



**Improving financial inclusion through data
for smallholder farmers in Kenya**



The GSMA represents the interests of mobile operators worldwide, uniting more than 750 operators with almost 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

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 about GSMA AgriTech Programme visit our website at: <https://www.gsma.com/mobilefordevelopment/agritech/>

Follow us on twitter [@GSMAM4d](https://twitter.com/GSMAM4d)

Author:
Rishi Raithatha, Insights Manager



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.

CONTENTS

EXECUTIVE SUMMARY	4
1. INTRODUCTION	6
2. AGRICULTURE IN KENYA	8
3. FINANCIAL INCLUSION IN KENYA	10
4. DIGITAL AGRICULTURAL SOLUTIONS IN KENYA	13
5. CREATING ECONOMIC IDENTITIES	15
6. EXPLORING KEY DATA CHALLENGES	16
7. LEARNINGS	25



Executive summary

In Kenya's agriculture sector, a range of mobile-based digital solutions have taken hold, easing pain points and delivering benefits to smallholder farmers, crop buyers and agribusinesses alike. Three main use cases have emerged:



LAST-MILE DIGITISATION TOOLS

These tools replace manual processes with mobile-based solutions that digitise transactions (i.e. procurement payments, digital receipts etc.) and streamline communication between smallholder farmers and agribusinesses.



MARKET LINKAGE TOOLS

Market linkage tools aim to formalise agricultural value chains by allowing crop producers and buyers to connect through a mobile-based online platform. This category includes direct-to-consumer e-commerce services as well as wholesale marketplaces. In some cases, e-commerce platforms have created new types of value chains.



DIRECT-TO-FARMER HUBS

These tools are "one-stop shops" in which third-party agricultural service providers, such as input suppliers, lenders, agricultural advisory providers and soil testers, can offer their services as a bundle directly to farmers registered on the hub. Farmers can also take orders directly from buyers via the hub (marketplaces).

Each of these digital tools is generating a large volume of rich data that can be used to improve financial inclusion for smallholder farmers. However, this is a multi-step process that begins with a digital profile, followed by digitising payments and processes to create economic identities. When shared with financial institutions, this data can be used to accurately assess the creditworthiness of farmers and their ability to take on and repay loans.

Despite some initiatives to share data with third-party service providers (such as lenders and input suppliers), data sharing remains limited and fragmented. Currently, e-commerce platforms like Twiga Foods and Tulaa are sharing data to offer loans to vendors and inputs on credit to farmers. While agribusinesses have a strong incentive to share data in order to provide additional services to farmers, there are no established best practices on how to share data between interested parties. Although consent to use farmers' data is sought during registration, there are divergent approaches to data ownership and how data is used.

There remains a significant opportunity in Kenya to use data to improve financial inclusion for smallholder farmers. To realise this opportunity, best practices in data sharing are needed for all types of data controllers. Additionally, claims around data ownership should be resolved and farmers' consent and awareness should be sought prior to any data being shared.





1. Introduction

In developing countries, a number of digital tools have been introduced to address pain points in the agricultural last mile. Kenya in particular has seen the launch of several digital initiatives led by both AgriTech companies and mobile network operators (MNOs). These tools have the potential to address some of the challenges experienced by crop buyers and smallholder farmers by making procurement more transparent and operations more efficient, while also improving communication channels and performance monitoring. A digital ecosystem also gives farmers access to formal markets and allows them to adopt the latest agricultural practices.

These new digital tools also generate a significant volume of data on transactions throughout the agricultural value chain. For many smallholder farmers, this data is often their first digital financial footprint that then provides a pathway to financial inclusion. Financial transaction logs created by digital solutions can be used to generate an economic identity and financial history, which banks and other financial institutions require to access formal financial services. For example, mobile money payment data can be used to assess a farmer's creditworthiness and ability to repay loans.

INTRODUCTION

Digital agricultural solutions have proliferated in Kenya on the back of strong mobile money adoption and mobile penetration. These include:



- Last-mile digitisation tools that monitor and optimise agricultural value chains.

Examples: [Virtual City](#) and [DigiFarm for Enterprise](#)



- Market linkage tools that formalise agricultural value chains by connecting crop producers and buyers through a mobile-based online platform.

Examples: [Twiga Foods](#) and [Tulaa](#)



- Direct-to-farmer hubs that serve as digital “one-stop shops” for a range of agricultural services, such as information, inputs and loans.

Examples: [DigiFarm for Consumer](#)

This report examines the types of data generated by these three distinct digital agricultural solutions, and how this data can be used to create economic identities for smallholder farmers in Kenya. As digital agricultural tools take hold across developing countries, the Kenyan approach may present opportunities for solution providers in other markets.

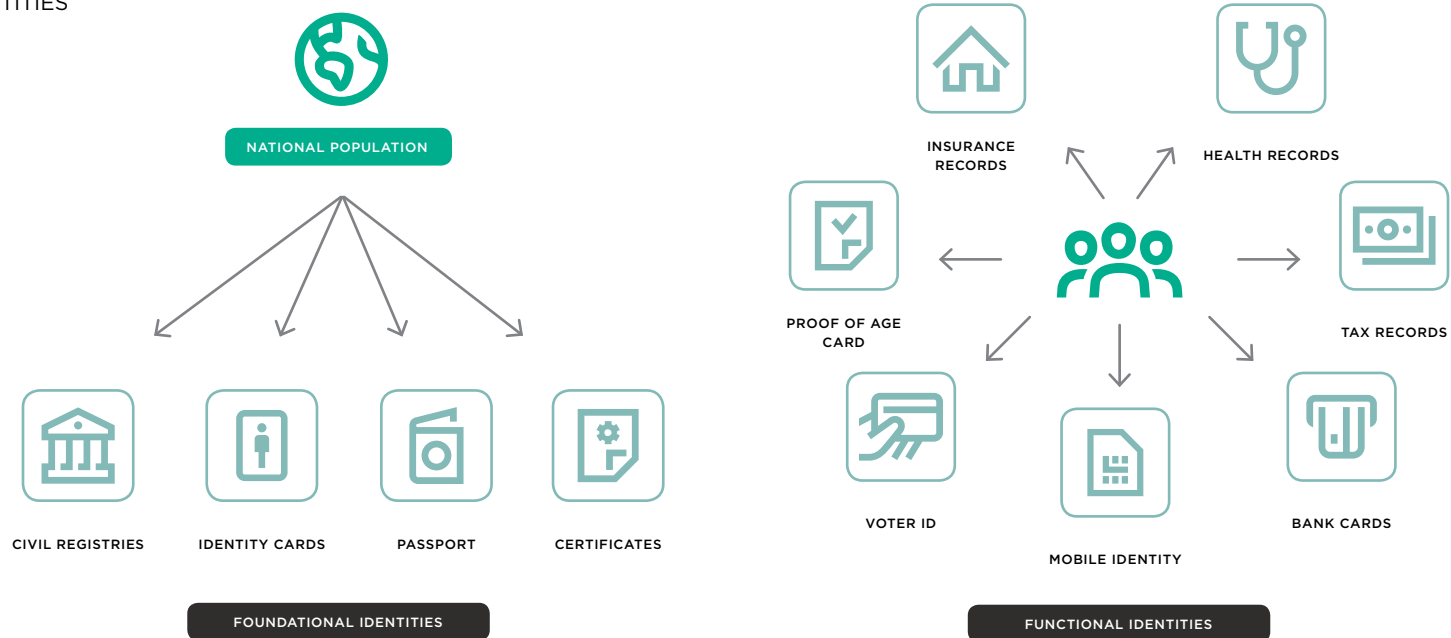
1.1 How is an economic identity defined?

