation



How to generate, share and use farmer data for financial inclusion?

Key questions



Data generation

1. What digital data is available to help farmers create an economic identity?
2. How does the digitisation of the agricultural last mile generate data that can be used to offer financial services to farmers?



Data ownership

1. Who owns the farmer and farm data that can unlock financial inclusion?
Agribusinesses, farmers, MNOs?
2. How and to what extent is farmer consent being sought and obtained?



Data sharing

1. As digital data becomes available, what partnerships are emerging between stakeholders (value chain actors, agritechs, FSPs) to share data that can unlock financial inclusion for farmers?
2. What new operational models and supporting technologies are available to share data?
3. What new approaches to innovative credit scoring models are emerging?



Data use

1. What financial products are required to meet the needs of farmers?
2. What are the key considerations in designing financial products for farmers?

Farmers must be aware of who owns their data

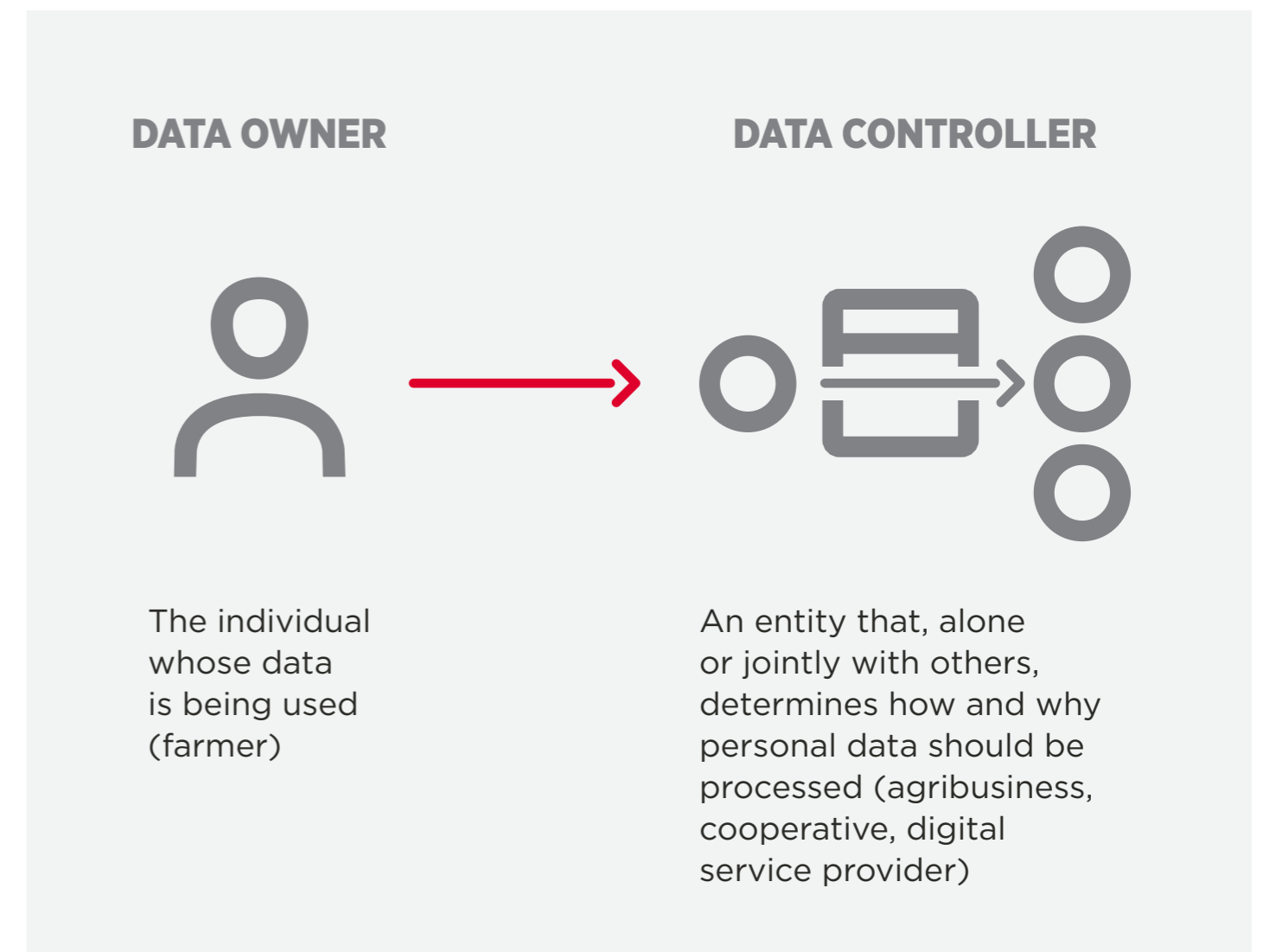
Data ownership

Any time farmers provide data to third parties, data ownership and awareness of who owns their data become an issue. Data ownership can be ambiguous and must be clarified upfront.

In agricultural value chains, agribusinesses may often assume implicit ownership of farmer and farm data as they build their own historical records of transactions and relationships with suppliers. The same may hold true for agribusinesses selling inputs to farmers. While farmers' claims to personal data are indisputable, claims to farm data may be more challenging, especially because of the lack of land ownership titles in developing countries.

Digital service providers engaged in last mile digitisation initiatives (agritech and fintech companies, MNOs, etc.) usually ensure that farmers' consent is sought.⁵⁶ However, questions remain about how well farmers understand how their data is shared and for what purpose. Farmers should be informed of how and with whom their data might be shared, and explicit consent should be sought prior to any data being shared and the initiation of the registration process.

A key distinction must be made between the data owner (the farmer) and the data controller (agribusiness, cooperative, digital service provider). The data controller either transfers data to a specific third-party financial provider to perform a credit risk analysis or, in cases where the data controller underwrites the risk, they perform a credit risk analysis themselves.



⁵⁶ In Indonesia, last mile digital tool HARA ensures farmers are aware of data sharing and understand the purpose of it. HARA uses an electronic authentication system that sends one-time passwords to farmers via SMS to request consent. In Kenya, agritech companies providers, such as Tulaa and Twiga Foods, ensure their agents explain to farmers how their data will be used. See GSMA (2019), [AgTech Innovation Unlocks Economic Identities for Smallholder Farmers in Indonesia](#). See also GSMA (2019), [Improving Financial Inclusion through Data for Smallholder Farmers in Kenya](#).

How to generate, share and use farmer data for financial inclusion?

Key questions



Data generation

1. What digital data is available to help farmers create an economic identity?
2. How does the digitisation of the agricultural last mile generate data that can be used to offer financial services to farmers?



Data ownership

1. Who owns the farmer and farm data that can unlock financial inclusion? Agribusinesses, farmers, MNOs?
2. How and to what extent is farmer consent being sought and obtained?



Data sharing

1. As digital data becomes available, what partnerships are emerging between stakeholders (value chain actors, agritechs, FSPs) to share data that can unlock financial inclusion for farmers?
2. What new operational models and supporting technologies are available to share data?
3. What new approaches to innovative credit scoring models are emerging?



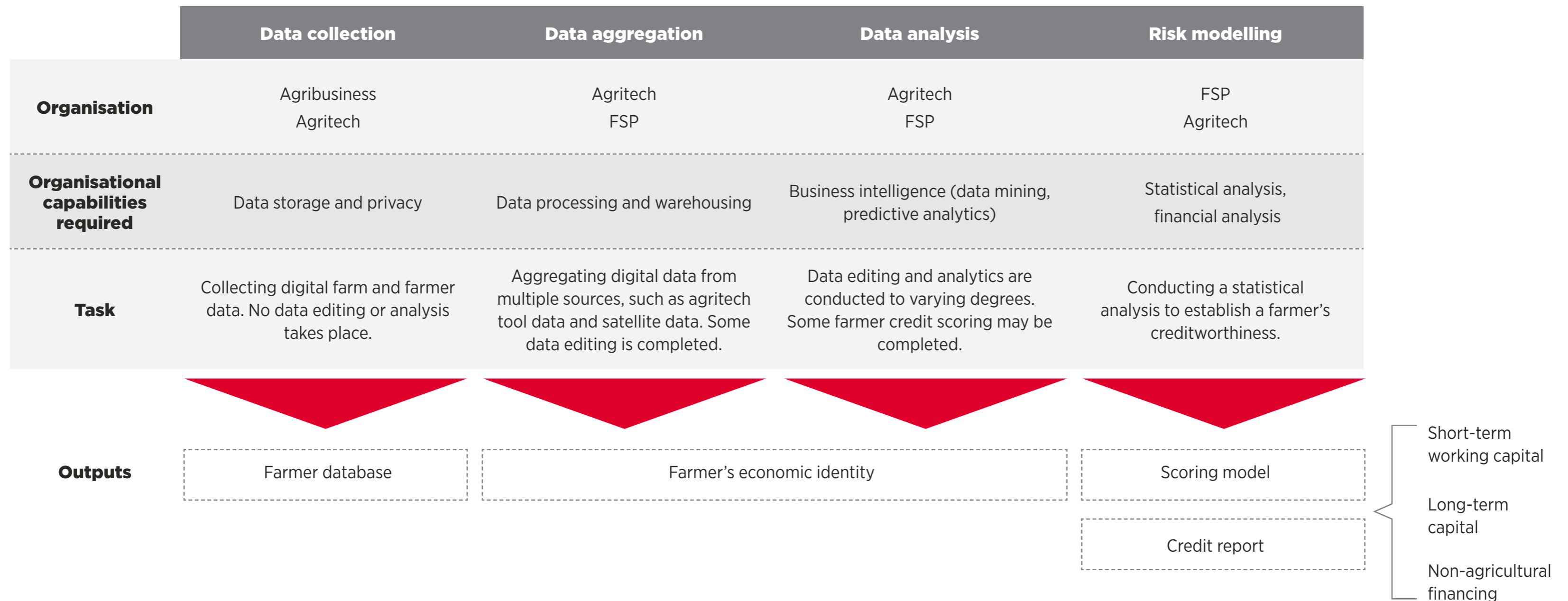
Data use

1. What financial products are required to meet the needs of farmers?
2. What are the key considerations in designing financial products for farmers?

Unlocking financial services for farmers requires participation and sharing of data between agritechs, FSPs and agribusinesses

Data sharing

Figure 41 **Unlocking financial services for farmers: Steps in data sharing**



Data-sharing models for smallholder financing

Data sharing

Different data-sharing models have emerged depending on the roles of agritechs, FSPs and agribusinesses at each step of the process of adding value to digital farmer and farm data.

DATA-SHARING MODELS		DATA COLLECTION	DATA AGGREGATION	DATA ANALYSIS	RISK MODELLING
A	Agri-tech as data provider	Agri-tech	Agri-tech	Agri-tech/FSP	FSP
B	Agri-tech as credit scoring enabler	Agri-tech / third-party agri-tech	Agri-tech	Agri-tech	Agri-tech
C	Agribusiness as data provider	Agri-tech	FSP	FSP	FSP

- A.** The **Agri-tech as data provider model** includes agritechs that collect and aggregate digital farmer and farm data and may perform some data analysis (e.g. data editing). Data is then used by third parties, most likely FSPs, for risk modelling. This model, which is the most widely available, includes agritechs that support:
- Farmer and farm data collection and aggregation via last mile digital tools (e.g. Virtual City in East Africa);
 - Collection of transactional data via e-commerce solutions (e.g. Twiga Foods in Kenya); and
 - Centralised data hubs for farmer and farm data sharing (e.g. Hara in Indonesia).
- B.** In the nascent **Agri-tech as credit scoring enabler** model, agritechs expand their role to perform analytics that support part or the entire risk modelling process. They typically aggregate farmer and farm data from multiple sources (farmers, agribusinesses and open data, such as satellite-based vegetation indexes) and, in some cases, support data collection directly through their digital tools.
- C.** In the **Agribusiness as data provider model**, agribusinesses form one-to-one data-sharing partnerships with FSPs to enable agricultural loans to be disbursed to farmers. This model is less common and requires FSPs that actively target the rural segment and take a proactive role in data aggregation, data analysis and risk modelling.

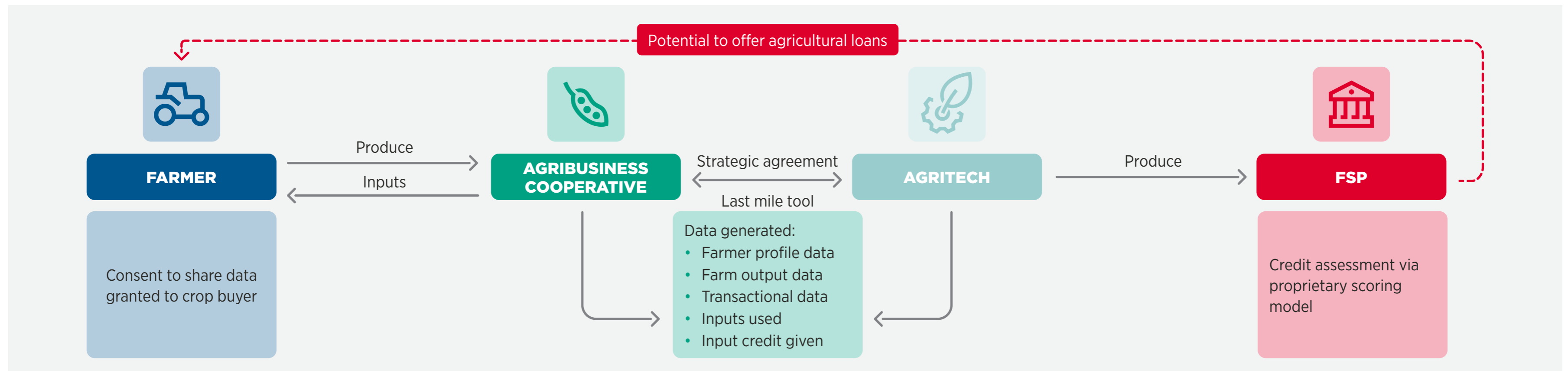
Agritech as data provider: data collection and aggregation using last mile digital tools

Data sharing

The ability to collect, aggregate and expose data to an FSP for credit scoring is an important value addition to a last mile digital tool for agribusinesses and farmers. In East Africa, agritech company Virtual City offers a last mile tool, Agrimanagr,⁵⁷ that collects and aggregates KYC data on farmers, as well as data on their economic activities, such as real-time updates on inputs used, quantity and quality (i.e. grading) of produce sold, pricing and payments data. Farmers give consent to the agribusiness or cooperative field agent operating the Agrimanagr app to share their data directly with banks.

In collaboration with its agribusiness and cooperative clients, Virtual City is forming partnerships with banks to enable agricultural loans to be disbursed to farmers.

Figure 42 **Data collection and aggregation using last mile digital tool: Virtual City's Agrimanagr**



57. See: GSMA (2019), *Bringing efficiency to Kenya's dairy value chain: Virtual City's Agrimanagr*.

Agritech as data provider: collection of transactional data via e-commerce solutions

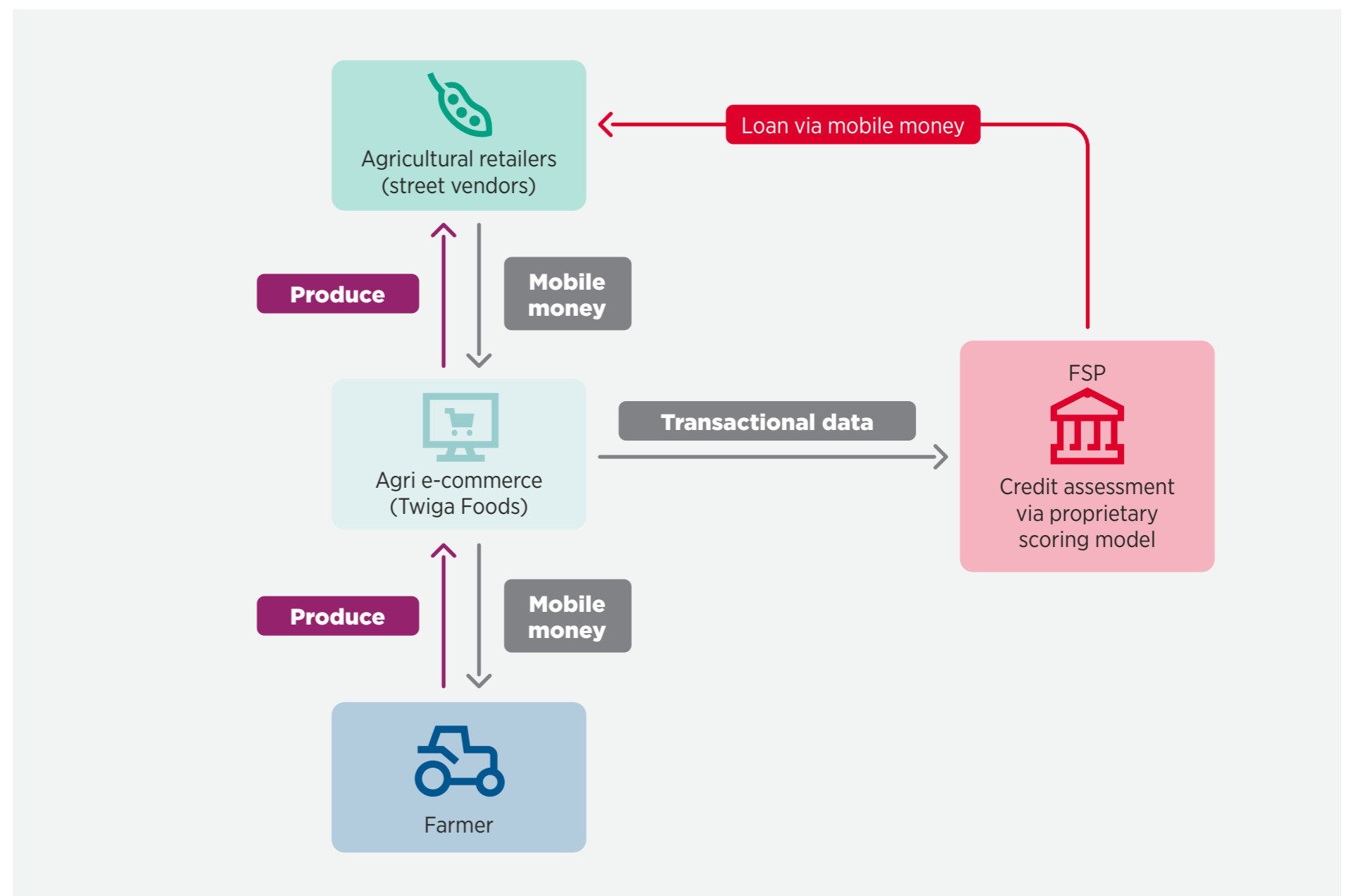
Data sharing

Agri e-commerce refers to market linkage tools that formalise agricultural value chains by connecting crop producers and buyers through a mobile-based online platform. In mobile money markets, agri e-commerce services are increasingly integrated with mobile money to support digital payments, generating useful transactional records for credit scoring.