INTRODUCTION

An economic identity is defined as a dynamic citizen profile that captures an individual's life events, assets and transaction history. Economic identity is a form of *functional identity* that enables access to a specific set of services. This is in contrast to *foundational identities*, which include government-issued documents such as identity cards, passports or birth certificates.

For smallholder farmers, the digitisation of crop procurement enables them to establish an economic identity through transactional data from the sale of agricultural produce. When combined with other farm and farmer data, transactional data has the potential to open full financial inclusion to farmers, including access to credit, leases, savings and investment products.

FIGURE 1
FOUNDATIONAL AND FUNCTIONAL IDENTITIES



Source: GSMA (2019), *Mobile-enabled Economic Identities for Smallholder Farmers in Ghana*.



2. Agriculture is the main driver of the Kenyan economy

AGRICULTURE IN KENYA

Agriculture has been a mainstay of Kenya's economy for many years, accounting for 31.5 per cent of Kenya's GDP¹ and employing 38 per cent of the population.² Over 70 per cent of rural residents rely on agriculture as their main source of income and form of employment.³

Kenya's agricultural sector output is diverse, comprising cereals (maize, wheat), livestock and dairy products (meat, milk), horticulture (cut flowers, vegetables and fruits), and cash crops (coffee, tea). Horticulture and cash crops dominate Kenya's agricultural exports.

The industry accounts for around 50 per cent of Kenya's exports⁴ and nearly 65 per cent of the country's export earnings.⁵

Agriculture is also a significant driver of the non-agricultural economy, providing inputs and markets for other industries such as building and construction, transportation, tourism, education and other social services.⁶ For example, 75 per cent of manufacturing sector employees are employed in agro-based industries.⁹

FIGURE 2
KENYA'S MAIN EXPORT COMMODITIES, 2017
(AS A PERCENTAGE OF TOTAL SHARE OF EXPORTS)⁷

TOTAL VALUE OF
KENYA'S EXPORTS:
KES 530.6 billion
(-USD 5.25 billion)

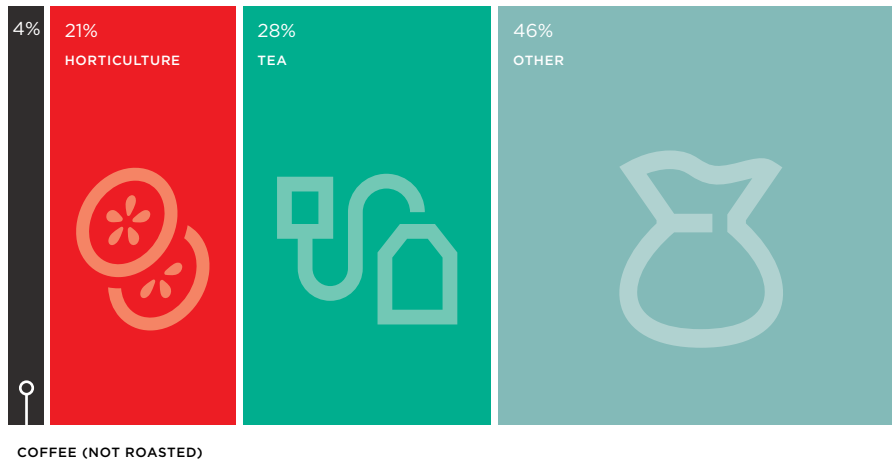
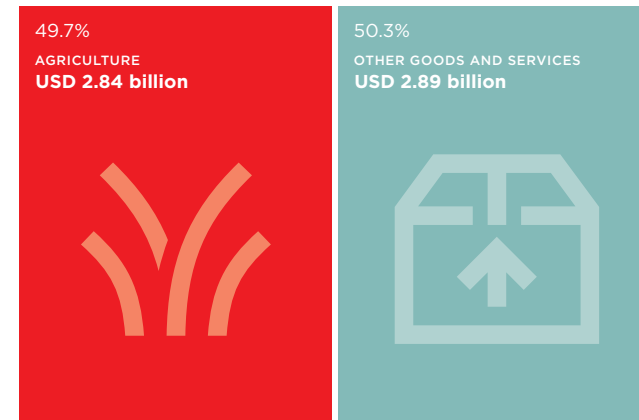


FIGURE 3
CONTRIBUTION OF AGRICULTURE
TO KENYA'S EXPORTS, 2017⁸



Sources: 1, 2 & 3 - The World Bank Databank 2018; 4 & 8 - World Integrated Trade Solution 2017; 5 & 6 - FAO (2018), *Evaluation of FAO's Contribution to the Republic of Kenya*; 7 - Kenya National Bureau of Statistics (2018), *Statistical Abstract 2018*; 9 - KIPPRA (2014), *Kenya Economic Report 2014*.



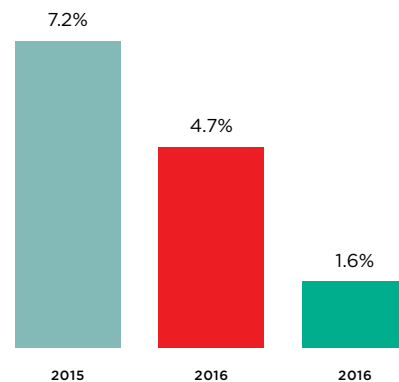
2.1 Smallholder farmers are most likely to be affected by inconsistent agricultural yields

AGRICULTURE IN KENYA

KENYA'S AGRICULTURAL SECTOR HAS SEEN DECLINING GROWTH SINCE 2015...

Since 2015, Kenya's agricultural performance has been sluggish, as shown in Figure 4. This can be attributed to several factors: persistent droughts, a surge in pests (such as Fall Armyworm) and chronic underinvestment that has undermined crop and livestock production. A drop in the production of food crops, such as maize and sugarcane, led to a steep rise in imports to bridge the production deficit, which in turn translated into higher purchase prices for consumers. Traditional cash crops for export, such as tea and coffee, also suffered a decline in production, hindering domestic growth.

FIGURE 4
ANNUAL GROWTH RATE OF KENYA'S AGRICULTURAL SECTOR, 2015-2017¹⁰



...WHICH CAN HAVE AN ADVERSE IMPACT ON FARMERS' LIVELIHOODS

For rural residents who depend on agriculture, the scarcity of key food crops and rising prices have put food security at risk and affected their livelihoods. Poor agricultural growth has also disrupted trade, affecting domestic consumption and curbing export revenue.