The most advanced agri e-commerce companies are taking on the role of aggregators in the agricultural last mile, performing logistics, warehousing and identifying producers and buyers. In doing so, they are taking on the traditional role of agribusinesses, from procuring and selling crops to enabling farmers to access financing.⁵⁸

In Kenya, agri e-commerce company Twiga Foods, a business-to-business platform connecting farmers to street vendors, is enabling financial inclusion for downstream stakeholders in the value chain by sharing data with FSPs. Street vendors purchasing produce from Twiga Foods can access short-term loans via mobile money to finance their stock. The loan repayment and transaction histories of vendors are taken into account for future credit, and Twiga Foods can monitor vendors' creditworthiness and provide preferential repayment and interest rates. Despite growing demand, loans are only offered to smallholder farmers on a limited and informal basis. However, there is potential to expand Twiga's model to also enable farmers to access formal loans.

Figure 43 **Collection of transactional data via e-commerce: Twiga Foods' stock financing loan**



58. Examples include TaniHub in Indonesia, AgroCenta and FarmCrowdy in Nigeria, Twiga Foods in Kenya.

Agritech as data provider: centralised data hubs

Data sharing

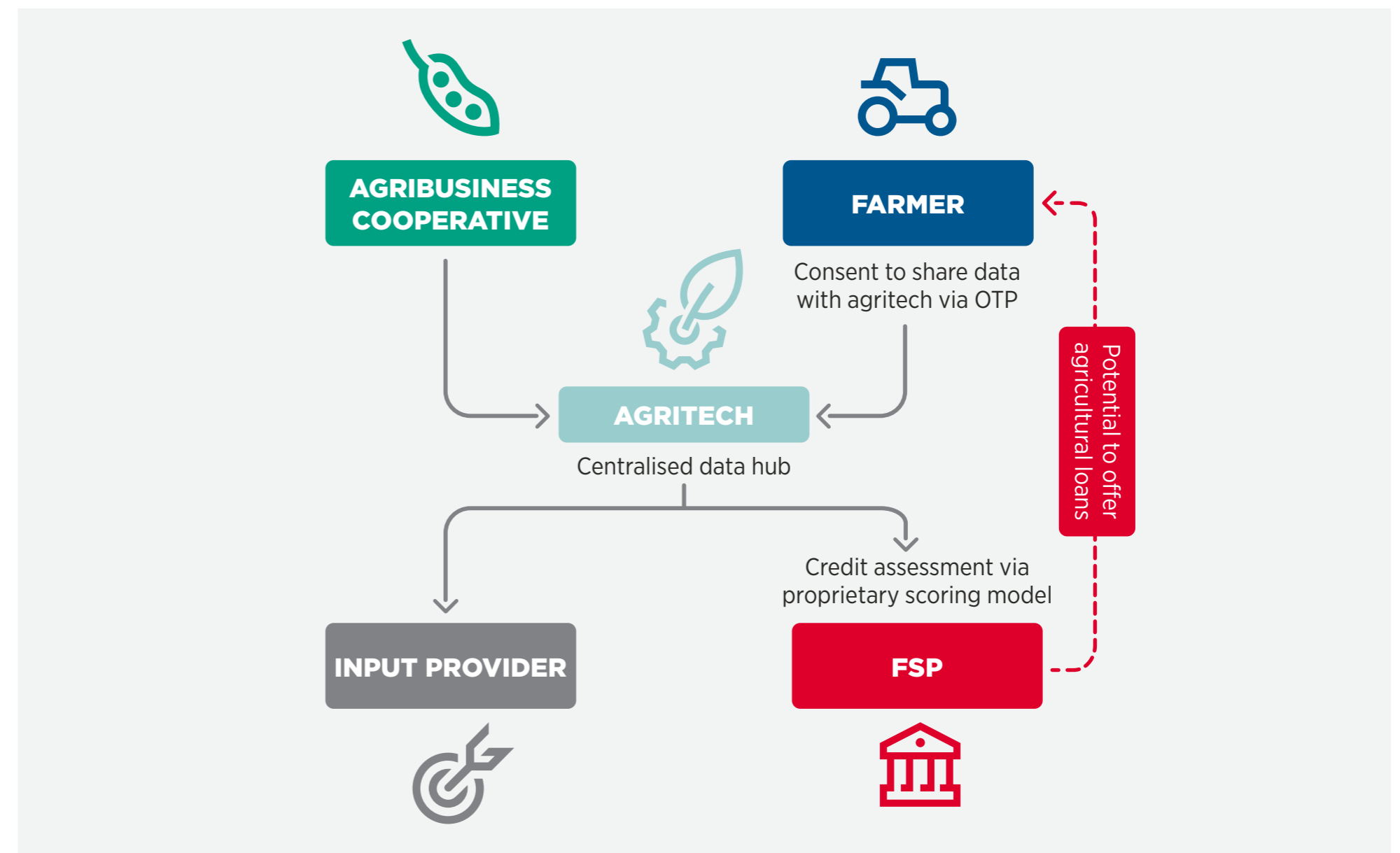
Exposing a greater quantity and variety of data points to a wider range of data users (e.g. FSPs) under a centralised data exchange model could greatly improve credit risk analysis and make more financial services available to farmers.

Centralised data sharing models (data hubs) allow for multiple data providers (e.g. agribusinesses, cooperatives, farmers) to provide data to multiple data users interested in the data (banks and other parties, such as input suppliers, insurers and government). By centralising the collection of farm and farmer data, they are making data more accessible, facilitating rich analytics and enabling data-driven decision making.

Agriculture-focused centralised data hubs have emerged in markets like Indonesia (e.g. Hara) and Nigeria (e.g. Verdant). In Indonesia, Hara's electronic authentication system sends one-time passwords to farmers via SMS to request their consent every time they share data.

The use of blockchain technology offers potential for more secure, traceable and transparent exchange of data. Agritech companies BanQu in Nigeria and Hara in Indonesia both use blockchain technology for data sharing.

Figure 44 **Centralised data hub: the Hara ecosystem in Indonesia**⁵⁹



⁵⁹. See GSMA (2019), *AgTech Innovation Unlocks Economic Identities for Smallholder Farmers in Indonesia*.

Agritech as credit scoring enabler: data analysis and risk modelling solutions

Data sharing

Beyond collecting and aggregating data, agritechs could play a role in analysing it, which leads to credit scoring. Agritechs may perform varied degrees of data analytics. At the most basic level, they may simply edit and clean the data to make it usable before providing it to FSPs for credit scoring. In some cases, the most specialised agritechs conduct a statistical and financial analysis to produce actual credit scores.

CASE STUDY



Myanmar's Impact Terra analyses data for partner bank

Myanmar's Impact Terra is an example of an agritech performing advanced analytics on farmer and farm data. In 2019, the company conducted a pilot with partner FSP Sathapana Bank to use data collected on maize farmers via its digital tool for credit scoring. With farmers' consent, Impact Terra analysed data to populate detailed profiles of farmer segments on behalf of the FSP, which then fed into a customised farmer credit scoring model run by the bank.

CASE STUDY



Kenya's FarmDrive enables credit scoring for farmers

In Kenya, agritech FarmDrive collects self-reported data directly from farmers (records of expenses, yields, revenue) and aggregates it with a range of alternative data sources (satellite-based environmental and agronomic data). It then analyses the data with a machine learning algorithm to produce relevant credit scores for farmers, as well as decision tools that enable several FSP partners, such as Kenya Commercial Bank (KCB), to develop agricultural loan products. Farmers then receive loans via mobile money (M-Pesa).

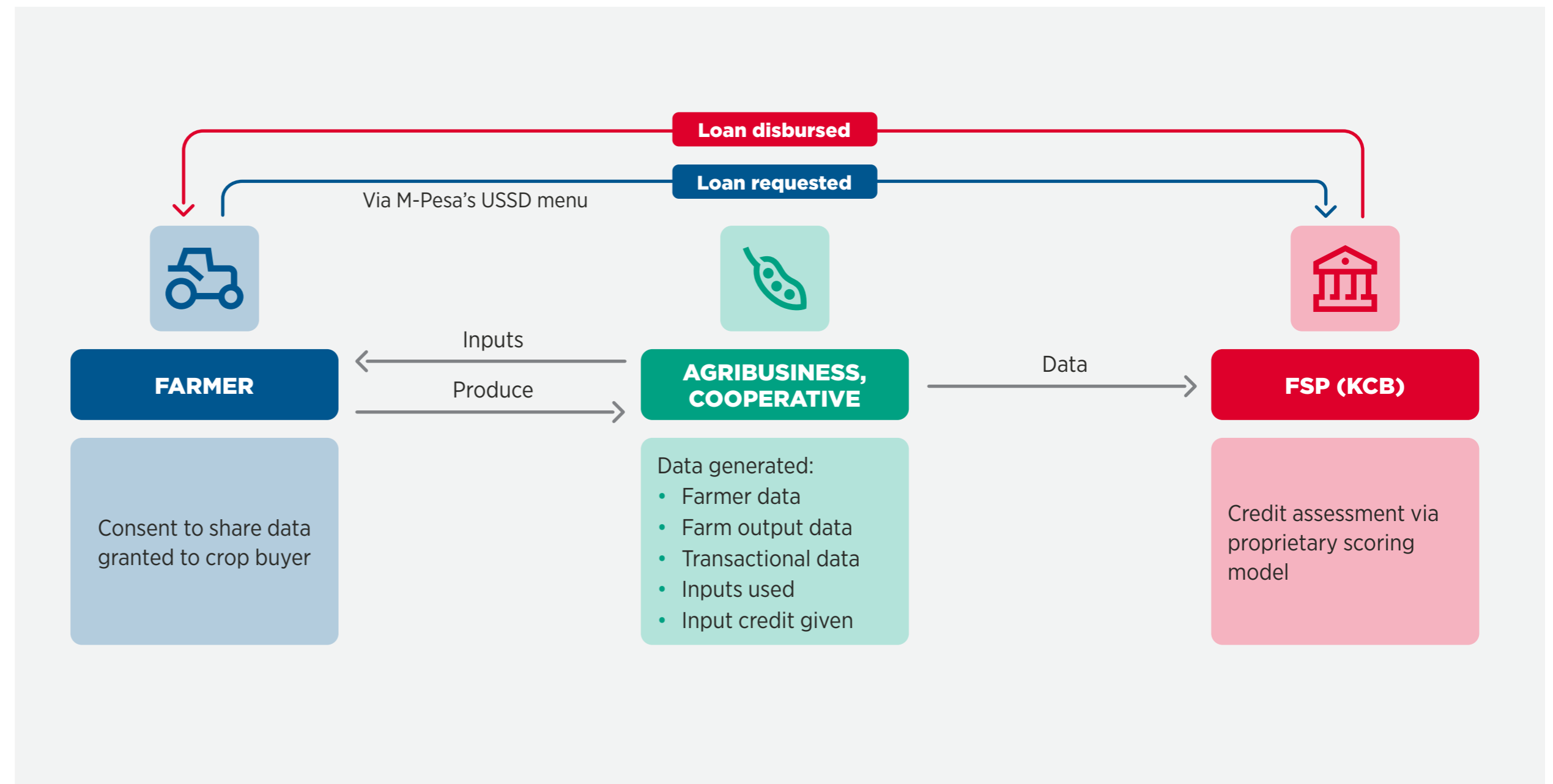
Agribusiness as data provider: one-to-one data-sharing partnerships – the example of KCB’s MobiGrow

Data sharing

KCB MobiGrow service aims to promote financial inclusion among smallholder farmers in Kenya and Rwanda by partnering with crop buyers (agribusinesses and cooperatives). Under the partnership, KCB directly accesses farm, farmer, transaction history and value chain data held by the crop buyers, and uses a proprietary credit scoring algorithm to determine a farmer’s creditworthiness.

In Kenya, MobiGrow uses M-Pesa’s established infrastructure as a distribution channel to provide farmers with credit and savings accounts. Farmers working with partner agribusinesses and cooperatives create a KCB MobiGrow account and access the service via the M-Pesa USSD menu. They can then request a loan based on their needs and, if successful, it is deposited into their MobiGrow account. Farmers can push funds to their M-Pesa account (for a small fee) or withdraw the money via agents. Repayments are made over one, three or six months.

Figure 45 **One-to-one data-sharing partnership: KCB and agribusiness partner**



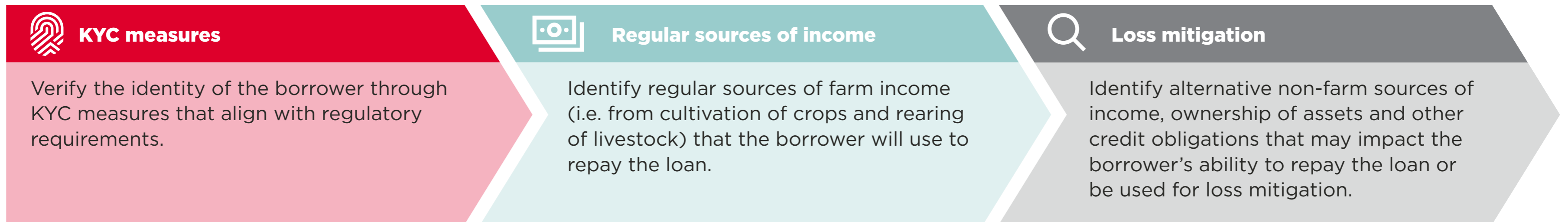
Digital data could address data gaps and speed up the credit scoring process

Data sharing

FSPs must collect and analyse a range of data about their customers to generate a numeric score (i.e. credit score) that is used to calculate the risk profile of the borrower. A credit score is an expression of a farmer’s apparent creditworthiness that is used to make underwriting decisions. Typically, credit scoring for smallholder farmers has involved analysing the few data points available, such as repayment records and current customer data on collateral, in order to understand future repayment risks. Data comes from traditional sources, such as surveys, demographic information or credit bureau data. However, unbanked farmers who have not received loans from FSPs in the past are unlikely to have a file in a credit bureau.

In the absence of alternative sources of data, credit scoring is a time-consuming process in which data is collected at a farm by loan officers who may store information as paper copies or in digital format. Data is then taken to the office for analysis and the farmer’s credit score is calculated. Agritech solutions not only address critical data gaps in the credit scoring process, but also present an opportunity to speed up the credit scoring process with data readily available in digital format.

Figure 46 **Typical steps in the credit scoring process**



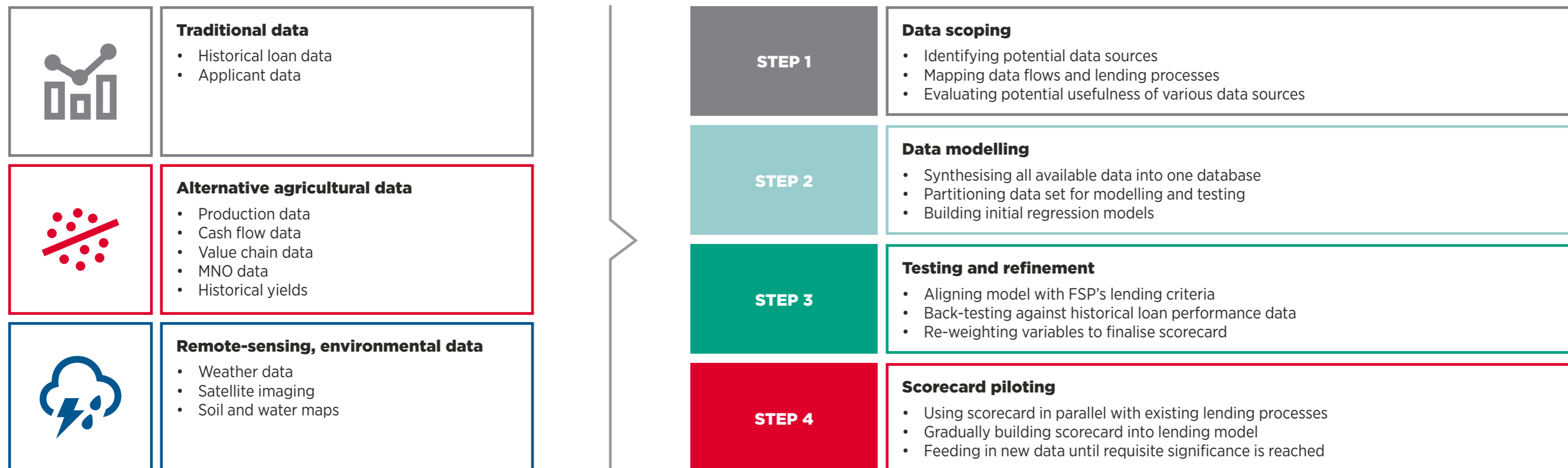
Emerging credit scoring methods are integrating traditional data sets with digital agricultural data

Data sharing

Emerging approaches to credit risk analysis rely on alternative agricultural data, including agritech-generated data and, increasingly, remote-sensing data. Historical production data and vegetation indexes from satellites, for example, could improve predictions of potential yields, which are crucial to assessing a farmer’s creditworthiness.

In 2018, a joint initiative in Uganda between CGAP, fintech firm Harvesting and the PRIDE Microfinance network in Uganda, tested a variety of data types for credit scoring. A key lesson from this initiative was that while the use of new data sets alone does not improve credit risk analysis, new data sets that are high quality (i.e. from automated collection processes versus self-reported data) do improve credit scoring.

Figure 47 **Steps in credit scoring**



How to generate, share and use farmer data for financial inclusion?

Key questions



Data generation

1. What digital data is available to help farmers create an economic identity?
2. How does the digitisation of the agricultural last mile generate data that can be used to offer financial services to farmers?



Data ownership

1. Who owns the farmer and farm data that can unlock financial inclusion? Agribusinesses, farmers, MNOs?
2. How and to what extent is farmer consent being sought and obtained?



Data sharing

1. As digital data becomes available, what partnerships are emerging between stakeholders (value chain actors, agritechs, FSPs) to share data that can unlock financial inclusion for farmers?
2. What new operational models and supporting technologies are available to share data?
3. What new approaches to innovative credit scoring models are emerging?



Data use

1. What financial products are required to meet the needs of farmers?
2. What are the key considerations in designing financial products for farmers?