Smallholder agriculture is the main mode of agricultural production in Kenya, accounting for 70 per cent of marketed agricultural production.¹¹ Around 10 to 20 per cent of smallholder farmers in Kenya are part of formal value chains, while the rest operate informally.¹² Farmers in organised value chains are more likely to benefit from digital initiatives. This is because formal buyers, such as agribusinesses and cooperatives, are incentivised to use digital tools that make operating in the agricultural last mile more efficient,¹³ such as reducing the risk of fraud for crop buyers and sellers and making it easier to meet certification requirements. Without the support of agribusinesses, informal smallholder farmers are more likely to see their incomes decline as a result of low agricultural growth.

Through its blueprint for development, Kenya Vision 2030, the Kenyan Government has earmarked an annual GDP growth rate of 10 per cent for the agriculture sector.¹⁴ To realise this objective, reverse the trend of slow growth and move beyond subsistence, smallholder farming should be transformed.¹⁵



3. Financial inclusion in Kenya has increased, but farmers are likely to remain excluded

FINANCIAL INCLUSION IN KENYA

According to the 2017 Global Findex database, 81.6 per cent of the 29.6 million Kenyans aged 15 and older have an account with a financial institution or mobile money provider. In rural areas, this figure is slightly lower at 81.2 per cent. Financial inclusion in Kenya is the result of high rates of mobile money adoption and use: 72.9 per cent of Kenyans aged 15 and older have a mobile money account and rural figures are similarly high at 72.6 per cent.

Despite the strong presence of mobile money in rural areas, most farmers remain financially excluded. They are often at the bottom of the economic pyramid, yet they are the ones most likely to need access to financial services to finance their core economic activities and earn a living. Access to credit for farmers is often limited due to the perceived high risk of lending to the agricultural sector and farmers' lack of financial history.

FIGURE 5
OVERVIEW OF FINANCIAL INCLUSION IN KENYA, 2017

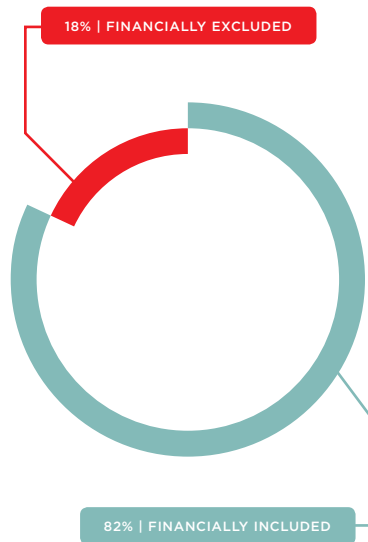


FIGURE 6
ACCOUNT TYPES, 2017

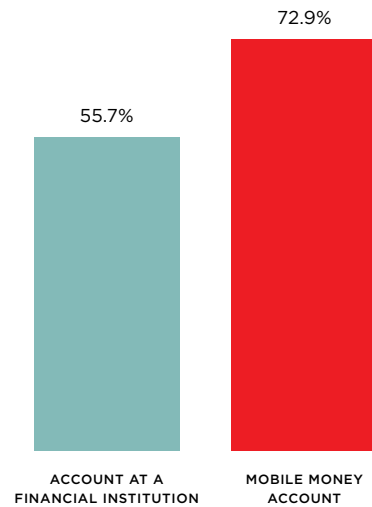
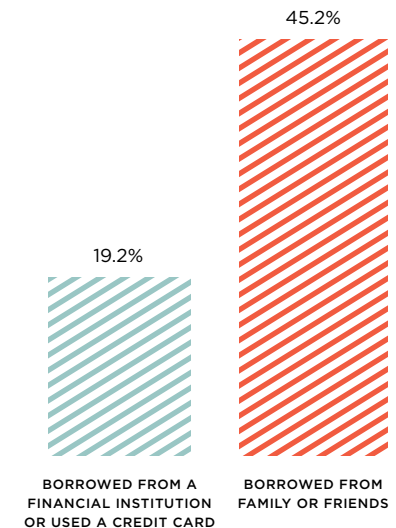


FIGURE 7
ACCESS TO CREDIT (ALL KENYANS AGED 15+), 2017



Source (all statistics): World Bank (2017), 2017 *Global Findex Database*.



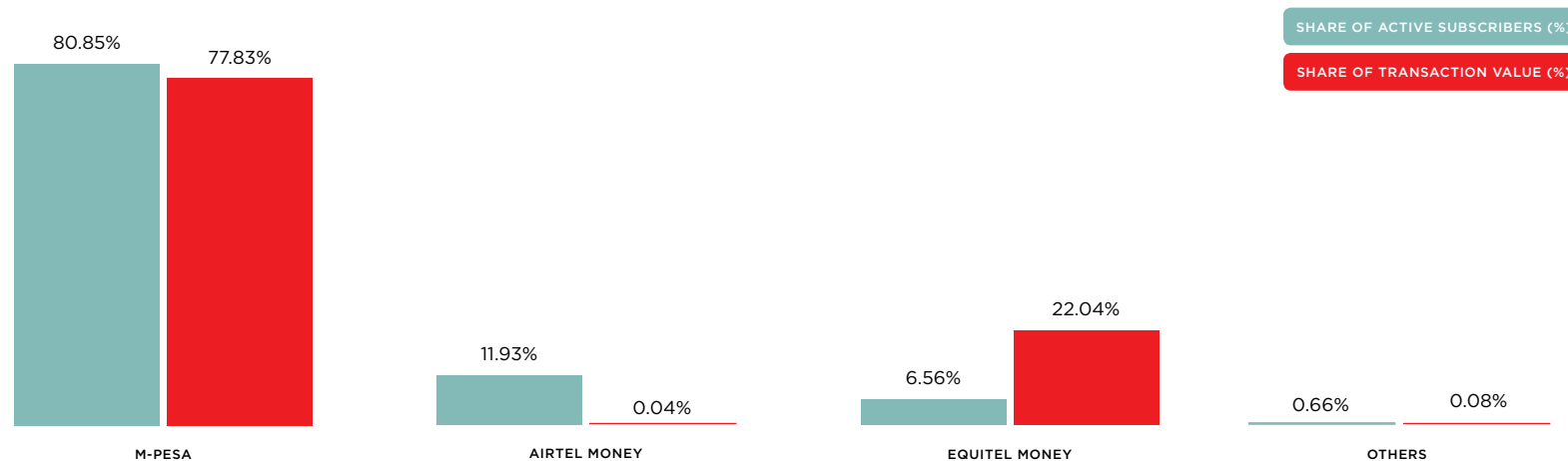
3.1 Mobile money is behind the rise in financial inclusion in Kenya

FINANCIAL INCLUSION IN KENYA

Since the launch of Safaricom's M-Pesa in 2007, Kenya has experienced rapid uptake of mobile money accounts. M-Pesa currently dominates market share with around 81 per cent of active subscriptions.¹⁶ According to The World Bank, nearly 80 per cent of the Kenyan population made or received a digital payment in 2017 — an increase of 10 percentage points from 2014.¹⁷

Kenya stands out as a digital finance pioneer, with mobile money payments used for remittances, bill payments, utilities, salaries and even government payments. For example, the government's eCitizen platform has led to over 90 per cent of digital payments being made with mobile money.¹⁸

FIGURE 8
MOBILE MONEY USE IN KENYA,
OCTOBER-DECEMBER 2018¹⁵



Sources: 16 - The Communications Authority of Kenya (2018), *Second Quarter Sector Statistics Report for 2018/2019*; 17 - The World Bank (2017), *2017 Global Findex Database*; 18 - GSMA (2017), *Person-to-government (P2G) payment digitisation*.