Credit products should address farmers' needs and circumstances, which vary throughout the year

Data use

Figure 48 **Ghana's cocoa farmers: crop calendar with cash inflows and outflows⁶⁰**

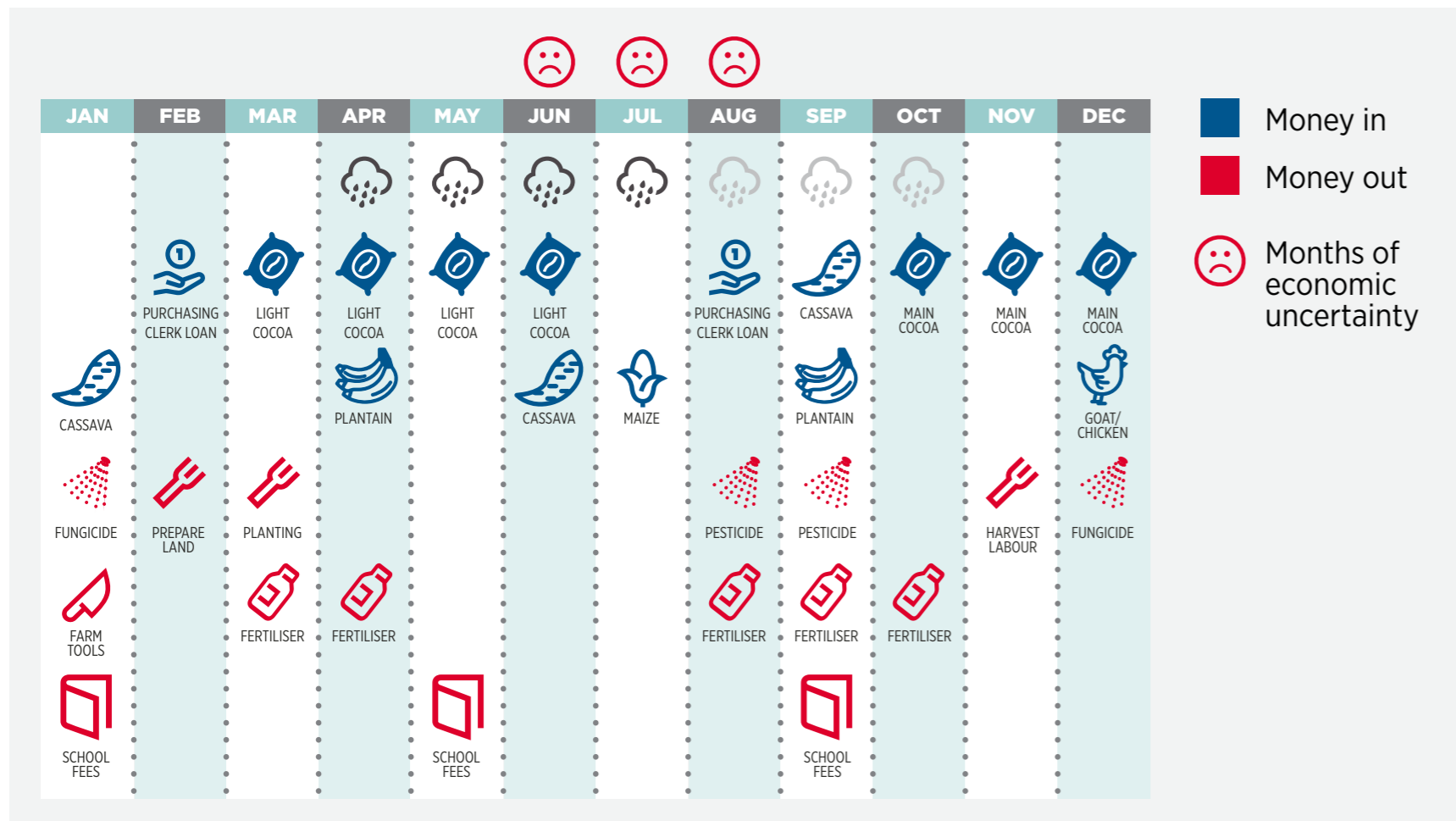
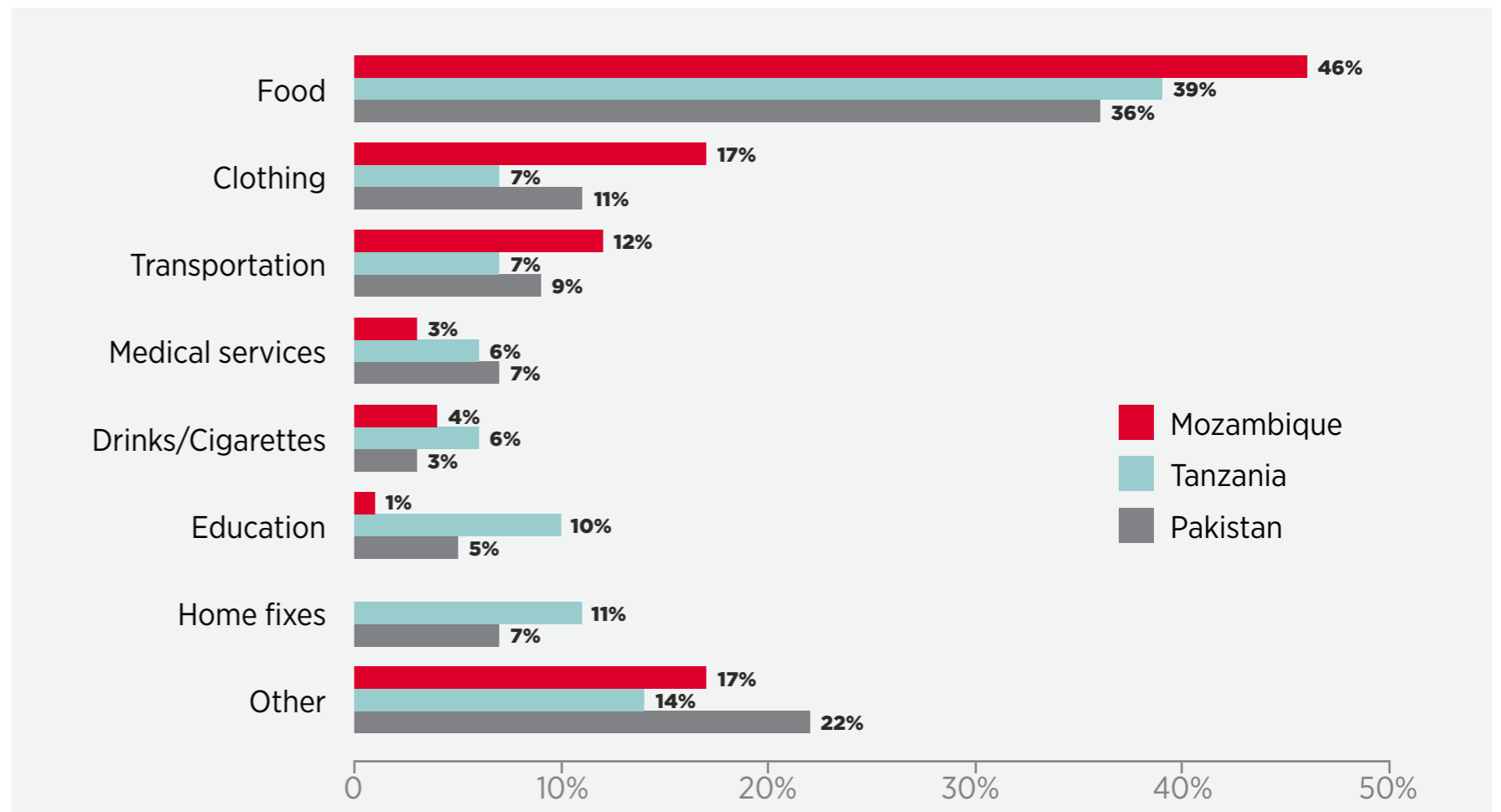


Figure 49 **Median share of consumption expenditures on various household needs⁶¹**



The demand for loans by smallholder farmers is closely tied to the seasonal nature of their income, which fluctuates throughout the growing season. During the year, farmers also have many cash outflows that can influence their ability to pay back loans. Research from CGAP in Tanzania, Mozambique and Pakistan has shown that farmer household expenses are smoother than income, but still fluctuate. Main expenditures vary across countries. Besides basic needs such as food and clothing, major expenditures for farmers include education, transportation and health services.

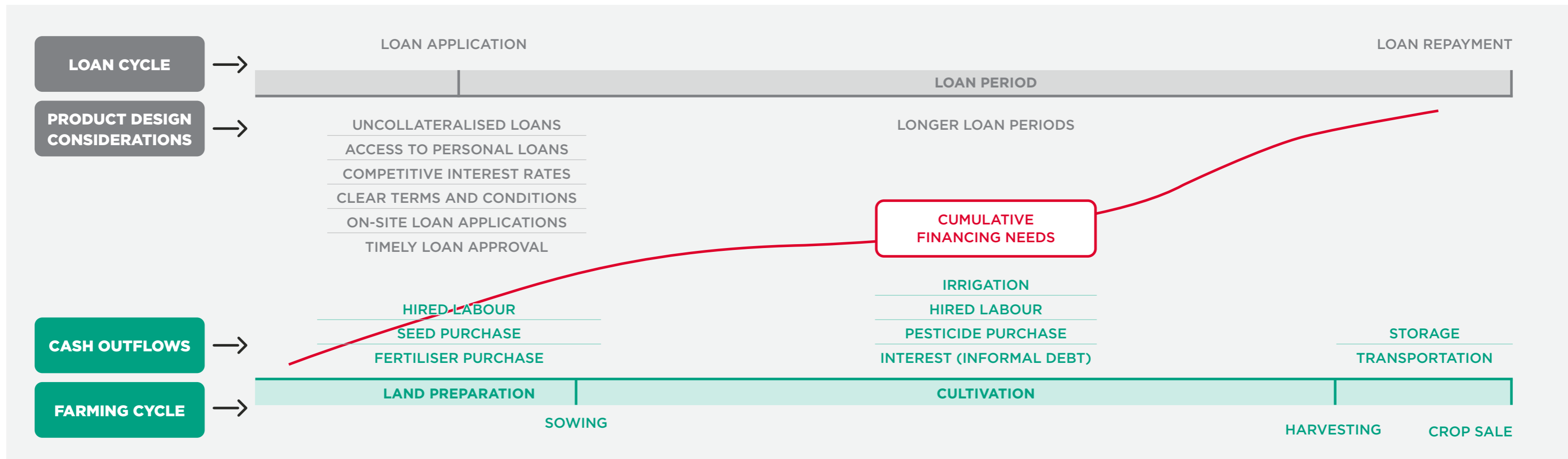
60. Source: GSMA (2019), *Mobile-Enabled Economic Identities for Smallholder Farmers in Ghana*.
 61. Source: CGAP (2016), *Smallholder diaries. Building the Evidence Base with Farming Families in Mozambique, Tanzania and Pakistan*.

Effective credit product design depends on understanding the cash outflows of rural households

Data use

Together with offering products that consider the seasonality of farmers' incomes, it is vital to design financial products that are customised to farmers' circumstances, needs and revenue-generating activities. The "farming journey" varies between value chains and geography, and user research is required to reveal it fully. FSPs must also consider issues like a gender-neutral approach to credit, for example, allowing collateral registered under women's names, loans that cover a range of crops, models that allow access to higher priced items (e.g. machinery) and transparency in data ownership and sharing.

Figure 50 **Product design considerations throughout the farming cycle**⁶²



62. Source: GSMA (2019), Digital credit scoring for farmers: Opportunities for Agritech Companies in Myanmar.

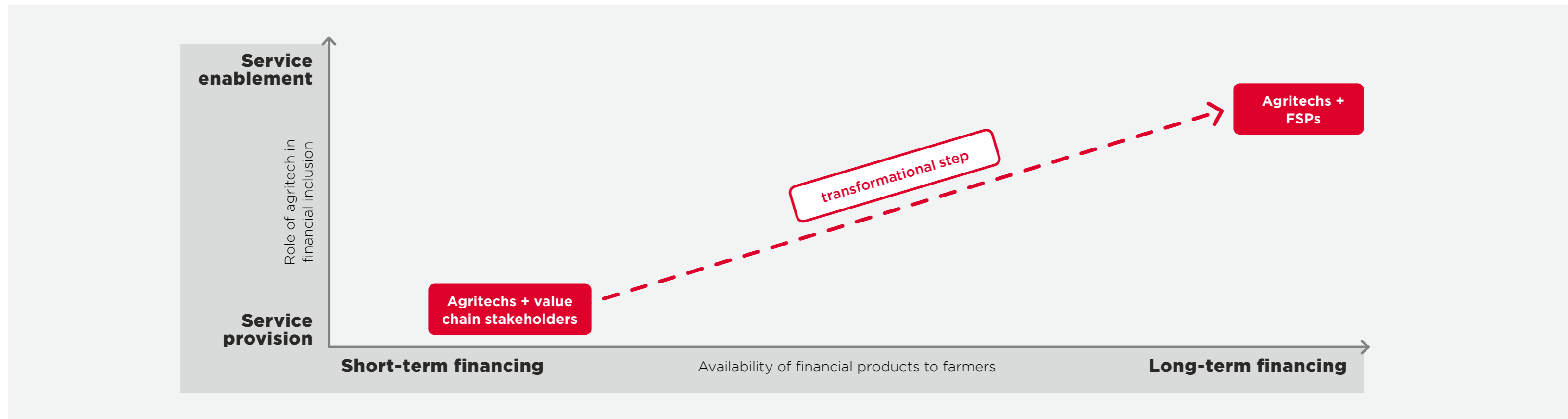
Agritechs have a role to play in short-term financing, but true social innovation lies in long-term financing

Data use

As more digital farmer and farm data becomes available, agritechs are playing a greater role in short-term input financing by offering solutions that digitise farmer and farm data. With more transparency from suppliers, value chain actors can provide farmers with short-term working capital.

Success and scalability will require strategic partnerships between agritechs and FSPs that target the rural sector. A transformational step in smallholder financing is the use of digital farmer and farm data for long-term financing (>one year) that enable farmers to invest in farm assets. This kind of transformation requires digital innovation in data generation, data sharing among interested parties and data use. It also requires agritechs to play a greater role as credit scoring enablers.

Figure 51 **Transformational step in farmer financing**



Smallholder financing must support climate adaptation and resilience for farmers

Data use



With climate change, smallholder finance is becoming more aligned with climate-smart finance. Climate-smart finance refers to financial instruments that support and account for climate change adaptation and mitigation objectives.

Examples of climate-smart finance in the agricultural sector include:

- Loans for high-quality inputs, including climate-resistant seeds, fertiliser and crop protection (short-term financing);
- Loans for assets that improve climate resilience, such as water pumps and drip irrigation systems (long-term financing); and
- Insurance products.



In addition to agricultural asset financing products, agricultural insurance (digital and traditional) is the least available financial product for smallholder farmers. In 2018, only three per cent of smallholder households in Africa and 22 per cent in South and Southeast Asia had access to any kind of agricultural insurance.

Examples are:

- Weather index insurance that protects farmers against severe weather resulting in crop failure;
- Generic crop insurance (not based on weather indexes) that protects and compensates farmers against yield losses; and
- Livestock insurance to help pastoralists deal with livestock losses, largely due to drought and forage losses.

There is an urgent and growing need to design climate-smart financial products, including climate insurance. There is an opportunity to use digital farmer and farm data both for credit profiling and insurance risk profiling. Climate-smart products can also greatly benefit from integration with satellite-based environmental data (weather data, vegetation indexes, soil maps). Crucially, the availability of insurance for climate adaptation can help unlock agricultural credit as it serves as collateral for loans and eases the process of assessing the creditworthiness of farmers.

Key findings and recommendations

- Digital agriculture tools that enable access to markets have significant potential to generate data for the creation of economic identities for farmers. Digital procurement solutions and e-commerce services make it possible to collect valuable data on the economic activities of farmers. These tools also capture critical transactional data on income from the sale of crops, especially when they are integrated with mobile money.
- MNOs can play a pivotal role in enabling effective data-sharing partnerships by bringing together agritech companies, agribusinesses and FSPs. With key assets such as customer relationships (farmers and agribusinesses), mobile money and connectivity, MNOs have an important role to play in scaling the specialised solutions for the digitisation of the agricultural sector developed by agritech companies. They are also well placed to take a lead in engaging with FSPs to develop digital financial services for the rural sector.
- The rich data that agritech companies generate is already helping to extend short-term working capital to farmers. The most impactful and transformational step, however, is using technology to enable long-term working capital for farmers. This shift requires partnerships between agritech companies and FSPs. When FSPs do not have the capacity to invest in credit scoring solutions, there is an opportunity for agritech companies to expand their value proposition from data collection, aggregation and analysis to risk modelling.
- There is a market need and business opportunity to rethink credit product design for the rural sector and to:
 - Design agricultural credit products around the demands of smallholder farmers at different stages of the farming cycle;
 - Take into account the cash inflows and outflows of farmers when structuring the stages of the loan cycle; and
 - Shift focus to enabling products that support the climate resilience of farmers, including agricultural insurance.



The business case for farmers to participate in digitised value chains

July 2022

A woman wearing a red dress with a circular pattern is standing in a field of tall grass. She is seen from behind, with her hands on her hips, looking out over the field towards a bright sunset. The sun is low on the horizon, creating a strong lens flare effect. The sky is a mix of orange and blue.

6

Introduction



What is the focus of this chapter?

This chapter makes the business case for smallholder farmers – those who operate on plots smaller than two hectares – to participate in digitised agricultural value chains. It specifically looks at whether digitised agricultural value chains increase the “farmer share”, or proportion of the price that farmers receive for the produce they sell, in relation to other actors in the value chain.

How can farmers benefit from digitised value chains?

The benefits of digitised value chains for agribusinesses are clear (see chapter 2). However, there is limited evidence of the economic benefits for farmers, in particular, whether more efficient and transparent procurement would allow farmers to earn more from what they produce.

Our research in Pakistan and Nigeria shows that digitised models that reduce intermediation in fragmented agricultural value chains can boost farmer share significantly. This increase is greatest in value chains where there are traditionally multiple intermediaries. In integrated value chains, meanwhile, the efficiencies that agribusinesses gain from digitisation may not be passed on to farmers since farmer share in digitised and non-digitised models is comparable. For smallholder farmers, digitised agricultural value chains can also be a catalyst for broader benefits when they provide an entry point to value-added services, such as financial and advisory services.

What is this chapter based on and who is it intended for?

In 2021, the GSMA AgriTech programme conducted a study to compare the value that farmers receive in traditional agricultural value chains and in digitised agricultural value chain models. Working with the rice and potatoes value chain and their procurement models in Nigeria and Pakistan, we tested whether digitised models allow farmers to capture a greater share of the price of their produce (see slide 119 for more information on the methodology).

This chapter is aimed primarily at the donor community, policymakers and social impact investors to support decision-making on fund allocations and investments in procurement models and digital solutions that maximise economic benefits for farmers.

Definitions

1/2

Agricultural value chains⁶³

The actors and activities that bring basic agricultural produce from the field to final consumption, with value added to the produce at each stage. An agricultural value chain can involve processing, packaging, storage, transport and distribution. Value chains can be formal or informal depending on the strength of the relationship between farmers and buyers.

TRADITIONAL AGRICULTURAL VALUE CHAINS

Intermediary-based value chains⁶⁴

Intermediary-based value chains are characterised by low levels of formality between actors and a high degree of fragmentation in the last mile. They rely on multiple local trade intermediaries (often called middlemen) and wholesale open markets to move agricultural produce from farms to end consumers.

Integrated value chains

Integrated value chains are characterised by formal relationships between actors. Fragmentation in the last mile is low, with stronger vertical integration that relies on agribusinesses (or cooperatives) to procure crops from farmers or farmer groups.

DIGITISED AGRICULTURAL VALUE CHAIN MODELS

Agri e-commerce⁶⁵

Agri e-commerce uses digital platforms to enable the buying and selling of agricultural produce online, disrupting traditional value chains. Although most agri e-commerce businesses sell domestically to urban consumers, agri e-commerce also enables farmers to reach international buyers.

Digitised integrated value chains

Integrated value chain actors use digital procurement tools to gain control over activities in their value chain. All digital procurement solutions generate digital transaction records. They can include payments or traceability functions, or a combination of the two.

63 GSMA. (2021). *Agri DFS: Emerging Business Models to Support the Financial Inclusion of Smallholder Farmers*.

64 GSMA. (2020). *Toolkit for the Digitisation of Agricultural Value Chains*.

65 GSMA. (2020). *Digital Agriculture Maps: 2020 State of the Sector in Low and Middle-Income Countries*.

Definitions

2/2

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.

Smallholder farmer⁶⁶

A farmer in a low- or middle-income country (LMIC) who produces crops or livestock on two-hectare plots of land or less.

Local trade intermediary

An informal broker (also called a middleman) who trades unprocessed produce, receiving a commission for their services.

Agribusiness⁶⁶

A formal buyer, trader or exporter of agricultural produce, or input supplier.

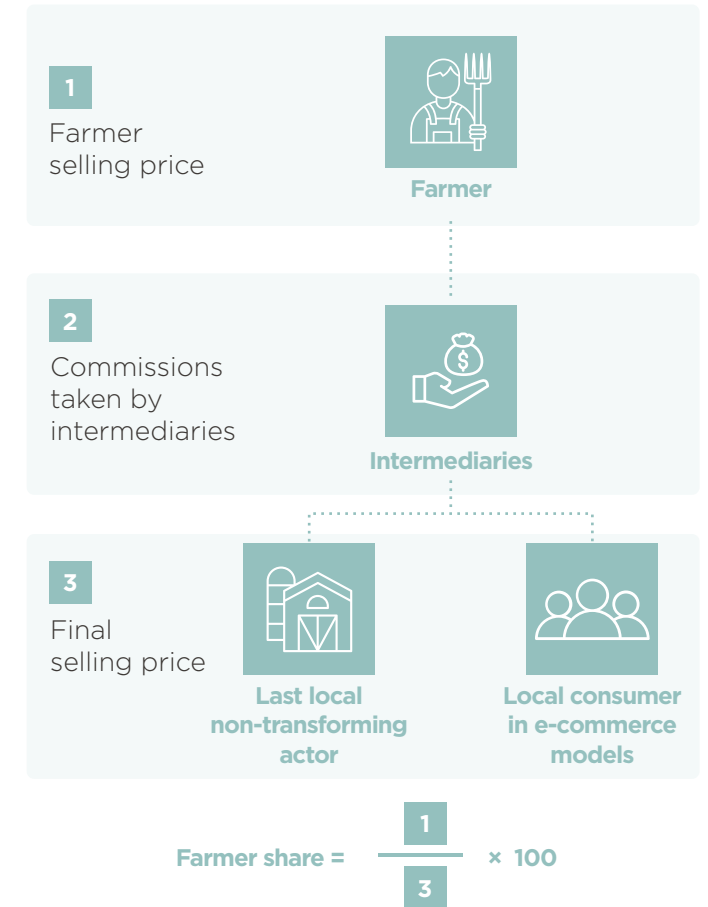
Agritech⁶⁶

A company providing tech-based solutions to increase efficiency, transparency and profitability in agriculture.

Farmer share

The proportion of the price farmers receive for their produce when it is sold to the final local value chain actor. The final local value chain actor is defined as the last local non-transforming (LLNT) stakeholder (a mill, processor, etc.) when produce needs transformation before consumption, or as the local consumer in domestic e-commerce models.

Figure 52 **Farmer share calculation**



Methodology

Our research, conducted in collaboration with Altai Consulting,⁶⁷ estimated and compared the farmer share of agricultural output prices in traditional (non-digitised) value chains and digitised value chain models.

Our research question:



Are digitised value chains leading to farmers capturing a higher share of the output price of the produce they sell?

Scope



The research focused on local value chains up to the produce transformation stage. This ensured price points were comparable and the value added from produce transformation was isolated. Value chains selected include:



Rice in Nigeria



Potatoes in Pakistan

Approach



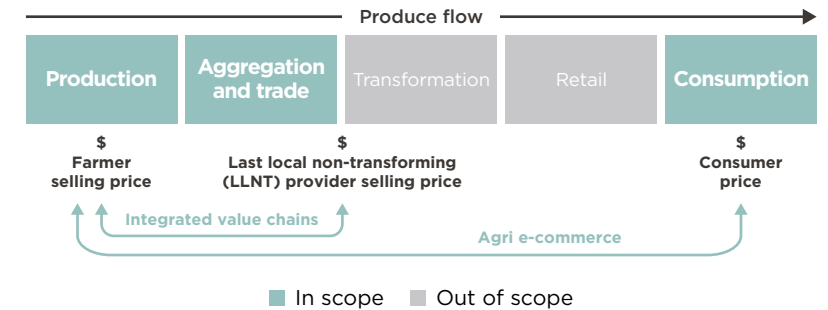
- Interviews with 20 value chain actors in selected value chains and GSMA grantees⁶⁸ in Nigeria and Pakistan between February and March 2021 to collect price points and insights on how digitisation contributes to increased farmer share.

Limitations



Prices are subject to seasonal variations, which this research mitigates by using price averages and expressing shares as a percentage among actors rather than as net revenue.

Figure 53 **Price point comparisons in the value chain**



- Triangulation of price points reported by value chain actors in traditional and digitised value chains and calculation of farmer shares.
- Qualitative analysis of the broader benefits of digitised value chains.

Incremental efficiencies from scaled digital services were not captured. Another round of research will be conducted to see how farmer shares evolve as digital agriculture services scale in these value chains.

⁶⁷ Altai Consulting provides strategy consulting and research services to private companies, governments and public institutions in LMICs. Its teams currently operate in more than 50 countries in Africa, the Middle East and South Asia.

⁶⁸ The GSMA Innovation Fund for the Digitisation of Agricultural Value Chains aims to scale digital solutions for the agricultural last mile and improve smallholders' financial inclusion, livelihoods and climate resilience. Grantees include: AgroMall in Nigeria, Dialog in Sri Lanka, Jazz in Pakistan, Koltiva in Indonesia, MTN Ghana, MTN Rwanda and Vodacom Tanzania.

Nearly 500 million households depend on smallholder farming for their livelihoods⁶⁹

Smallholder farmers are an integral part of our food systems, producing more than 30 per cent of food globally, and representing more than 80 per cent of the world's farms. The majority of smallholders live in LMICs, particularly in Asia and Sub-Saharan Africa (see Figure 55).⁷⁰ Collectively, they manage about a quarter of the world's cropland⁷¹ and play a key role in the production of cash crops like rice, cocoa and tea.

Figure 54 **Key data on smallholder farmers in agriculture**



84% of the world's farms are smaller than two hectares⁷¹



Smallholders use 24% of the world's agricultural land⁷¹



Smallholders produce:

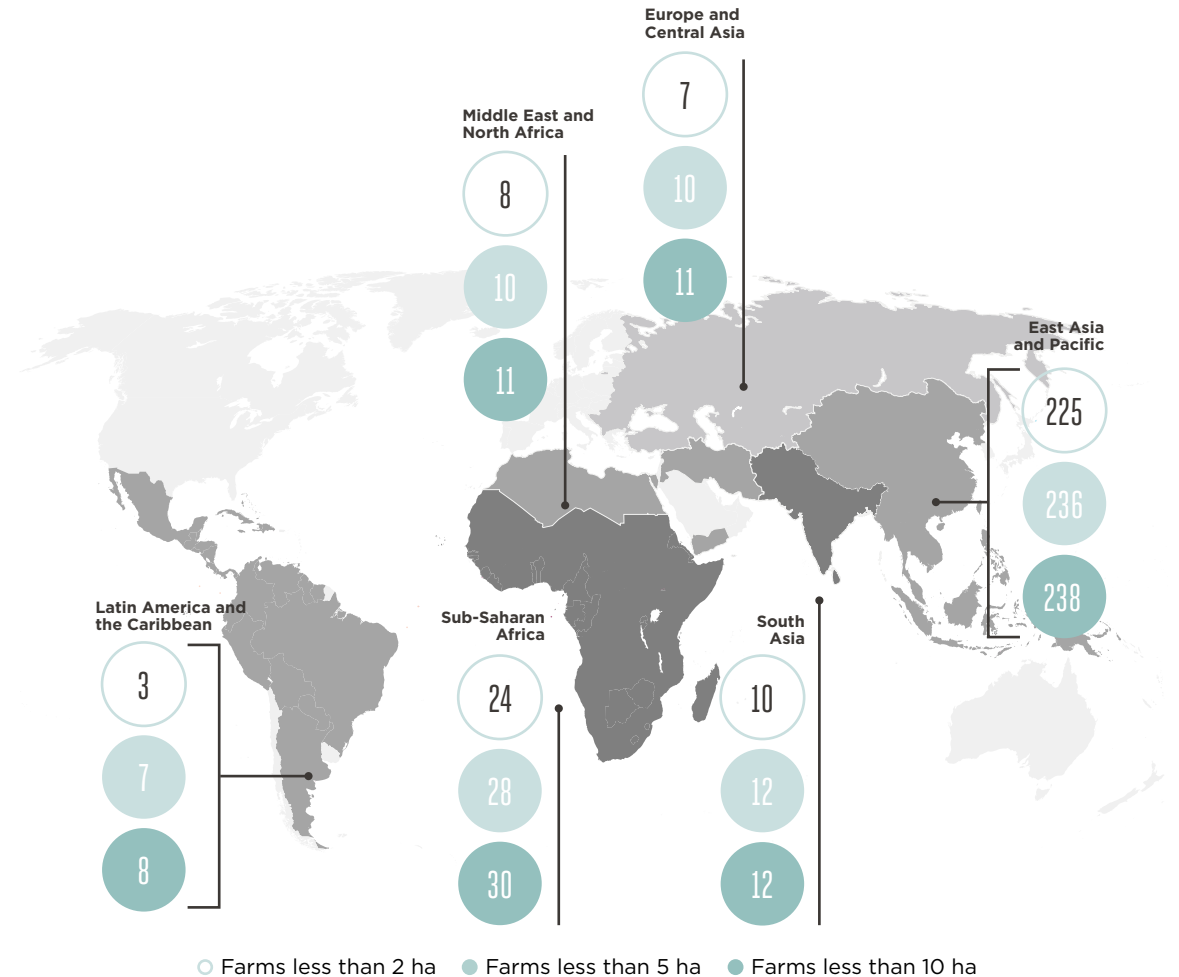
- More than 30% of the world's food⁷¹
- More than 80% of the food consumed in Asia and Sub-Saharan Africa⁷²



Smallholders' contribution to global production by value chain:⁷³

- Rice: more than 80%
- Groundnuts and oil palm: 75%
- Millet and cassava: nearly 60%
- Cotton and sugarcane: more than 40%

Figure 55 **Geographic distribution of small-scale farms (in millions)⁷⁰**



69 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*.

70 Lowder, et al. (2016). *The Number, Size, and Distribution of Farms, Smallholder Farms, and Family Farms Worldwide*. Appendix 1. Note: Farm size is available for 80% of the 570 million farms estimated in this source. There were 113 million farms for which farm size was not available.

71 Ricciardi, Vincent et al. (2018). *How much of the world's food do smallholders produce?*

72 IFAD. (2021). *Smallholders can feed the world*.

73 Leah H Samberg et al. (2016). *Subnational distribution of average farm size and smallholder contributions to global food production*.

Despite being the foundation of the global food system, smallholder farmers make up most of the world's poor

The contribution of agriculture to local economies is substantial:

18.5 per cent and 18 per cent of GDP in Sub-Saharan Africa and South Asia respectively, and more than 30 per cent in countries such as Ethiopia, Sierra Leone, Chad, Mali and Liberia.⁷⁴ However, many smallholders are unable to earn a sustainable living from agriculture.

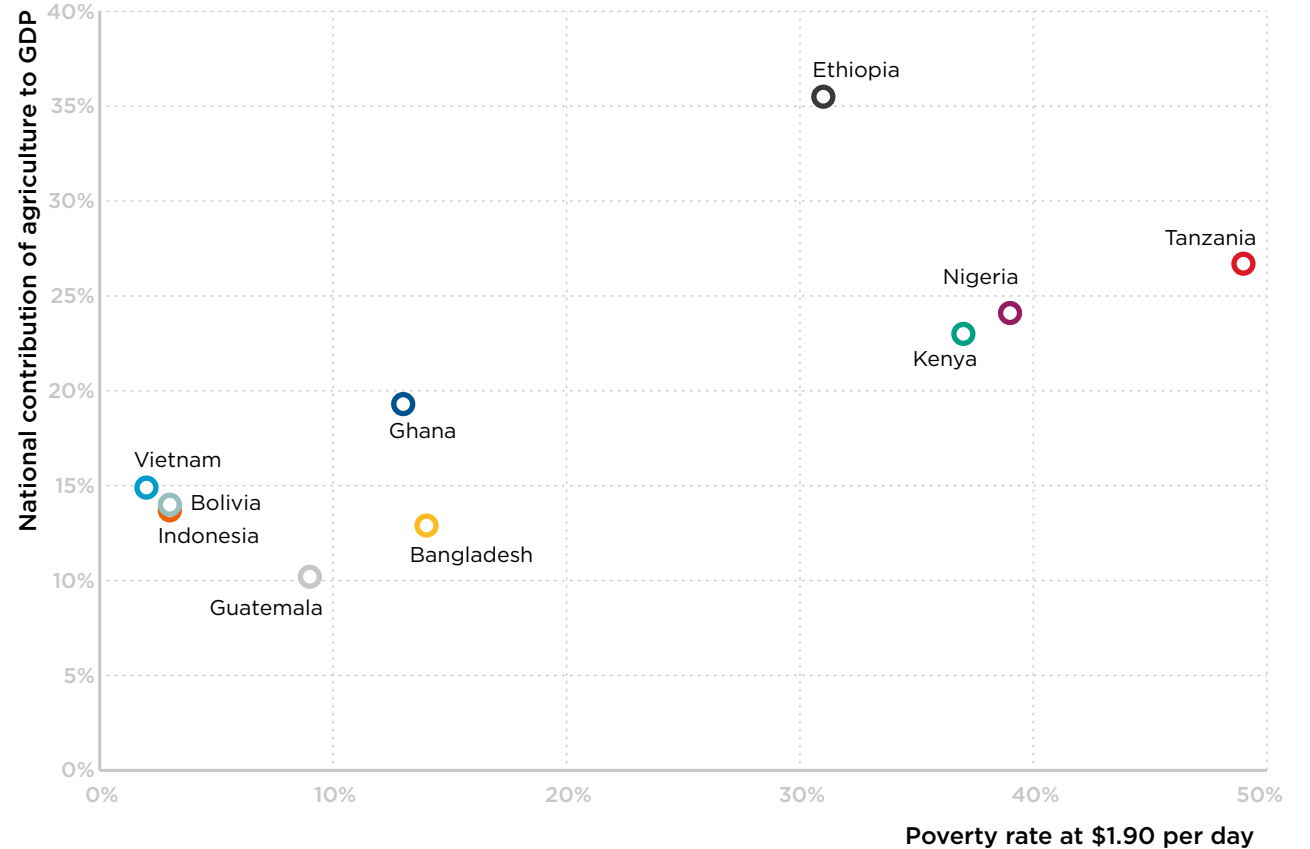
Figure 56 illustrates this paradox, showing that the more agriculture contributes to national GDP, the higher the national poverty rate.

Poverty among smallholder farmers is widespread and, in most countries, much higher than the national poverty headcount rate.⁷⁵ It is estimated that 78 per cent of the world's extreme poor live in rural areas and rely largely on agriculture.⁷⁶

It is a terrible irony that those who grow our food cannot afford to feed their own families healthy, nutritious diets.

Gilbert F. Hougbo, President of IFAD⁷⁷

Figure 56 **Smallholder poverty rate relative to national contribution of agriculture to GDP⁷⁴**



⁷⁴ World Bank Data Bank. (2020). *World Development Indicators*.

⁷⁵ FAO. (2015). *The Economic Lives of Smallholder Farmers: An Analysis Based on Household Data from Nine Countries*.

⁷⁶ Castaneda et al. Elsevier. (2018). *A New Profile of the Global Poor*.

⁷⁷ IFAD. (2021). "Small-scale farmers need decent wages: IFAD calls on world leaders to commit to action at Food Systems Summit".

Poor access to markets is one of the key obstacles to increasing farmer incomes

There are multiple dimensions to the economic struggles of smallholder farmers (see Figure 57).

Farmers typically rely on traditional farming techniques that limit crop yields. They also suffer from irregular cash flows and limited access to financial services to manage their incomes. In addition, they typically operate in fragmented markets and face high price volatility.

Figure 57 **Main challenges faced by smallholder farmers**⁷⁸

Access to markets



Fragmented access to formal markets prevents farmers from selling their produce at a competitive price.

Access to services



Farmers have poor access to information due to inadequate government-led agricultural extension services.

Farmers lack access to appropriate financial services to afford quality inputs and assets and develop risk-coping mechanisms.

Access to assets



Lacking access to farming assets like machinery and irrigation systems, farmers suffer from low productivity and stagnant incomes.

Access to markets is a challenge

due to the complexity of agricultural value chains and the strong role of intermediaries, leaving many farmers highly dependent on them and often with little or no choice of buyers.⁷⁸

Women smallholders are disproportionately affected by this challenge, as social norms often discourage them from engaging with formal market players, who are typically male, and because of domestic work and limited land ownership.



⁷⁸ GSMA. (2020). *Digital Agriculture Maps: 2020 State of the Sector in Low and Middle-Income Countries*.