3.2 More adults in rural Kenya use mobile money than ever before, despite gaps in coverage and liquidity

FINANCIAL INCLUSION IN KENYA

According to the 2019 FinAccess Household Survey, rural access to formal financial services has grown alongside a rise in mobile money use in rural Kenya. However, barriers to further adoption persist, such as gaps in rural mobile coverage, availability and liquidity of mobile money agents to support cash-outs, and a lack of formal identification documents to meet rigorous know-your-customer (KYC) requirements.

In 2017, over 73 per cent of adults in rural areas had access to a mobile money account, while 37 per cent received money from the sale of agricultural products through a mobile phone (compared to around 30 per cent in 2014).¹⁹

FIGURE 9
RURAL FINANCIAL INCLUSION
IN KENYA, 2016-2019²⁰

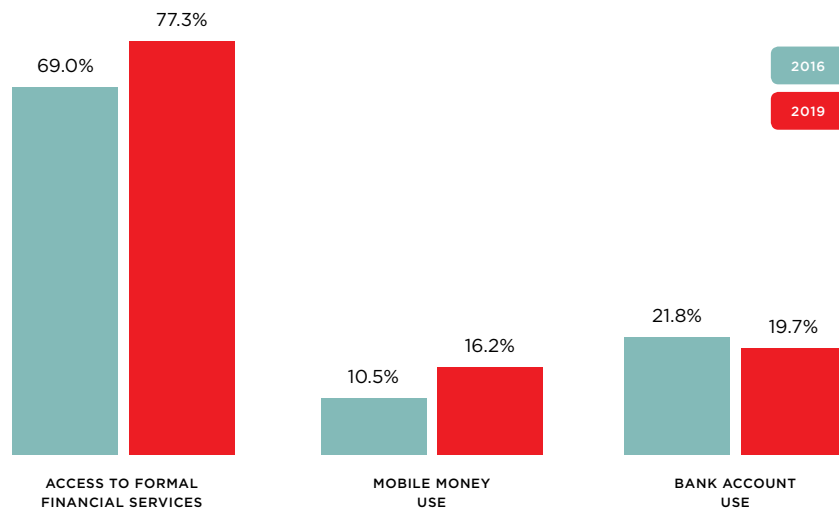
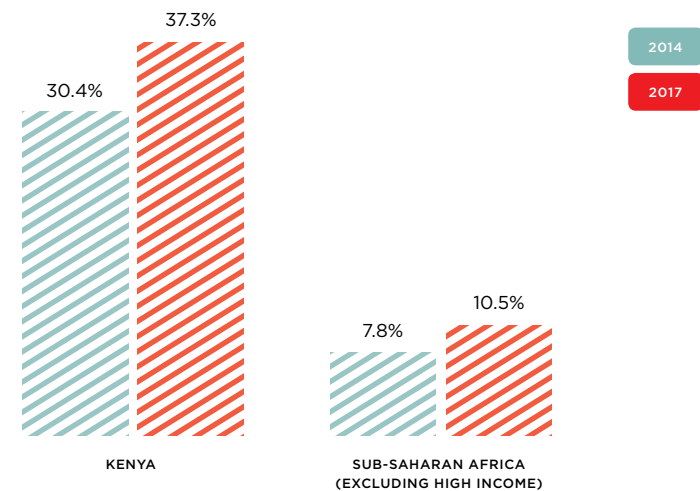


FIGURE 10
PERCENTAGE OF ADULTS WHO RECEIVED
PAYMENTS FOR AGRICULTURAL PRODUCTS
THROUGH A MOBILE PHONE IN KENYA²¹



Sources: 19 & 21 - The World Bank (2017), 2017 Global Findex Database; 20 - FSD (2019), FinAccess Household Survey.



4. Different digital agricultural solutions have emerged to address the needs of Kenyan farmers and agribusinesses

DIGITAL AGRI SOLUTIONS IN KENYA

AgriTech startups and MNOs in Kenya have developed and introduced digital, mobile-based solutions to address some of the challenges experienced by crop

producers, agribusinesses, crop aggregators (such as cooperatives) and crop buyers. Three main use cases have emerged.