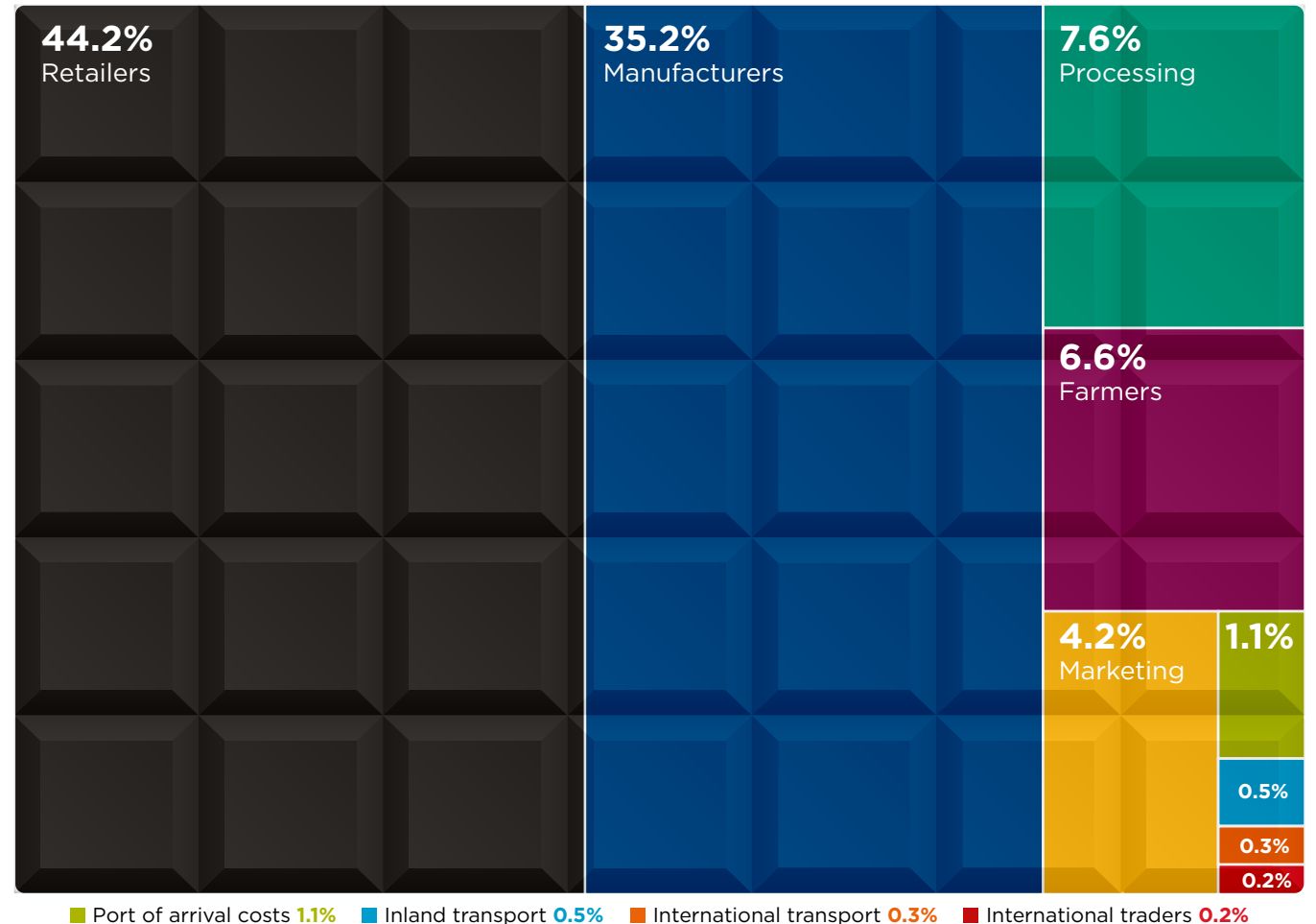
The farmer share of final retail prices has been declining, due in part to poor market access

The farmer share of retail prices has plummeted in recent decades.⁷⁹ Inadequate access to markets, combined with poor business skills and limited bargaining power, result in smallholder farmers earning significantly less than other actors in the value chain, such as larger processors, retailers and exporters whose market power has been progressively growing. As a result, large food companies have grown while the smallholder farmers responsible for food production are trapped in poverty and hunger.

Evidence of agricultural price shares is limited across LMICs due to the lack of available and comparable data.⁸⁰ In the few value chains or markets where data is available, trends show that farmer share of the final product price has reduced over time, as traders, brands and retailers have taken a bigger cut. For example, the share of the total cocoa value chain revenue that goes to farmers has dramatically declined from 50 per cent in 1970 to only seven per cent in 2020.⁸¹

Now, farmers in the cocoa value chain capture just a small share (6.6 per cent) of the final retail price of transformed chocolate products, while processors, manufacturers and retailers take the lion's share (88 per cent combined). Retailers alone collect almost half of chocolate's retail price (44 per cent).

Figure 58 Retail price shares captured by actors in the cocoa value chain⁸²



79 Jing Yi et al. (2021). *Post-farmgate food value chains make up most of consumer food expenditures globally*.

80 FAO. (2017). *The future of food and agriculture - Trends and challenges*.

81 The Conversation. (2012). *Why efforts by Côte d'Ivoire and Ghana to help cocoa farmers haven't worked*.

82 World Economic Forum. (2020). *Cocoa's bittersweet supply chain in one visualization*.

Only 40 per cent of smallholder farmers access markets through agricultural value chains and only 19 per cent have a formal contract

In 2016, CGAP divided smallholder farmers into three distinct segments based on several factors, including crop type, farm size and access to markets.⁸³ This framework helped to reveal that only 40 per cent of smallholders are commercial farmers with some access to markets. In 2019, CGAP refined this framework to highlight farmers' financing needs.⁸⁴ Although segments from 2016 and 2019 do not entirely overlap, they have several similarities.

Figure 59 Segmentation of smallholder farmers, 2016⁸³

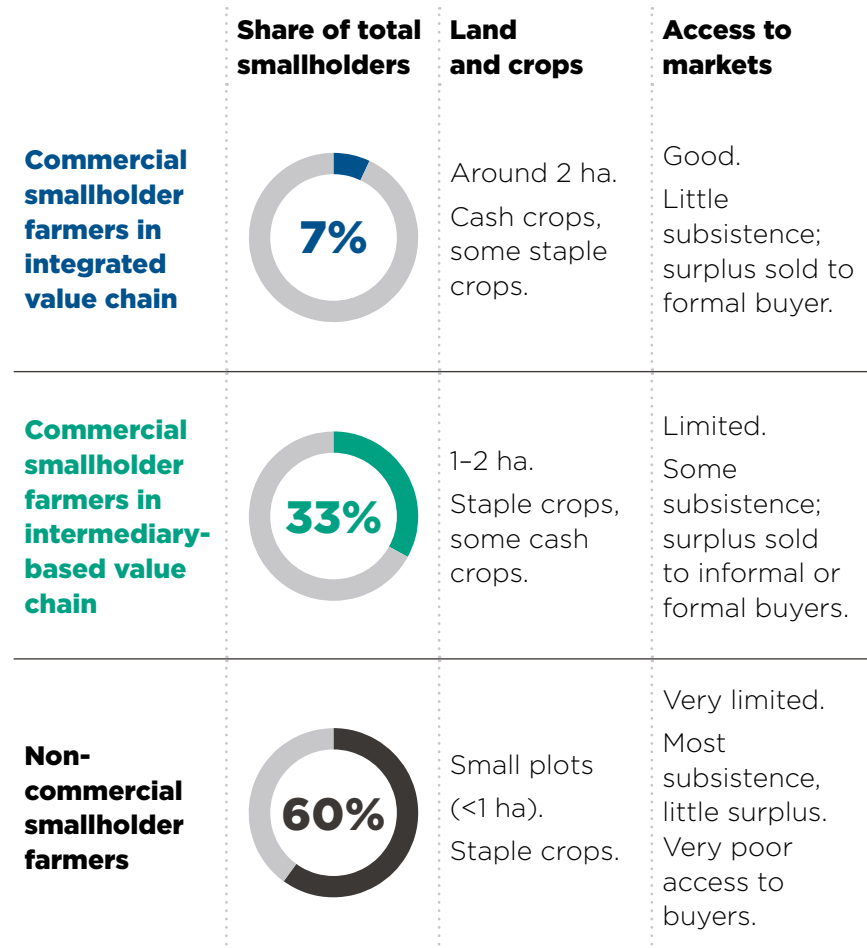
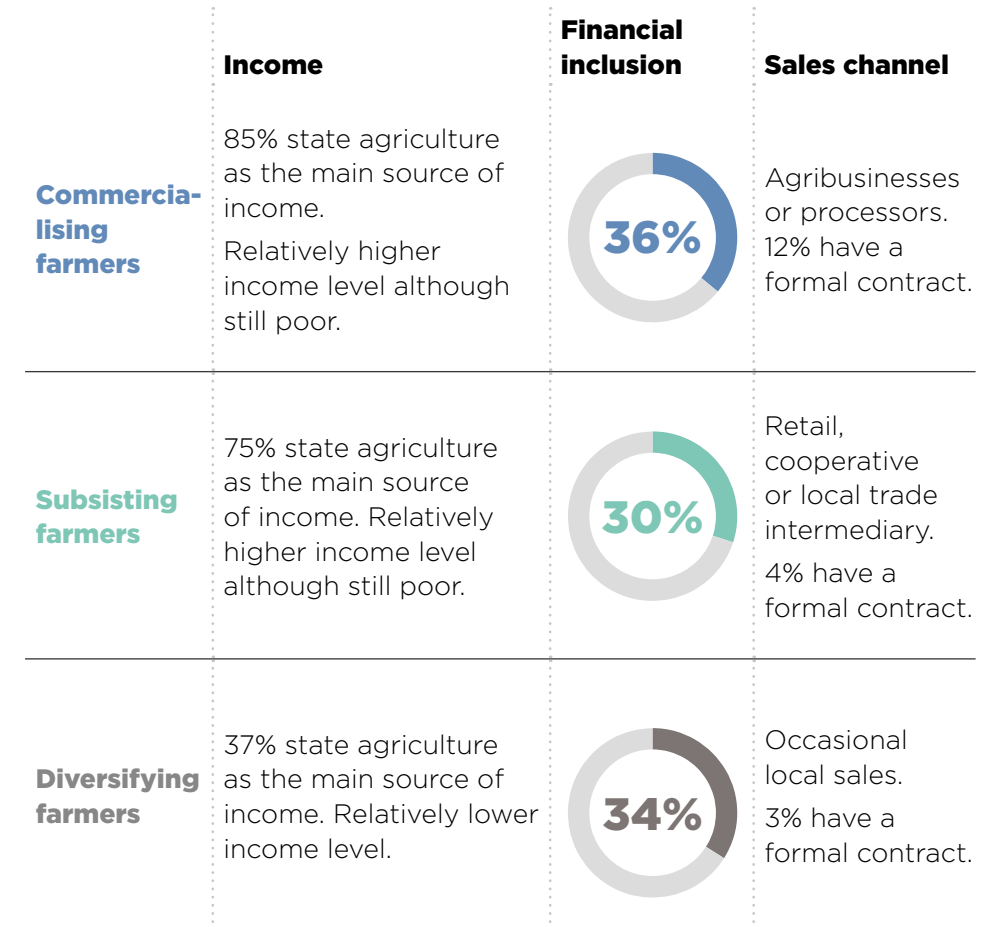


Figure 60 Segmentation of smallholder farmers, 2019⁸⁴



⁸³ CGAP. (2016). *Inflection point: Unlocking growth in the era of farmer finance.*

⁸⁴ CGAP. (2019). *Smallholder Households: Distinct segments, Different needs.*

Agricultural value chains have varying degrees of formality and intermediation

Moving crops from farmers to consumers involves a variety of steps and actors, and creates a multitude of value chain models.

The GSMA has identified two main value chain models through which farmers can access markets. These value chains differ structurally, both in terms of their level of intermediation (how many people are involved in local trade) and level of formality between actors (how formal transactions between actors are).

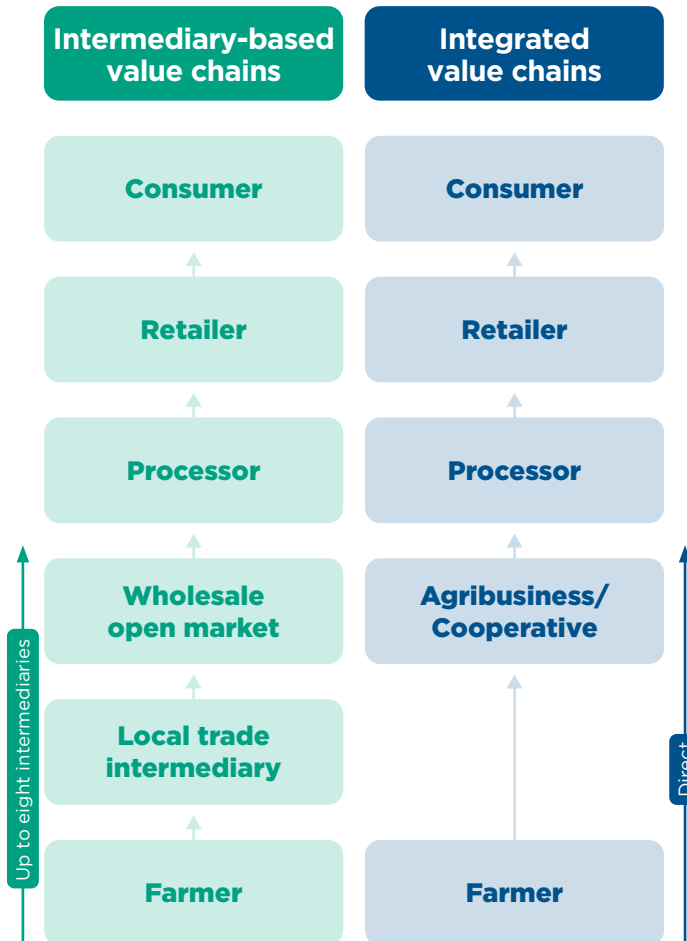
High degree of intermediation

Smallholder farmers rely on local trade intermediaries to sell their produce to the wholesale open market. They can occasionally go to the market themselves. The number of intermediaries can range from two up to eight in some value chains (e.g. potato value chain in Pakistan). Each intermediary captures a share of the output price.

Repeated informal agreements

Intermediary-based value chains see repeated, typically informal, transactions between a farmer and a crop buyer.⁸⁵

Figure 61 **Two most common types of agricultural value chains in LMICs**



Direct access to formal buyers

Integrated value chains are structured around formal buyers like agribusinesses and cooperatives that have last-mile connections to farmers. This allows for a shorter value chain for farmers, bypassing intermediaries who are typically involved in informal value chains.⁸⁶

Varying degrees of formality

More formal agreements (contract farming) are typically found when dealing with large agribusinesses or processors. Less formal agreements (verbal or unwritten contracts) most often characterise farmer relationships with cooperatives or small agribusinesses.⁸⁵

⁸⁵ Liverpool-Tasie, L.S.O., Wineman, A., Young, S. et al. (2020). *A scoping review of market links between value chain actors and small-scale producers in developing regions*.

⁸⁶ GSMA. (2020). *GSMA AgriTech Toolkit for the Digitisation of Agricultural Value Chains*.

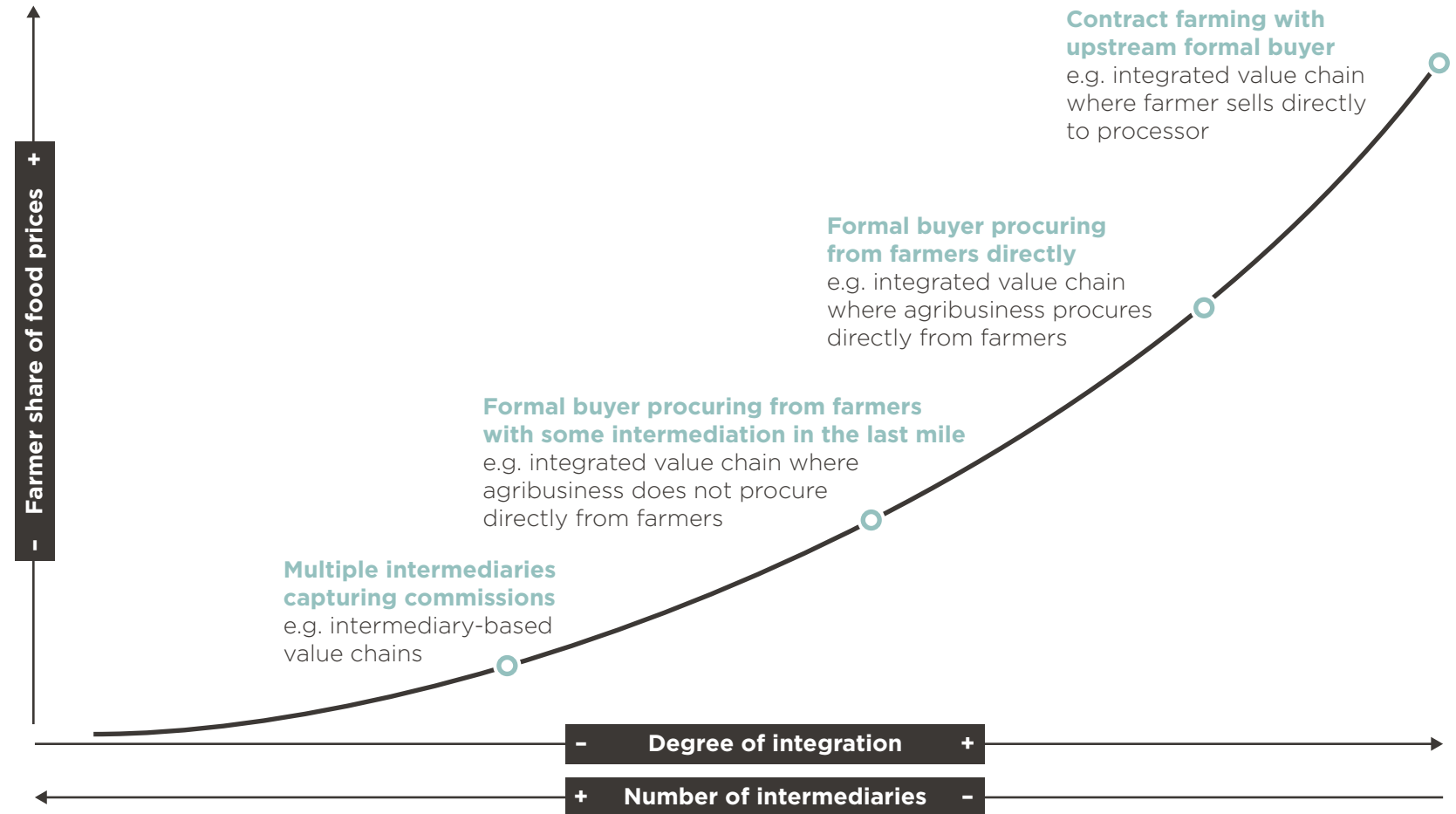
Farmer share of the output price increases as the number of intermediaries in the value chain declines

The level of intermediation in value chains has an impact on the share of the price that farmers can capture for their produce.

In highly fragmented value chains like intermediary-based value chains, each intermediary charges a commission for aggregation and trading, which is added to the farm gate price.

In integrated value chains that avoid some or all intermediaries, farmers can capture a larger share of the price of agricultural outputs. As a result, value chains with higher degrees of integration secure the highest farmer share. Farmers in contract farming earn, on average, about 10 per cent higher incomes than their counterparts without contracts.⁸⁷

Figure 62 **Farmer share of agricultural output prices relative to levels of integration and intermediation within value chains**



The number of intermediaries goes down as the degree of integration increases

⁸⁷ Eva Marie Meemken and Marc F. Bellemare. (2019). *Smallholder farmers and contract farming in developing countries*.

While integrated value chains have stricter produce quality requirements, they provide more benefits to farmers

Each type of value chain has characteristics and requirements that shape how smallholder farmers participate in agricultural markets. These requirements can be more or less advantageous for farmers. Figure 63 ranks how favourable these characteristics and requirements are for smallholder farmers, from green (favourable) to orange (moderate) to red (unfavourable).

Figure 63 **Rules and requirements of the most common agricultural value chains**

Characteristics and requirements	Intermediary-based value chains	Integrated value chains
Crop quality	Relaxed requirements; low- and medium-quality produce is accepted.	Rigid requirements; high-quality produce is expected.
Market entry	No market entry conditions; any farmer can sell produce in the wholesale open market.	Market entry is typically limited to large or commercial farmers that can grow high-quality produce.
Price volatility	Prices in these value chains are highly volatile and unknown to farmers ahead of the sale.	Prices are usually stable for the duration of the contract/agreement and align with market prices.
Farmer share	Farmer share of the agricultural output price is low, as a large portion of the price is shared between intermediaries. In remote locations, intermediaries have a dominant position and bargaining power.	Higher farmer share as a result of a shorter value chain. Farmers sell produce to agribusinesses almost directly.
Value-added services	Value-added services like financial and advisory services, or access to inputs, are rarely accessible.	Access to inputs, financing and advisory are available to farmers, depending on the agreement.
Crop collection costs	When produce is sold at the farm gate, farmers do not incur transportation costs. Farmers incur these costs when produce is sold away from the farm gate (e.g. collection point).	The agribusiness may cover transportation costs, depending on the agreement.

Digital agriculture solutions can improve access to markets for smallholders

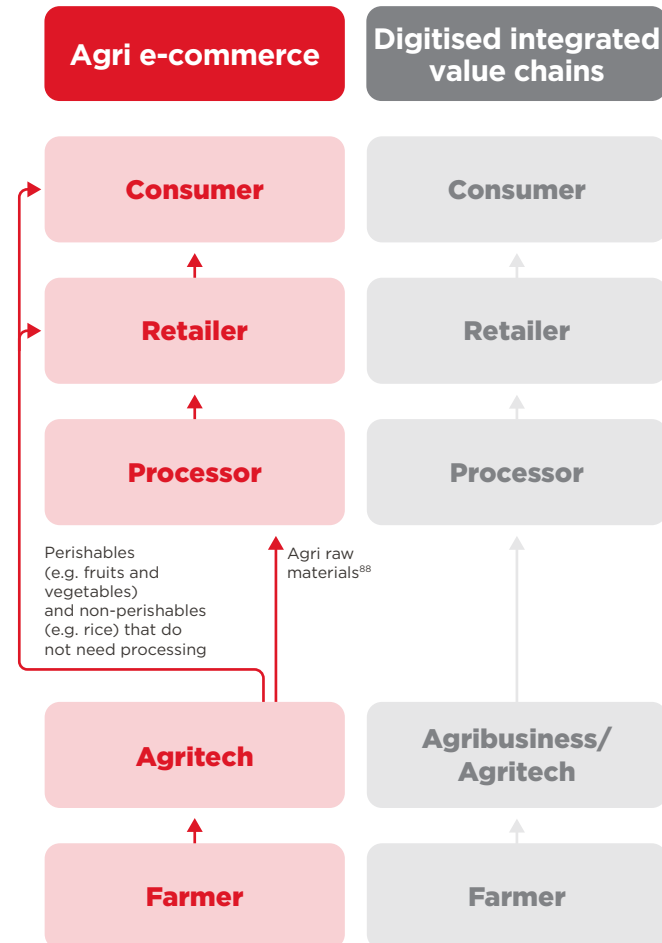
Digitised agriculture models have the potential to disrupt traditional value chains, as they allow for more transparency in the last mile and give farmers a more direct route to agricultural markets. Digitised value chain models include agri e-commerce and the use of digital procurement solutions in integrated value chains.

Agri e-commerce platforms

Agri e-commerce uses digital platforms to facilitate the movement of agricultural produce (typically fresh produce) from farmers to an array of buyers, including agribusinesses, retailers, restaurants and consumers.

Agri e-commerce solutions provided by agritechs allow farmers to bypass local trade intermediaries and give them direct access to buyers, making procurement more transparent and streamlined.

Figure 64 **Agri e-commerce and digitised integrated value chain**



Digital procurement solutions

Digital procurement solutions in integrated value chains enable the transition from paper to digital for a range of systems and processes.⁸⁹ They facilitate the creation and management of formal agreements between smallholder farmers and formal buyers.

To deploy digital procurement solutions in the last mile, agribusinesses can partner with agritechs or can develop solutions in-house, such as Olam and Ecom.⁸⁹

⁸⁸ Agricultural raw material includes produce used as raw materials to manufacture other items.

⁸⁹ GSMA. (2020). *Digital Agriculture Maps: 2020 State of the Sector in Low and Middle-Income Countries*.

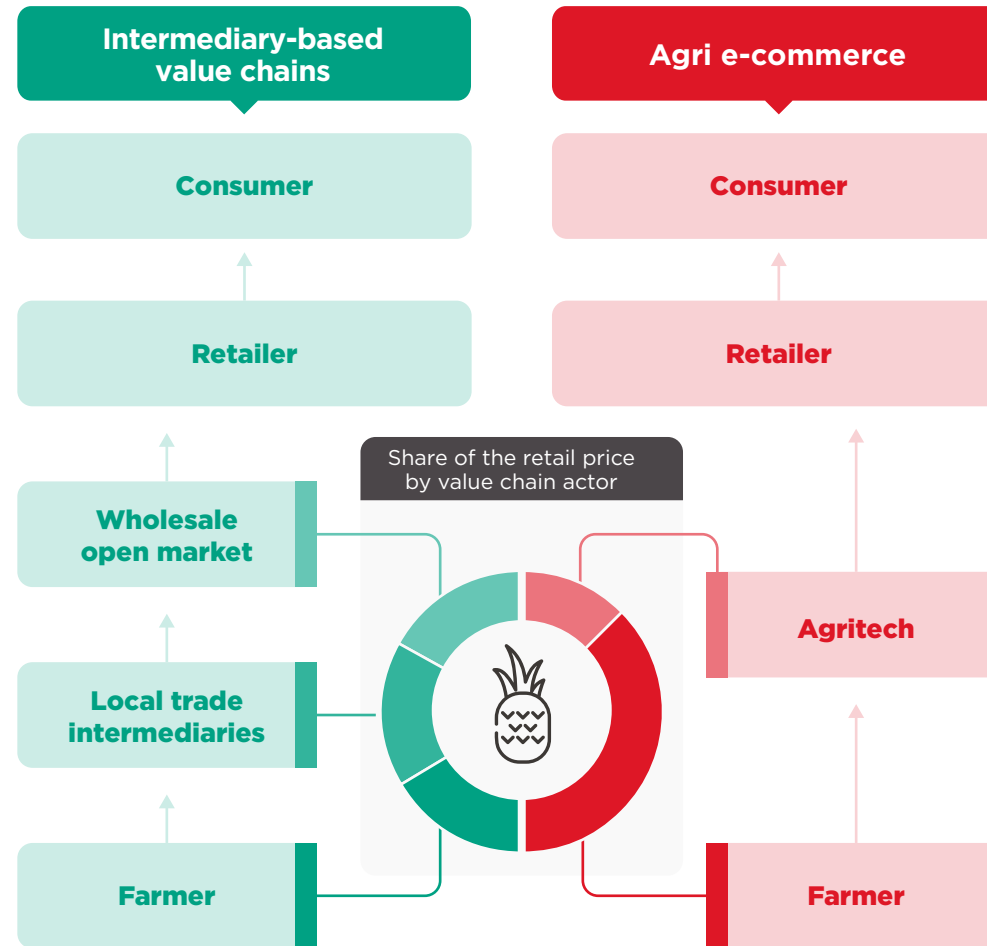
GSMA research finds that agri e-commerce can give farmers a greater share of the agricultural output retail price than intermediary-based value chains

Traditional intermediary-based value chains involve multiple informal actors between farmers and consumers. For example, some value chains have up to eight trade intermediaries with each claiming a commission of two to 10 per cent.⁹⁰

As a result, farmers receive only a small proportion of the price paid by the end consumer, as each intermediary in the value chain earns a commission.

Agri e-commerce provides an opportunity to streamline informal agricultural value chains and reduce inefficiencies in the distribution of farm produce.⁹¹

Figure 65 **Share of retail prices for unprocessed produce, by actor, in intermediary-based value chains and agri e-commerce value chain models⁹²**



Opportunities from digitisation

	Delivers fresher produce to buyers by shortening its journey to customers.
	Makes market prices more transparent and visible to farmers (digital records).
	Increases farmer share of retail price as it allows them to bypass intermediaries in the value chain.
	Improves farmers' access to new markets through a digital marketplace.
	Reduces post-harvest losses by securing consistent demand for farm produce.

⁹⁰ Based on evidence from our research and interviews conducted with agribusinesses.

⁹¹ GSMA. (2019). *E-commerce in Agriculture: New Business Models for Smallholders' Inclusion into the Formal Economy*.

⁹² Figure 65 represents the share of the retail price for perishable and non-perishable produce, which do not need processing. This is because this research focuses on local value chains up to the produce transformation stage to ensure comparability between price points before any transformation/value addition occurs (see slide 119 on Methodology).

Agri e-commerce shows great potential to improve farmers' incomes, but is still nascent in many LMICs

Agri e-commerce is likely to generate a positive economic impact for smallholder farmers that rely on local intermediaries with high bargaining power to reach buyers with their produce.⁹³ However, these farmers often operate in low-tech, cash-based communities, and may be reluctant to adopt digital payments and e-commerce models more generally. The GSMA identified that agri e-commerce is unlocked through seven enablers, including digital payments, access to relevant mobile devices and familiarity with mainstream e-commerce services, among others (see Figure 66).

Agri e-commerce in LMICs⁹⁴

Agri e-commerce is still at a nascent stage in LMICs, but it is developing rapidly and demand has peaked during the COVID-19 pandemic.⁹⁵

123 services in LMICs (2019) **3.5 times** more services than in 2014 **60%** from Sub-Saharan Africa

Examples of e-commerce solutions



Figure 66 **Seven enablers of agri e-commerce solutions⁹³**

	Mobile internet Connectivity enables sellers and buyers to access online services
	Logistics Developed logistics infrastructure and systems enable the delivery of goods
	Digital payments Digital payments accelerate transactions and avoid the issues with cash on delivery
	Agricultural readiness Access to relevant mobile devices and digital literacy enable farmers to use agri e-commerce
	E-commerce familiarity Familiarity with mainstream e-commerce services increases agri e-commerce adoption
	Urbanisation Urban lifestyles and affordable deliveries in urban areas increase demand for agri e-commerce
	Income structure Higher income levels lead to changing food consumption and lifestyle patterns that are well served by agri e-commerce

⁹³ GSMA. (2019). *E-commerce in Agriculture: New Business Models for Smallholders' Inclusion into the Formal Economy*.

⁹⁴ GSMA. (2020). *Digital Agriculture Maps: 2020 State of the Sector in Low and Middle-Income Countries*.

⁹⁵ GSMA. (2021). *COVID-19: Accelerating the Use of Digital Agriculture*.

Farm to Home, an agri e-commerce solution in Pakistan, connects farmers and consumers

1/2

CASE STUDY 1



Pakistan country context

Number of digital agriculture solutions⁹⁶ 2022 **51**

Contribution of agriculture to GDP⁹⁷ 2020 **23%**

Labour force in agriculture⁹⁸ 2018 **38%**

Poverty rate⁹⁷ 2018 **22%**

Financial inclusion⁹⁹ 2019 **23%**

Mobile penetration¹⁰⁰ 2021 **43%**

In 2019, the GSMA, mobile operator Jazz Pakistan and agritech BaKhabar Kissan (Farm to Home's sister company, through which support was provided) partnered to digitise farmer profiles, procurement records, payments and advisory services for farmers in Pakistan across several value chains, including maize, wheat, potatoes and various fresh fruits.

Farm to Home is an e-commerce company in Pakistan that procures fresh produce from farmers across the country and delivers it to consumers and businesses (hotels, restaurants, shops), primarily in the Islamabad area.

96 Tracxn. (2022). *AgriTech Startups in Pakistan*, updated March 2022.

97 World Bank Data Bank. (2020). *World Development Indicators*.

98 Pakistan Bureau of Statistics. (2018-19). *Labour Force Survey Pakistan*.

99 State Bank of Pakistan. (2019). *Financial Inclusion Reporting*.

100 GSMA Intelligence Portal, accessed 11 April 2022.

101 Based on discussions with Farm to Home.



Value proposition of Farm to Home

Make agricultural value chains more efficient by connecting farmers and end consumers.



Farm to Home provides home delivery options, while produce can also be purchased in physical shops.



Farmers and customers can use their Jazz Cash mobile money wallet for the transaction or choose cash on delivery.

Key data¹⁰¹

- **825 farmers**, including 325 they procure directly from.
- More than **7,000 customers**, including 300 outlet customers.
- Close to **60,000 online orders**.
- App downloaded close to 200,000 times.
- **8 tonnes** of daily merchandises.

Farm to Home can increase farmer share in the potato value chain in Pakistan by up to 33 percentage points

2/2

CASE STUDY 1

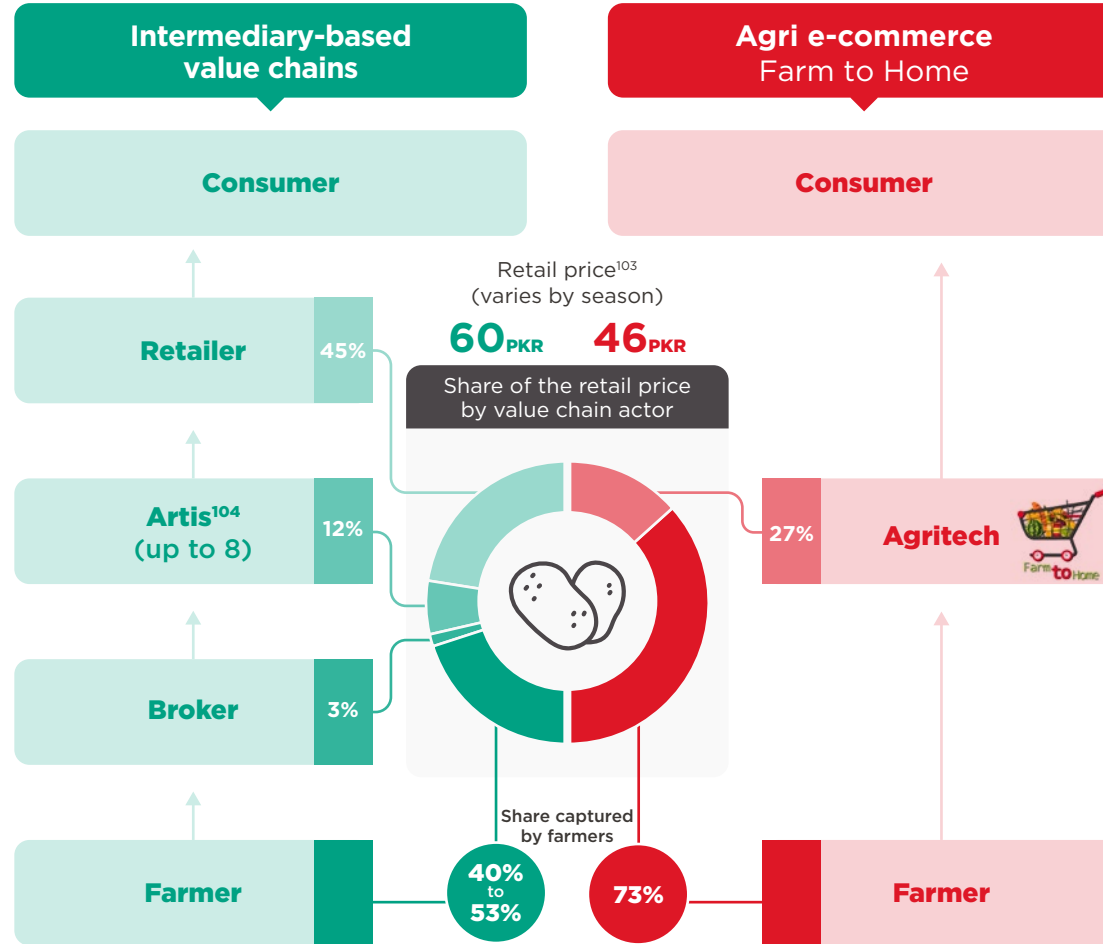
The GSMA, in collaboration with Altai Consulting, conducted 11 interviews with value chain actors in both non-digitised, intermediary-based potato value chains and in Farm to Home's digitised model. These interviews took place between February and March 2021 and aimed to collect insights on sourcing potatoes and how the price changes along the value chain. The research focused on two provinces in Pakistan: Punjab and Khyber Pakhtunkhwa (KPK), which cultivate 96 per cent and four per cent of the potato production in the country, respectively.¹⁰² (See slide 119 for more information on the methodology.)

¹⁰² Ministry of Planning, Development & Special Initiatives. (2020). *Potato Cluster Feasibility and Transformation Study*.

¹⁰³ Prices are in PKR/kg of potatoes. Prices fluctuate greatly. Margins are comparable between the models, but prices are not since price points are not always collected at the same time

¹⁰⁴ Local trade intermediaries in Pakistan are called 'Artis'.

Figure 67 **Farmer share of retail price, intermediary-based value chain versus agri e-commerce Farm to Home**



Key takeaways

In the agri e-commerce model, Farm to Home can bypass intermediaries in the potato value chain. Shortening the value chain brings farmers closer to consumers and allows agritechs to pay farmers a higher price.

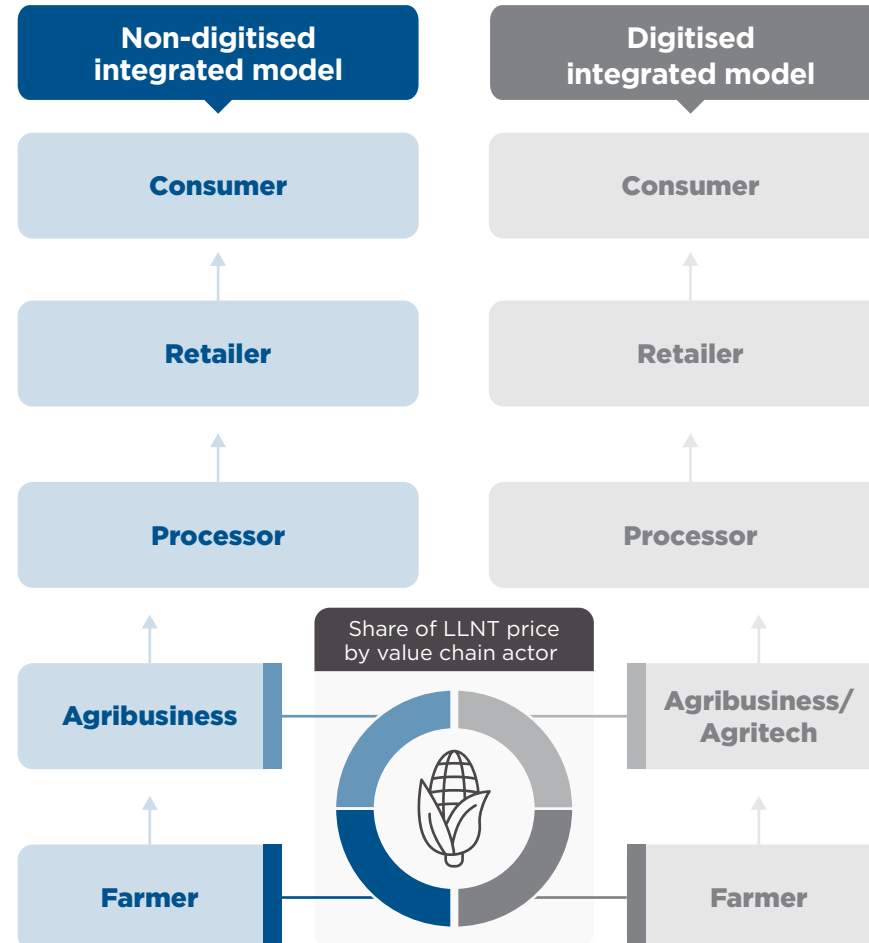
The Farm to Home model shows that e-commerce provides a clear opportunity for smallholder farmers to capture a larger share of the final retail price compared to intermediary-based value chains.