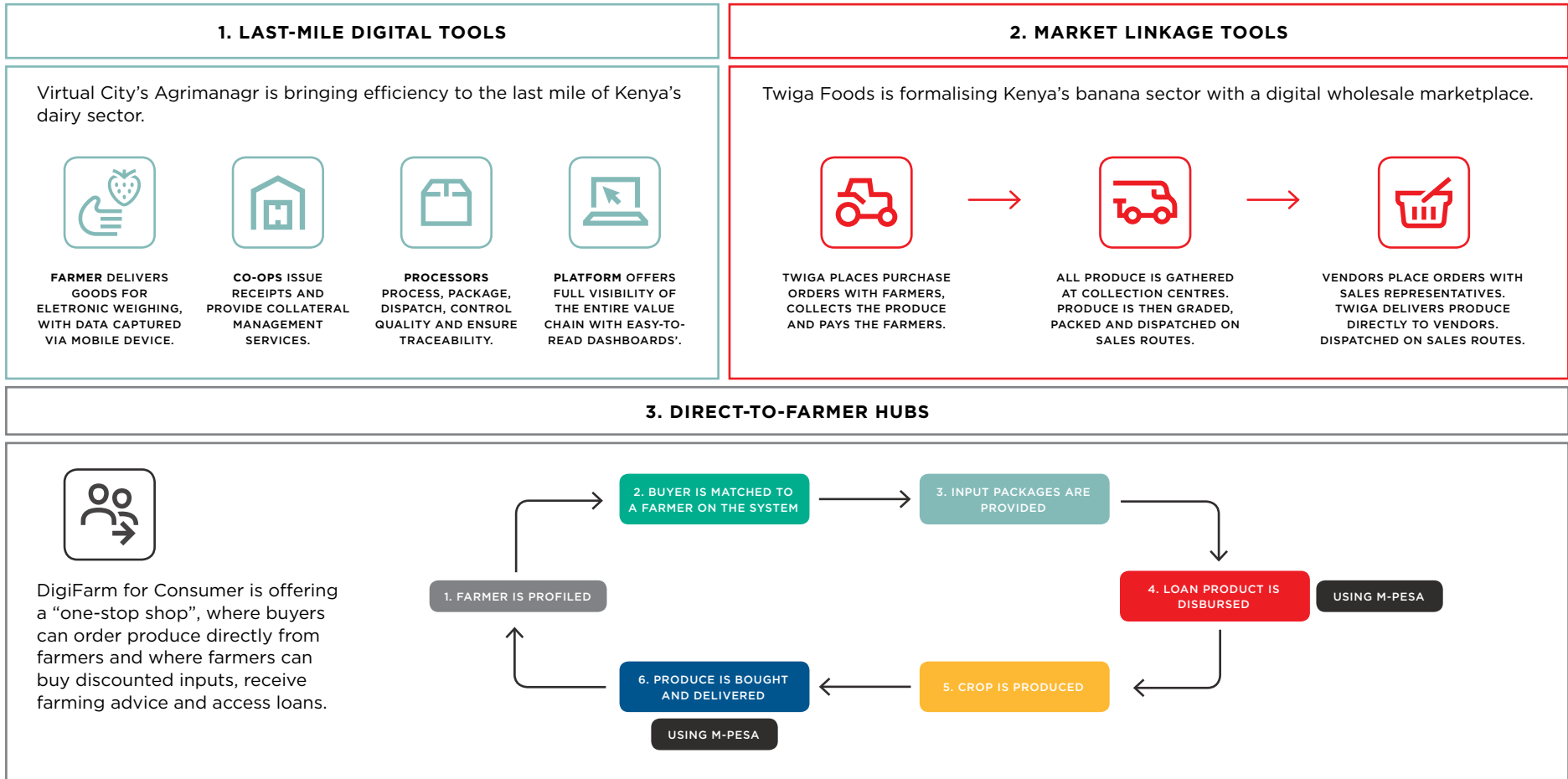
1. LAST-MILE DIGITAL TOOLS	2. MARKET LINKAGE TOOLS	3. DIRECT-TO-FARMER HUBS
<p>Mobile-based enterprise solutions that enable digital transactions and communication between smallholder farmers and agribusinesses, create digital profiles for farmers and enable track-and-trace and better farm management.</p>	<p>Tools that formalise agricultural value chains by connecting crop producers and buyers through a mobile-based online platform. This includes both direct-to-consumer e-commerce services as well as wholesale market places.</p>	<p>A centralised, online, mobile-based hub that allows buyers to place orders for crops directly from farmers, and enables suppliers to offer agricultural products and services to farmers.</p>
EXAMPLES IN KENYA		
<ul style="list-style-type: none"> Virtual City's Agrimanagr: brings real-time visibility to the agricultural last mile by digitising procurement. DigiFarm for Enterprise: an enterprise platform for agricultural value chains that helps agribusinesses work more efficiently with smallholder farmers, boosting their productivity and incomes. 	<ul style="list-style-type: none"> Twiga Foods: a mobile-based, cashless, business-to-business supply platform connecting farmers to small- and medium-size vendors. Tulaa: a mobile-based online marketplace that connects smallholder farmers with input suppliers and crop buyers. Tulaa also provides input credits for farmers based on their own credit assessments. Masoko*: an online marketplace where customers can buy items that are delivered to their homes and suppliers can sell their products directly to buyers. 	<p>In Kenya, DigiFarm for Consumer allows buyers to place orders and enables farmers to buy discounted inputs, receive farming advice and access loans from their mobile phones. The loans are disbursed and repaid via mobile money. The platform aims to be a "one-stop shop" for farmers, providing services for their farms and a market in which to sell their crops.</p>

* Masoko already sells groceries through its platform, though it is not a direct-to-consumer service in this case. Fresh produce is supplied by Mboga Masters.



4.1 Digital agricultural tools address pain points for farmers and other stakeholders in the value chain

DIGITAL AGRI SOLUTIONS IN KENYA





5. Creating economic identities for farmers to improve financial inclusion is a multi-step process

CREATING ECONOMIC IDENTITIES



- DATA SHOWING A REGULAR INCOME
- LOAN/CREDIT REPAYMENT HISTORY
- MOBILE MONEY USAGE DATA



- ACCESS TO (ADDITIONAL) CREDIT/LOANS
- EVIDENCE OF COLLATERAL FOR LOANS
- CREDIT SCORE(S)



STEP 1

DIGITISE PROCUREMENT TRANSACTIONS AND PAYMENTS

Since most agricultural payments are cash-based, banks often perceive agricultural loans as high risk and can be reluctant to lend to farmers without understanding their source and frequency of income. The introduction of business-to-person (B2P) digital payments for crop procurement has the potential to de-risk smallholder farmer financing. Through mobile money payments, farmers can build a transaction history that demonstrates a regular income to potential lenders. For example, DigiFarm for Enterprise has not only digitised manual processes, such as record keeping, but has also introduced digital payments (via mobile money) for farmers previously paid in cash.



STEP 2 (A)

SHARE INFORMATION WITH PARTNERS WHO CAN PROVIDE LOANS...

A digital footprint, such as mobile money transactional history, does not automatically make farmers eligible for more financial services. With mobile money account logs in particular, many banks do not consider these data points evidence of financial activities. To overcome this, Virtual City has partnered with a bank to collect KYC data on farmers in the value chains they are digitising. While agribusinesses often claim ownership of farmers' data, farmers' consent is obtained prior to any data being shared. This arrangement has enabled agribusinesses that use Virtual City's digital solution to offer bank loans to the farmers they work with.



STEP 2 (B)

...OR UNDERWRITE LOANS TO FARMERS YOURSELF

For farmers, a downside of accessing traditional bank loans can be high interest rates and charges. Tulaa has overcome this challenge by offering and underwriting loans to farmers directly. Farmers can apply for input credits at more favourable terms than offered by banks. According to Tulaa, 71 per cent of the farmers they work with have never accessed input financing before, but when it is provided, financial inclusion improves. However, this approach involves setting up bespoke credit scoring models, as well as securing substantial capital to finance debt, which may make it difficult for the model to scale in the long term.



STEP 3

TRANSLATE DIGITAL BEHAVIOURS INTO CREDIT SCORES

Smallholder farmers are typically considered high risk for credit or loans due to their lack of collateral and volatile incomes. However, DigiFarm for Consumer is working with a number of banks to co-create a credit score. This involves producing a composite rating based on credit scores generated by the banks, a farmer's mobile phone usage, lending or payments via mobile money and their agricultural activities. The aim is to enable farmers to become eligible for bank loans and credit on the basis of their mobile phone or mobile money usage.



6. What challenges are emerging as new digital farmer data becomes available from digital interventions?

EXPLORING KEY DATA CHALLENGES

	1. LAST-MILE DIGITAL TOOLS	2. MARKET LINKAGE TOOLS	3. DIRECT-TO-FARMER HUBS
DATA GENERATION		How do you generate data? What types of data do you generate: farm, farmer or both?	
DATA OWNERSHIP		Who owns the data? Is consent sought/provided by farmers on how their data is used?	
DATA SHARING		What are the considerations around sharing data with third parties? As farm and farmer data is generated, how is this data shared with third parties?	



6.1 How can data generated via digital agriculture solutions improve financial inclusion for farmers?

EXPLORING KEY DATA CHALLENGES: DATA GENERATION

























WHAT TYPES OF DATA ARE GENERATED FROM DIGITAL AGRICULTURAL TOOLS?

The three use cases featured in this report collect and generate data that is broadly similar (see Figure 10). All three include at least five of six farm and farmer data categories. The exception is financial data, specifically historical loan data, which is not yet collected by the last-mile digital tools we surveyed.

HOW IS THIS DATA GENERATED?

Initial registration is either collected by field-based data clerks or inputted directly by farmers – both via mobile apps. In some cases, self-reported data is then verified by a field agent. For example, DigiFarm for Consumer allows farmers to enter their details and then verifies farm locations and sizes through an agent. Secondary data is generated through analysis either by the agribusinesses using the solution or by the solution provider. For example, Tulaa offers credit to farmers based on their own analysis of farmer data.

FIGURE 10
FARM AND FARMER
DATA POINTS

DATA CATEGORIES		EXAMPLE DATA POINTS	
	PERSONAL INFORMATION	  	NAME, GENDER, FAMILY SIZE, ID NUMBER
	COMMUNICATION	  	MOBILE NUMBER, NATIVE LANGUAGE
	FARM	  	FARM LOCATION, FIELD SIZE, LAND TITLE, SOIL CONDITIONS
	CROP	  	CROPS GROWN OVER TIME, VARIETIES GROWN, PLANT SPACING
	PRODUCTION	  	CULTIVATION AND PRODUCTION DATA, USE OF AGROCHEMICALS, HISTORICAL SALES DATA
	FINANCIAL	  	TRANSACTION DATA, ACCOUNT OWNERSHIP, CREDIT AND SAVINGS, INSURANCE DATA

LAST-MILE DIGITAL TOOLS

E-COMMERCE PLATFORMS

DIRECT-TO-FARMER HUBS



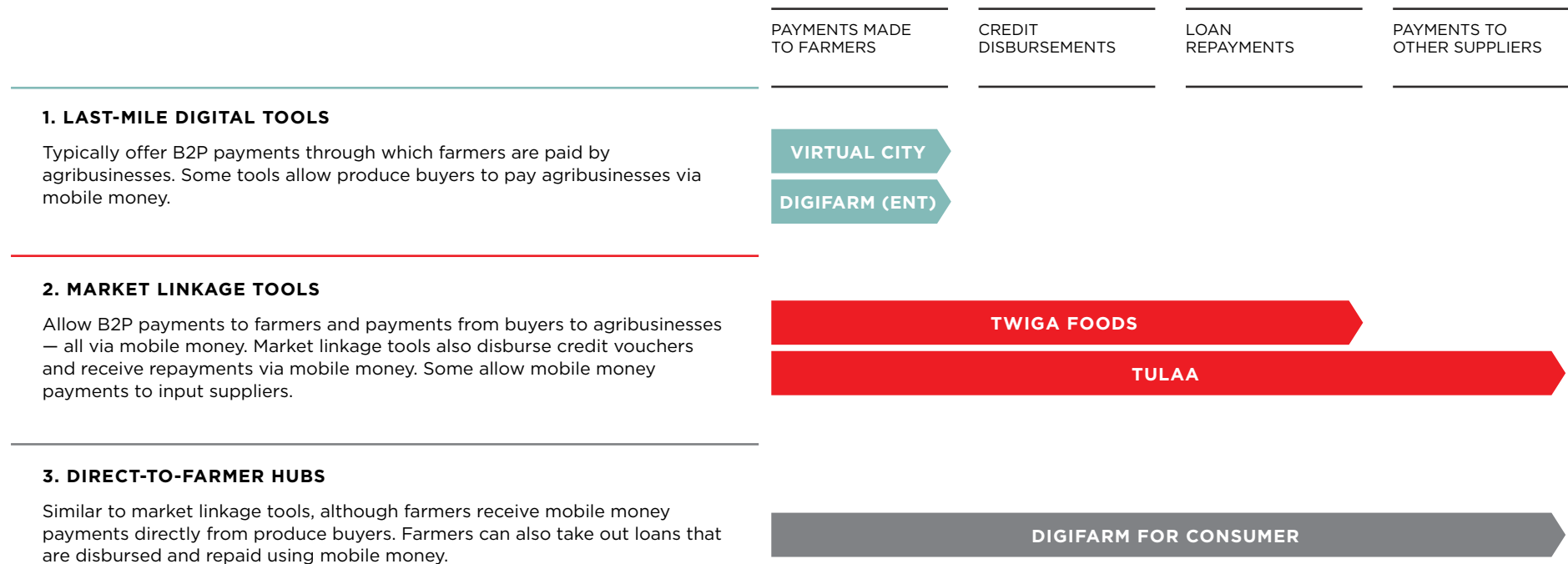
6.2 MOBILE MONEY GENERATES DIGITAL FINANCIAL DATA ON FARMERS' ECONOMIC LIVES

EXPLORING KEY DATA CHALLENGES: DATA GENERATION

Mobile money can be an important enabler for the three digital agricultural use cases presented here, generating financial data that could be used to create

economic identities for farmers. Figure 11 shows the types of transactions supported by the digital solutions we surveyed.

FIGURE 11
MOBILE MONEY USE CASES








6.3 FARMERS' CONSENT TO SHARE DATA IS NEARLY ALWAYS SOUGHT, BUT AWARENESS OF HOW THEIR DATA IS USED IS LOW

EXPLORING KEY DATA CHALLENGES: DATA OWNERSHIP

Our survey of digital agricultural tools in Kenya showed a range of approaches to data sharing and data ownership (see Table 1). Digital solution providers have some ongoing, limited data sharing agreements. For example, almost all digital solutions currently share data with third-party providers to enable loans to be disbursed and inputs supplied to farmers.

All digital solution providers recognised the importance of data privacy and seeking consent from farmers before sharing their data. Some providers, such as Tulaa and Twiga Foods, ensure their agents explain to farmers how their data will be used. Others, such as DigiFarm, seek consent when required for specific modular services. However, questions remain about how well farmers understand how their data is shared and for what purpose.