According to GSMA research, digitising integrated value chains increases farmer shares only marginally, but unlocks other benefits

Unlike intermediary-based value chains, integrated value chains are shorter and allow farmers to sell produce directly to agribusinesses. As a result, they help farmers capture a higher share of the LLNT price than intermediary-based value chains (see Figure 68).

Using digital procurement solutions to digitise systems and processes in integrated value chains, such as farmer payments, recordkeeping and traceability, unlocks other opportunities for both farmers and crop buyers. In particular, digitisation allows agribusinesses to source from a larger number of smallholders rather than from a smaller pool of larger farmers. Our field research found that digitisation helps all procurement steps to operate at scale, enabling agribusinesses to deal with thousands of farmers at a time. It also unlocks access to digitally enabled, value-added services (see case studies on slides 136 and 138).

Figure 68 **Share of LLNT price, by actor, in non-digitised and digitised value chain models¹⁰⁵**



Opportunities from digitisation

	Increases, marginally, the share of the LLNT price captured by farmers.
	Reduces the risk and cost of payments to farmers. ¹⁰⁶
	Allows agribusinesses to source from more smallholder farmers.
	Creates economic identities from digital farm and farmer records. ^{107, 108}
	Unlocks access to financial services by leveraging economic identities.

¹⁰⁵ Figure 68 represents the share of LLNT price, which excludes processing. This is because this research focuses on local value chains, up to produce transformation stage, to ensure comparability between price points before any transformation/ value addition occurs (see slide 119 on the Methodology).

¹⁰⁶ GSMA. (2020). *The GSMA AgriTech Toolkit for the Digitisation of Agricultural Value Chains*.

¹⁰⁷ CGAP. (2017). *Digitizing Value Chain Finance for Smallholder Farmers*.

¹⁰⁸ GSMA. (2021). *Agri DFS: Emerging business models to support the financial inclusion of smallholder farmers*. Economic identities are a form of functional identity that enables access to certain services, such as credit, insurance and savings.

Holistic digital procurement solutions can support financial inclusion for smallholder farmers

From improving transparency and traceability in the agricultural last mile to reducing inefficiencies in crop procurement for both agribusinesses and farmers, digital procurement solutions have far-reaching effects. At the most basic level, digital procurement solutions generate digital transaction records, but a growing number of solutions integrate other use cases, including payments, product traceability or a combination of the two.

Digital procurement in LMICs¹⁰⁹

110+ services in LMICs (2019)

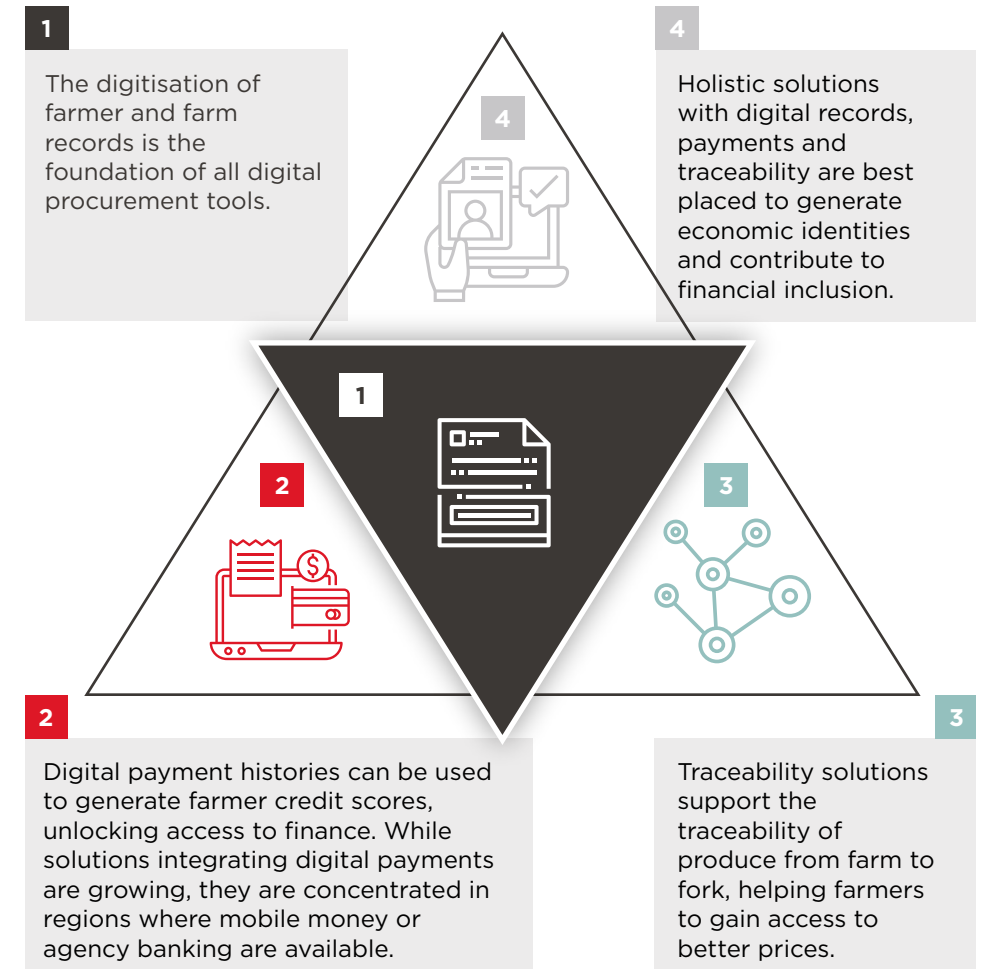
4 times more services than in 2014

55% from Sub-Saharan Africa

Examples of digital procurement solutions



Figure 69 Sub-use cases of digital procurement solutions in the last mile¹⁰⁹



¹⁰⁹ GSMA. (2020). *Digital Agriculture Maps: 2020 State of the Sector in Low and Middle-Income Countries*.

Reap Agro develops digital solutions for the last mile to streamline input lending and procurement

1/2



Farmer challenges in Pakistan

Access to information

Lack of information on weather forecasts, pest attacks, optimal fertiliser application and current market prices.¹¹⁰

Access to markets

Lack of direct access to buyers, forcing farmers to go through intermediaries before their produce is wasted.¹¹⁰

Access to finance

Securing loans from formal financial service providers (FSPs) is difficult, so most farmers rely on traders and moneylenders with high lending rates.¹¹¹

Climate

Pakistan has been experiencing periods of severe drought followed by devastating floods. Pakistan is ranked among the top 10 most climate-vulnerable countries in the world on the Global Climate Risk Index.¹¹³

Productivity

Stagnating productivity resulting in much lower crop yields than neighbouring countries.¹¹²

In 2019, the GSMA, mobile operator Jazz Pakistan and agritech Reap Agro partnered to digitise farmer profiling, procurement records, payments and advisory services for farmers in Pakistan across the maize, potato and wheat value chains.

The GSMA studied Reap Agro's model in the potato value chain in Pakistan to understand the impact of digitised integrated value chains on the farmer share of the produce they sell.

¹¹⁰ Based on interviews with GSMA grantees, December 2020.

¹¹¹ MDF. (2020). *Financial Inclusion in Pakistan: The Business Case for the Financial Inclusion of Rural Women*.

¹¹² Government of Pakistan. (2019). *The Pakistan Economic Survey 2018-2019*.

¹¹³ World Bank. (2019). *Climate-Smart Agriculture in Pakistan*.

¹¹⁴ Blue Marble. (2021). "Blue Marble partners with Asia Insurance and Reap Agro to launch index-based crop insurance solution in Pakistan".

¹¹⁵ Reap Agro website.

Value proposition of Reap Agro



Reap Agro is both an input lender and an offtaker,¹¹⁴ using digital agriculture solutions to address farmer challenges and improve productivity and profitability in farming through:

Access to markets

Direct procurement from smallholder farmers.

Formal contract agreements that specify the price of produce in advance.¹¹⁴

1,598

Farmers selling crops¹¹⁵

Access to advisory

Best agricultural practices shared with farmers via field agents.¹¹⁴

Digital advisory services of Reap Agro's sister company, BaKhabar Kissan offered to farmers (e.g. SMS weather forecasts, crop management).¹¹⁴

5,213

Farmers advised¹¹⁵

Access to finance

Interest-free input loans provided to farmers to improve their yields.

Tractors and a range of mechanised equipment can be accessed through Reap Agro.

2,567

Loans disbursed¹¹⁵

Reap Agro's model offers similar farmer share but allows to reach a larger number of smallholder farmers

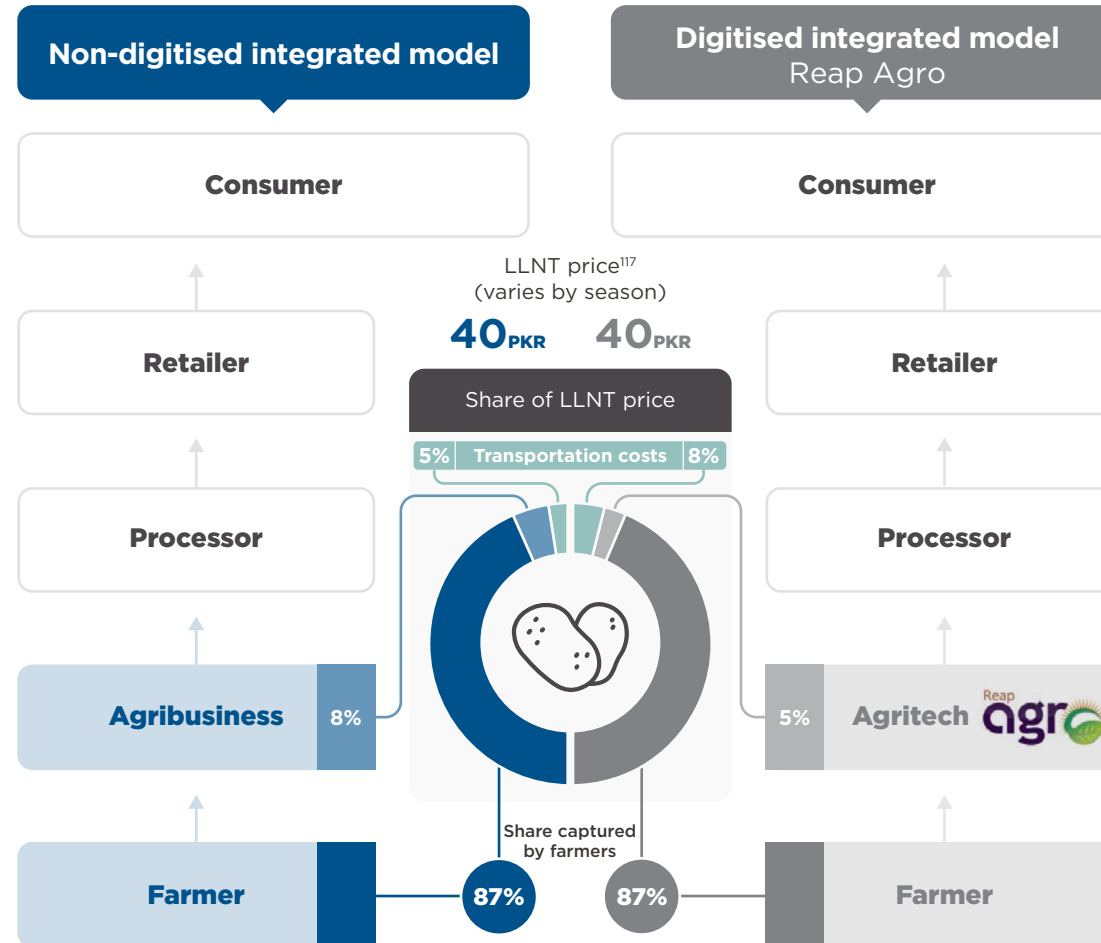
2/2
CASE STUDY 2

The GSMA, in collaboration with Altai Consulting, conducted 11 interviews with potato value chain actors, both non-digitised and digitised. The interviews were conducted between February and March 2021 and collected insights on sourcing potatoes and their price along the value chain. The research focused on two provinces in Pakistan: Punjab and KPK, which cultivate 96 per cent and four per cent of potato production in the country, respectively¹¹⁶ (see slide 119 for more information on the methodology). Figure 70 shows the different actors involved in the non-digitised and digitised potato value chain in Pakistan and the share of the final price they capture before processing (the last local non-transforming, or LLNT, price).

¹¹⁶ Ministry of Planning, Development & Special Initiatives. (2020). *Potato Cluster Feasibility and Transformation Study*.

¹¹⁷ Prices are in PKR/kg of potatoes.

Figure 70 **Farmer share of the LLNT price in non-digitised integrated value chain and in Reap Agro's digitised integrated model**


Key takeaways

- Reap Agro operates a digital procurement solution that does not reduce intermediation within the value chain.
- Although Reap Agro's commissions are lower than those of formal buyers in non-digitised models (five per cent versus eight per cent), the farmer share is similar since the agritech covers the significant transportation costs included in the LLNT price and compete with farmer share.
- However, Reap Agro's digitised model allows them to procure from more smallholders than the non-digitised model, which is often limited to a smaller circle of smallholder farmers or to supply from larger farms.

AgroMall's digital agriculture platform optimises the rice value chain in Nigeria

1/2



Nigeria country context

Number of digital agriculture solutions¹¹⁸ 2020 **49**

Contribution of agriculture to GDP¹¹⁹ 2020 **24%**

Labour force in agriculture¹²⁰ 2019 **35%**

Poverty rate¹¹⁹ 2018 **40%**

Financial inclusion¹²¹ 2021 **45%**

Mobile penetration¹²² Q4 2021 **51%**

Agromall is an agritech company in Nigeria working with smallholder farmers and agribusinesses to digitise procurement transactions and payments, provide digital advisory services to farmers and give farmers access to financial services, including input loans, labour loans and mechanisation loans. It also provides logistics services and storage facilities for agricultural produce. The GSMA supports AgroMall in scaling digital procurement across the rice, maize and soya bean value chains.

118 GSMA. (2020). *Digital Agriculture Maps: 2020 State of the Sector in Low and Middle-Income Countries*.

119 World Bank Data Bank. (2020). *World Development Indicators*.

120 Dayo Phillip et al. (2018). *Innovation Opportunities in the Rice Value Chain in Nigeria*.

121 World Bank. (2021). *Global Findex Database*.

122 GSMA Intelligence Portal, accessed 11 April 2022.

123 GSMA. (2021). *Empowering Smallholder Farmers in Nigeria: An Introduction to AgroMall*.

124 Reuters. (2020). "A growing problem: Nigerian rice farmers fall short after borders close".

125 PwC. (2018). *Boosting Rice Production through Increased Mechanisation*.

126 IFPRI. (2016). *The Nigerian Rice Economy Policy Options for Transforming Production, Marketing, and Trade*.



Founded in 2017 in Lagos, AgroMall operates at the intersection of digitised agriculture production support, digital advisory and digital financial services. It provides:

Access to markets

A more direct procurement route than in a highly fragmented rice value chain, while relying on agribusinesses and cooperatives to aggregate rice from farmers and providing them with logistics services.¹²³ Direct procurement is currently being tested.

Access to advisory

Customised digital agronomic advice on agricultural practices (fertiliser use or soil diagnosis).
Market prices shared with farmers to enable more informed decisions.

Access to finance

Role of trusted intermediary to facilitate financing of inputs and farm services.¹²³
Economic identities created from track-and-trace procurement records and enabling access to credit.

Rice production in Nigeria

To promote self-sufficiency in rice production, the Government of Nigeria raised taxes on imported rice and banned land-imported rice¹²⁴ while favouring local production by including zero tariffs on machinery and equipment¹²⁵ and incentives to create formal linkages between farmers and processors.¹²⁶ This helped local processors to flourish in the country while local farmers have struggled to meet the demand. As a result of this highly competitive market, the rice value chain in Nigeria features some hybrid models with varying levels of formality. Integrated value chain actors (agribusinesses, processors) source from informal local intermediaries to find sufficient supply.