TABLE 1
DATA SHARING AND OWNERSHIP APPROACHES

	WHO CLAIMS OWNERSHIP OF THE DATA?	WHAT IS THE DATA USED FOR?	IS THE DATA CONTROLLER KEEN TO SHARE DATA?	IS FARMER CONSENT SOUGHT PRIOR TO SHARING DATA?	WHO IS THE DATA CURRENTLY SHARED WITH?
 LAST-MILE DIGITISATION TOOLS	Agribusinesses own the data in most cases. The digital solution provider often acts as a data controller*.	The data is used to create farmer profiles, while transaction logs are being trialled as collateral for bank loans.	Yes - there is a desire to share data. Virtual City and its agribusiness clients are keen to share data with banks to offer loans.	Yes - the agribusiness will typically seek consent via a field agent prior to sharing farmer data.	Virtual City shares data with banks under an agreement with the agribusiness to provide loans to farmers.
 MARKET LINKAGE TOOLS	Ownership varies. Twiga claims ownership, but for Tulaa, raw data belongs to the farmer while it owns the analysed data.	The data is used to assess farmer performance. Uniquely, Twiga uses the data to determine vendor creditworthiness.	Some data is shared, though this varies. Twiga shares data with lenders while Tulaa shares analysed data with an input supplier.	Yes - field agents seek consent during the registration process by explaining terms and conditions to farmers.	Twiga shares data with third-party lenders to offer credit to vendors. Tulaa shares some data with an input supplier (Syngenta).
 DIRECT-TO-FARMER PLATFORMS	The platform provider owns the data while partners plugged into the hub hold subsets of the data.	The data is used to offer tailored products to farmers. DigiFarm is working to develop a composite credit score with banks.	Certain data points are shared with providers on its platform. DigiFarm aims to share credit scores with a number of local banks.	Yes - general consent is sought at registration. Consent is also sought when farmers enrol for a modular service (e.g., credit).	DigiFarm shares non-personal data with partner service providers on its hub.

* A data controller refers to "the natural or legal person, public authority, agency or other body which, alone or jointly with others, determines the purposes and means of the processing of personal data".
Source: *GDPR Article 4 - Definitions*.



6.4 By accessing farmer data, a range of companies can customise products for farmers

EXPLORING KEY DATA CHALLENGES: DATA SHARING

In Kenya, a number of agribusinesses, AgriTech companies and MNOs are already sharing data with a range of organisations, which in turn are offering targeted products and services to farmers. For example, Tulaa shares data with Syngenta, an input supplier, so that farmers can purchase inputs with credit from Tulaa. Figure 12 shows the various data points sought by third-party providers and the types of products and services they can subsequently offer.

Not all data owners currently share data. In most cases, agribusinesses are likely to have an incentive to share data to enable farmers to benefit from additional services. However, data sharing relies on a farmer's consent to use their data in a specific way. For example, agribusinesses using Virtual City's Agrimanagr solution seek consent from farmers before sharing their data with banks they have partnered with to disburse farmer loans.

FIGURE 12
WHAT DATA POINTS DO
THIRD-PARTY PROVIDERS NEED
TO OFFER THEIR SERVICES?

THIRD-PARTY PROVIDERS INTERESTED IN FARMER/FARM DATA	DATA POINTS GENERATED BY DIGITAL AGRICULTURAL SOLUTIONS USED BY THIRD-PARTY PROVIDERS TO OFFER ADDITIONAL SERVICES TO FARMERS							EXAMPLES OF PRODUCTS THAT CAN BE OFFERED BASED ON THE DATA POINT	
	MOBILE MONEY DATA	LOAN REPAYMENT DATA	PERSONAL DATA	FARM PRODUCE DATA	FARM LOCATION (GPS) DATA	SOIL CONDITION	INPUTS USED		CROP YIELD DATA
BANKS AND MICROFINANCE LENDERS	■	■	■	■	■				CREDIT SCORES, LOANS AND SAVINGS
MICROINSURANCE PROVIDERS			■	■	■				HEALTH, LIFE AND CROP/WEATHER INDEX INSURANCE POLICIES
SOIL TESTING PROVIDERS					■	■	■	■	SOIL TESTING SERVICES
INPUT SUPPLIERS							■	■	FARM INPUTS AND ANIMAL FEEDS
INFORMATION SERVICE PROVIDERS							■	■	AGRICULTURAL ADVISORY SERVICES AND EDUCATION



6.5 Digital agricultural tools in Kenya are already enabling financial inclusion for downstream stakeholders in the value chain

EXPLORING KEY DATA CHALLENGES: DATA SHARING

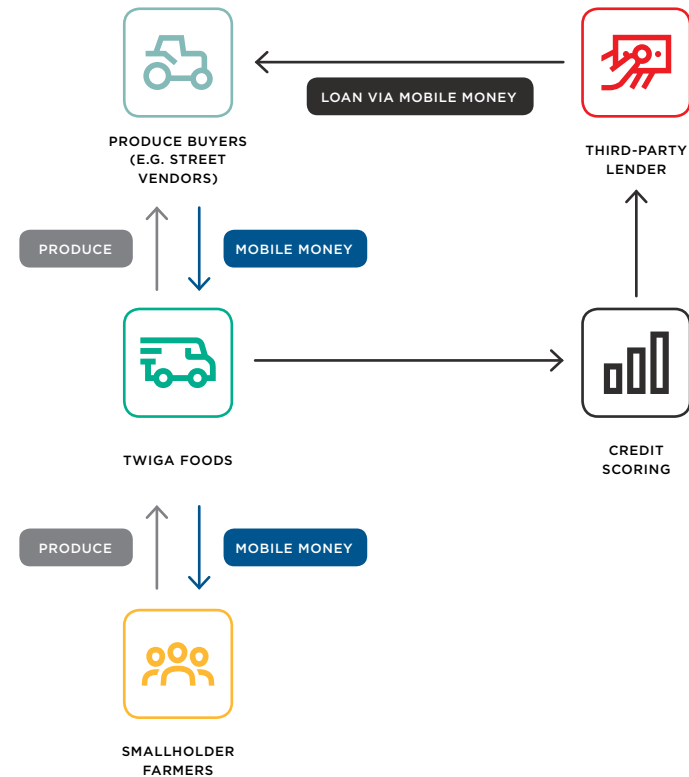
The digitisation of value chains has already increased financial inclusion for produce buyers through some of the digital tools featured here.

For example, Virtual City's agribusiness clients have seen buyers, typically small-scale sellers and street vendors, pay them via mobile money for produce supplied by smallholder farmers. DigiFarm for Consumer relies on produce buyers paying farmers directly with mobile money.

Through these payments, some produce buyers have gained access to credit. Street sellers purchasing produce from Twiga Foods are being offered short-term loans disbursed via mobile money to finance their stock. Buyers' loan repayment and transaction histories are taken into account for future credit, and Twiga Foods can monitor vendors' creditworthiness and provide preferential repayment and interest rates accordingly (as shown in Figure 13).

Despite growing demand, loans and credit services are only offered to smallholder farmers on a limited and informal basis. However, Twiga Foods' model can be replicated for farmers to access formal loans. While some digital tools already offer input credits to farmers using a closed-loop model, credit disbursement would enable farmers to move beyond buying inputs and expand their output.