Farmer share in the integrated rice value chain is higher or equivalent 2/2 in AgroMall's digitised model than in non-digitised models

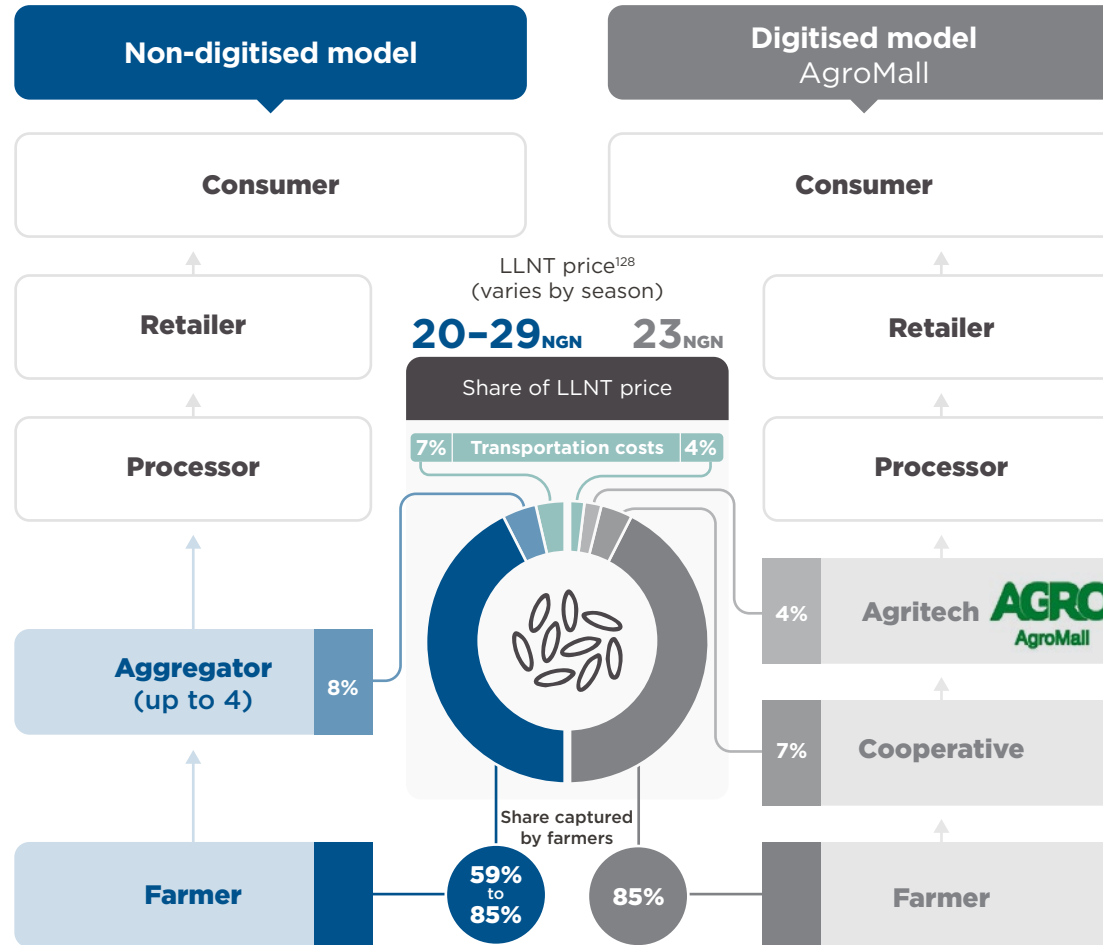
CASE STUDY 3

The GSMA, in collaboration with Altai Consulting, conducted 10 interviews with rice value chain actors in Nigeria, operating in both non-digitised and digitised models. Interviews were conducted between February and March 2021 and collected insights on sourcing rice and its price along the value chain. The research focused on two of the 10 biggest rice producing states in Nigeria: Kaduna and Niger¹²⁷ (see slide 119 for more information on the methodology). Figure 71 shows the non-digitised and digitised models in the rice value chain in Nigeria and the share of the final price that actors capture before processing (LLNT price).

127 Nigeria Infopedia. (2019). [Full list of rice-producing states in Nigeria](#).

128 Prices are in NGN/kg of rice.

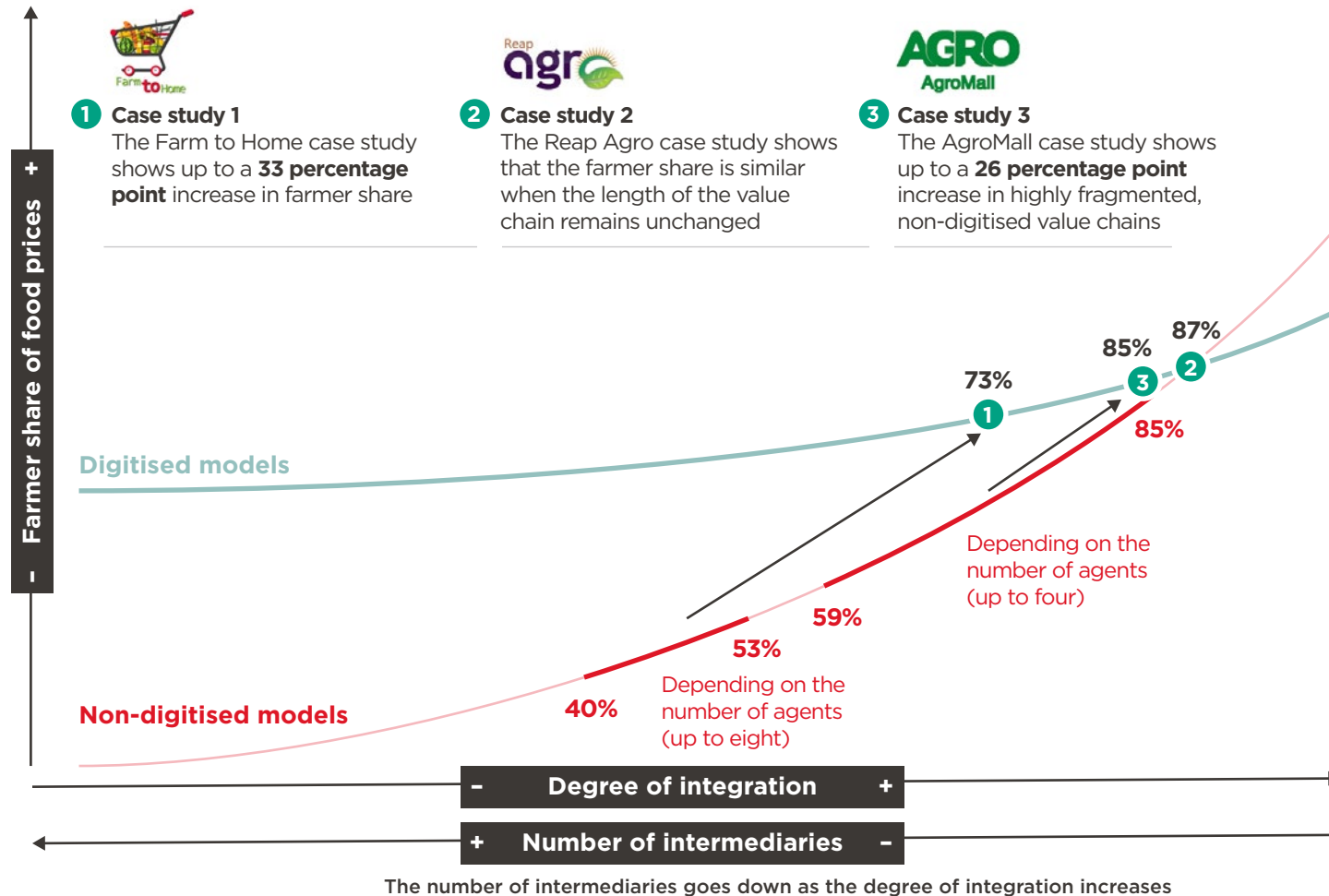
Figure 71 **Farmer share of LLNT price in non-digitised value chains and in AgroMall's digitised integrated model**


Key takeaways

- Boundaries between integrated and intermediary-based value chains in Nigeria are often blurred given the difficulty formal buyers have in securing rice supply. The rice value chain can be more or less fragmented in the last mile, even in integrated value chains.
- The AgroMall case study shows that when there are comparable levels of intermediation in the value chain, farmer shares are similar in both digitised and non-digitised models.
- However, when traditional value chains are fragmented (in this case, with up to four aggregators) AgroMall provides farmers with a higher share of the price than traditional value chain actors.
- This shows that the benefits of digital procurement systems for farmers depend on the extent to which they streamline and shorten the value chain.

Digital procurement models have the most potential to increase farmer share in fragmented value chains

Figure 72 Farmer share and digital procurement models



The three case studies examined by the GSMA offer some evidence of the evolution of farmer share in digitised models (see Figure 72):

- **Bypassing intermediaries that connect farmers to markets** increases the share farmers capture of the final value of the produce they sell.
- **The increase in farmer share between digitised and non-digitised models is more pronounced when farmers originally operate within intermediary-based value chains.** Given that 33 per cent of smallholders in LMICs operate in intermediary-based value chains,¹²⁹ there is great potential for digitised models to increase farmer revenues.
- When traditional value chains are already integrated around a low number of formal value chain actors, the increased share from digitisation is marginal. This indicates that the benefits of digitised value chains for agribusinesses do not always get passed on to farmers.
- To increase the benefits for farmers in all types of value chains, digital procurement should be bundled with other digital services.

129 CGAP. (2016). *Inflection Point: Unlocking Growth in the Era of Farmer Finance*.

Digitising value chains offers other benefits to smallholders by enabling certification and traceability of produce

Agribusinesses, agritech companies and e-commerce platforms typically abide by quality and traceability standards.¹³⁰

Farmers who comply with these standards can sell their produce to these buyers at a higher price, as the quality of the produce is certified and can be traced back to the farm, meeting consumers' increased demand for visibility of the food they consume. The impact on farmer incomes would be moderate for farmers already working with formal buyers, as these standards may have been already in place, but is high for farmers who have been selling on the open market.

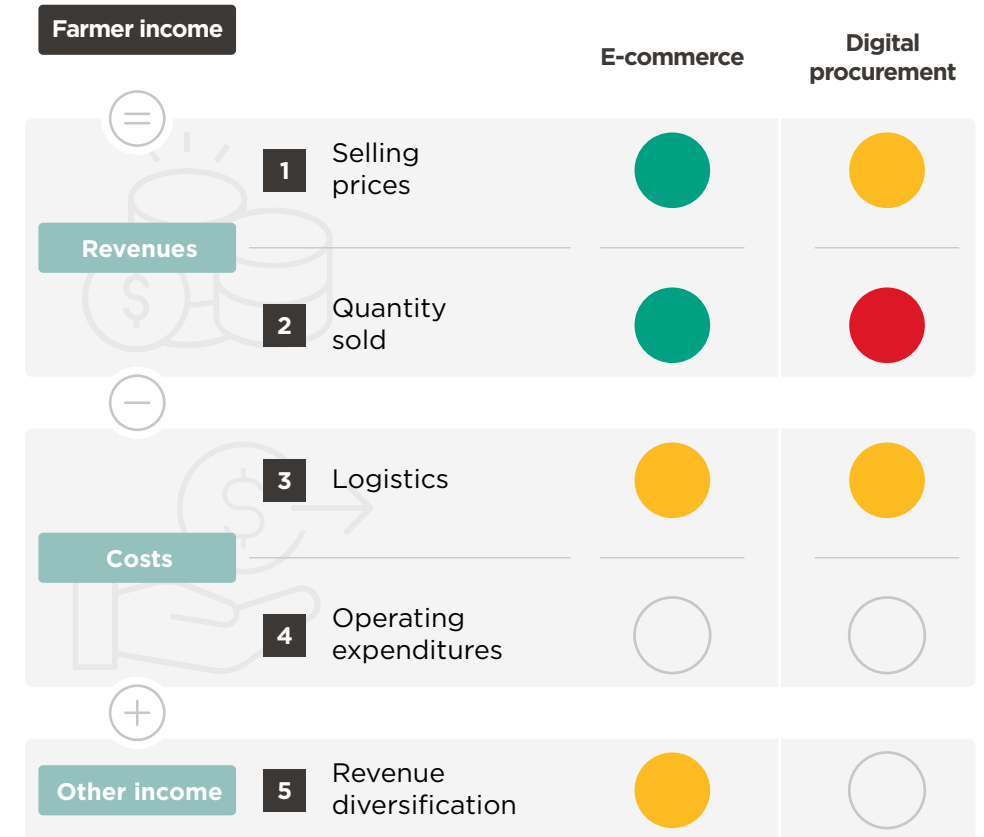
Farmers can also leverage these digitised models to increase the quantity of the produce being sold.¹³¹

Although some produce may be rejected to comply with quality standards, farmers can reduce post-harvest wastage by leveraging access to new markets and continuous demand through online sales and marketing.

Digital profiling of farmers helps buyers in digitised models understand where farmers are located, how much they produce and **manage the logistics better.**¹³⁰

While solely digitising access to markets does not necessarily reduce operating expenses, e-commerce marketplaces also give farmers **access to work opportunities** to provide labour in other farms.¹³¹

Figure 73 Potential impact of additional benefits of e-commerce and digital procurement models on farmers' income



● High ● Moderate ● Low ○ Nil

¹³⁰ GSMA. (2020). *Digital Agriculture Maps: 2020 State of the Sector in Low and Middle-Income Countries*.

¹³¹ CTA. (2018-2019). *Digitalization of African Agriculture Report*.

Digital models also offer an entry point to other value-added services that can provide additional benefits and increase farm income even more

Actors digitising access to markets for smallholder farmers can leverage their services, digital infrastructure and the economic identities they generate to **provide value-added services to farmers**. These holistic models can yield a 15 per cent increase in yearly income compared to models that only provide a few services.¹³²

Advisory service providers, such as BaKhabar Kissan in Pakistan, can give farmers access to market prices, putting them in a better position to negotiate prices with formal buyers. Weather information and tailored agronomic advice also support farmers to adopt **more productive techniques**, which can lead to higher and better-quality yields and lower operating costs (e.g. better water management and input use).¹³³

¹³² IDH. (2020). *Key Trends and Emerging Opportunities in Digital Agriculture: IDH Farmfit Offers Tools and Resources to Support your Journey*.

¹³³ GSMA. (2022). *How Economic Identities Facilitate Lending to Smallholder Farmers: The Case of Rural Loan in Papua New Guinea*.

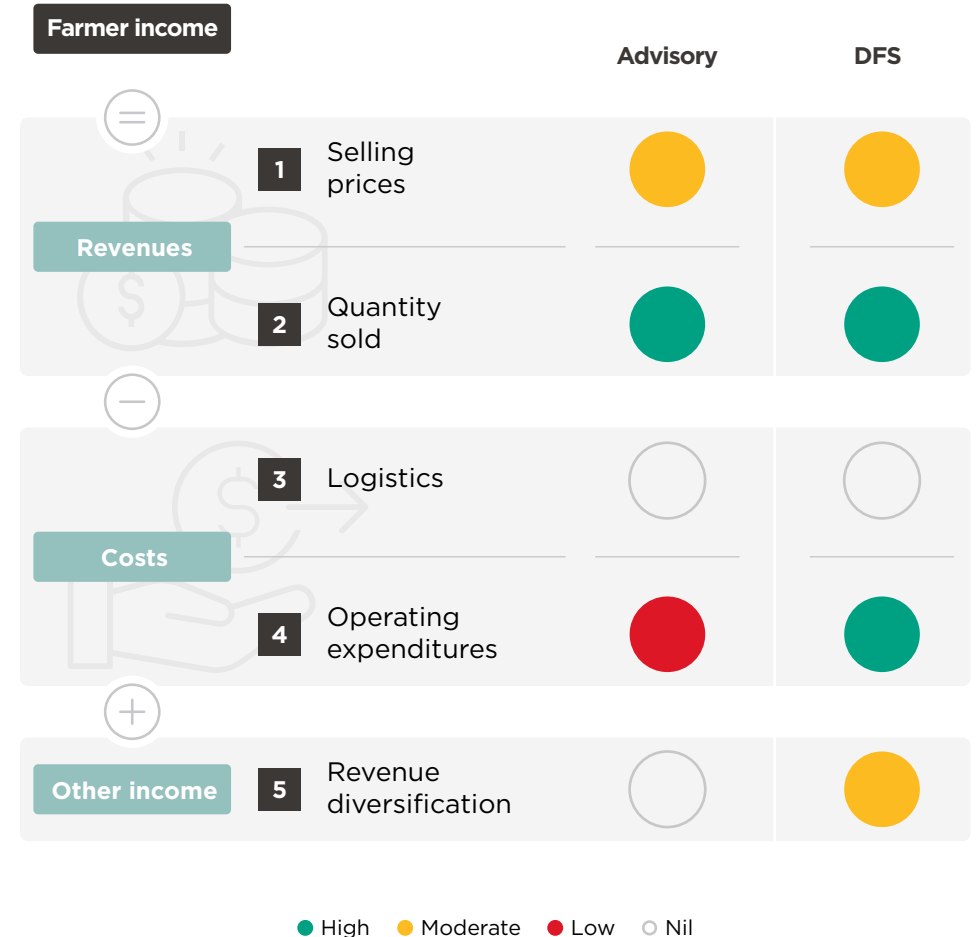
¹³⁴ GSMA. (2021). *Agri DFS: Emerging Business Models to Support the Financial Inclusion of Smallholder Farmers*.

Agri digital financial services (Agri DFS)

can be deployed in digitised value chains and provide access to capital, assets and a safety net for farmers.

- Economic identities generated by digital procurement unlock access to input loans, allowing farmers to buy quality inputs that support better-quality yields and sell at higher prices. Quality inputs also help to increase crop yields.¹³³
- Digital savings can help farmers save to finance future expenses or build financial safety nets to prepare for external shocks.
- Economic identities and 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 that help their operations become more cost-effective.¹³⁴
- The ability of farmers to access non-agri loans through their digital records (economic identities) provides them with capital to start a new business and diversify their income outside agriculture.

Figure 74 Potential impact of value-added services provided in e-commerce and digital procurement on farmer incomes



Key findings

- Smallholder farmers play a major role in global food systems, producing more than 30 per cent of the world's food. However, inadequate access to markets, combined with poor business skills and limited bargaining power, have led smallholder farmers to become trapped in poverty.
- GSMA research in two value chains in Nigeria and Pakistan shows that digital models that reduce the level of intermediation in traditionally fragmented value chains have the most impact on increasing farmer share. This is even more impactful in intermediary-based value chains where there are traditionally multiple intermediaries.
- In integrated value chains, the efficiencies that agribusinesses gain from digitisation may not be passed on to farmers, since farmer shares in digitised and non-digitised models are comparable. However, digital models are key to unlocking one-to-many procurement and make it possible to source crops from more smallholder farmers, while non-digitised integrated models typically focus on larger farms.
- Digitised agricultural value chains are a catalyst for broader benefits to smallholder farmers when they provide an entry point for value-added services, such as financial and advisory services. For example, bundling digital procurement with advisory services provides farmers with market information and agronomic advice, while leveraging economic identities allows for credit scoring of farmers and unlocks access to digital financial services.

Recommendations

- To increase farmer share, donors and investors in the agriculture sector need to actively identify and support digital agriculture models that bypass intermediaries and give smallholder farmers more direct access to markets. Agritechs are in need of technical assistance and patient capital to develop farmer-centric business models that scale.
- To help these models scale, donors and investors should simultaneously support the digital inclusion of smallholder farmers – a prerequisite to access and use e-commerce and digital agriculture platforms. By working with governments and supporting NGOs and other community-based organisations to improve digital skills within farmer communities, they can help to ensure farmer uptake of digital agriculture solutions.
- Supporting partnerships between agribusinesses, agritechs, financial service providers and other relevant service providers can enable full suites of digital agricultural services to be offered to farmers.
- Although digital agriculture models have the potential to boost farmers' incomes and livelihoods, donors and investors need to ensure these models are truly inclusive and do not further marginalise vulnerable farmers, such as women and farmers with disabilities. Building the capacity of agribusinesses and e-commerce in data collection and analysis can help flag disparities. Donors and investors should also offer incentives to providers to apply best practices in gender and disability inclusion to close these gaps.

When rural people are paid fairly for their labour, the ripple effect is enormous. Profitable small farms put children through school, pay for diverse, healthy diets, generate employment, and boost rural economies.

Gilbert F. Hougbo, President of IFAD¹³⁵

135 IFAD. (2021). "Small-scale farmers need decent wages – IFAD calls on world leaders to commit to action at Food Systems Summit."



GSMA HEAD OFFICE

One Angel Lane
London
EC4R 3AB
Tel: +44 (0)20 7356 0600
Fax: +44 (0)20 7356 0601