FIGURE 13
TWIGA FOODS' STOCK-FINANCING
LOAN PROCESS





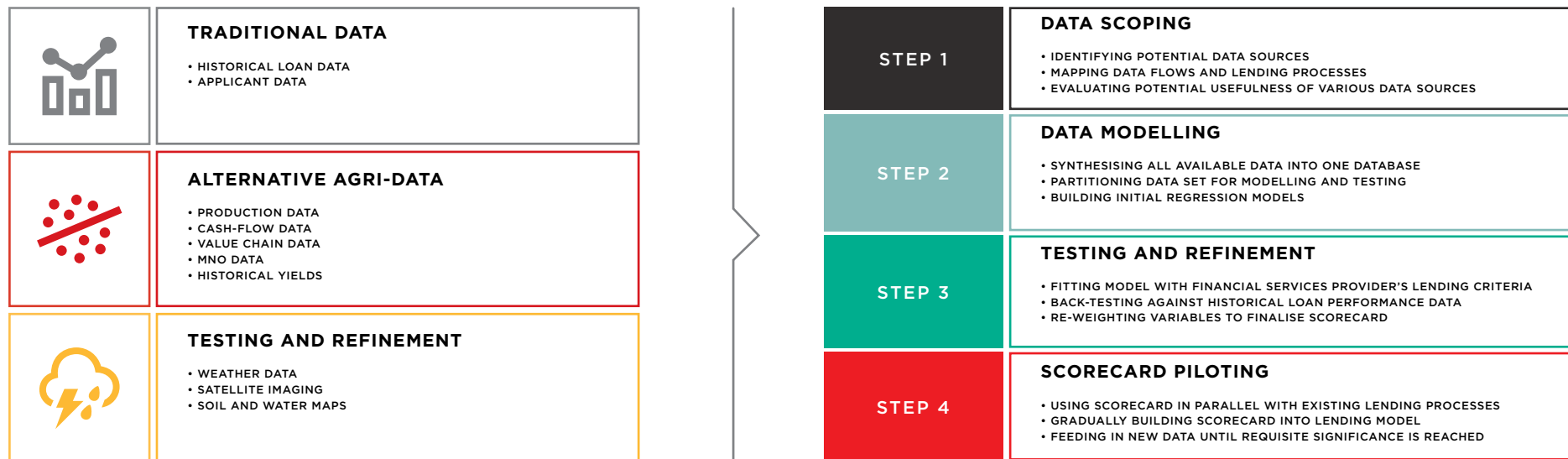
6.6 Using new digital agricultural and remote-sensing data enables credit scoring for unbanked farmers

EXPLORING KEY DATA CHALLENGES: DATA SHARING

Typically, credit scoring for smallholder farmers has involved analysis of the few data points available, such as historical repayment records and current data (i.e. data on the farmer's current activities), in order to understand future repayment risks. Emerging approaches to credit risk analysis envisage the use of alternative agricultural data, including data generated by digital agriculture initiatives and, increasingly, the use of remote-sensing data. Historical production data and vegetation indexes from satellites, for example, can be used to improve predictions of potential yields, which is crucial to assessing the creditworthiness of farmers.

In 2018, a joint initiative in Uganda between CGAP, Harvesting, a FinTech firm, and PRIDE Microfinance, Uganda's largest microfinance network, tested the use of a variety of data types for credit scoring. The project found that the sole use of new data sets does not necessarily improve credit risk analysis. Rather, when new data sets are of high quality (i.e., from automated collection processes versus self-reported data) they lead to improved credit scoring. To enhance credit risk analysis, the initiative demonstrated that data providers and users should focus on improving the quality of traditional data while simultaneously looking for new alternative agri-data and remote-sensing data (see Figure 14).

FIGURE 14
TYPES OF DATA POINTS TO USE WHEN BUILDING A CREDIT SCORING MODEL



Source: Adapted by GSMA CGAP (2018), *Credit Scoring for Smallholders: Lessons from Uganda*.



6.7 Although data is being shared in Kenya to improve financial inclusion, this can be done through a central hub

EXPLORING KEY DATA CHALLENGES: DATA SHARING

In Kenya, current initiatives to use last-mile digital data to enable the disbursement of agricultural loans to farmers are happening on a one-to-one basis (see Figure 15). This kind of partnership allows a data controller (an agribusiness or cooperative) to transfer data to a third-party financial provider for credit risk analysis. Exposing a higher quantity and variety of data points to a wider range of data users (financial services providers) under a centralised data exchange model (see Figure 16) could greatly improve credit risk analysis (see slide 21) and ultimately increase the availability of financial services to farmers. In this model, the use of blockchain technology allows for secure, traceable and transparent exchange of data. Such data hubs have emerged in markets like Indonesia²² to respond to demand from financial services providers for intermediation and aggregation in agricultural data sharing.

In Sub-Saharan Africa, a number of AgriTech companies (BanQu, AgriLedger) use blockchain technology to enable greater data sharing and support the creation of economic identities for farmers. In Kenya, AgriLedger conducted a pilot in which farmers used the solution to communicate, share resources and make and record payments.²³ In Kenya, DigiFarm for Consumer already allows third-party service providers to plug into its platform and access a subset of its farmer data to offer services to farmers on the hub. The addition of a centralised data exchange, with incentives for farmers to actively exchange data with business users of the platform, could represent a potential evolution for a service such as DigiFarm that is already providing a “one-stop shop” for farmers.

FIGURE 15
ONE-TO-ONE DATA SHARING (VIRTUAL CITY EXAMPLE)

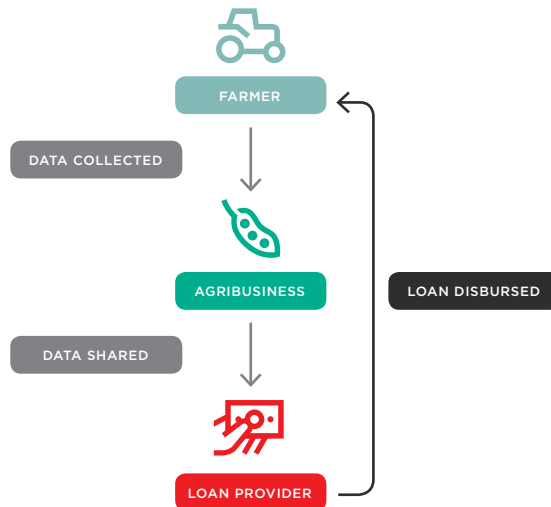
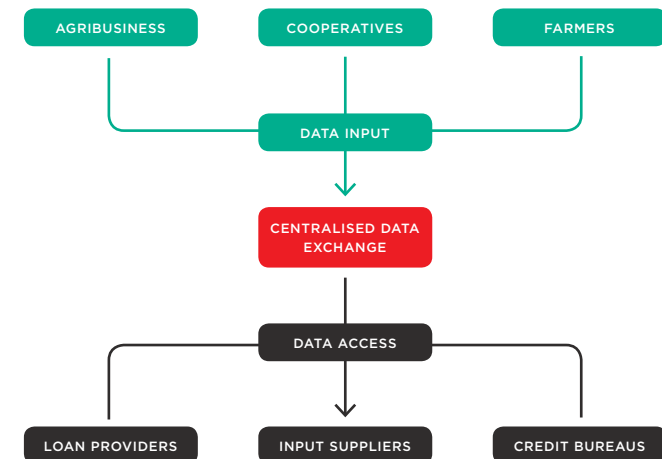


FIGURE 16
CENTRALISED DATA EXCHANGE



Sources: 22 – GSMA (2019), *AgTech Innovation Unlocks Economic Identities for Smallholders in Indonesia*; 23 – AgInnovators (2018), *Aussie start-up goes global with blockchain tech for world's poorest farmers*.



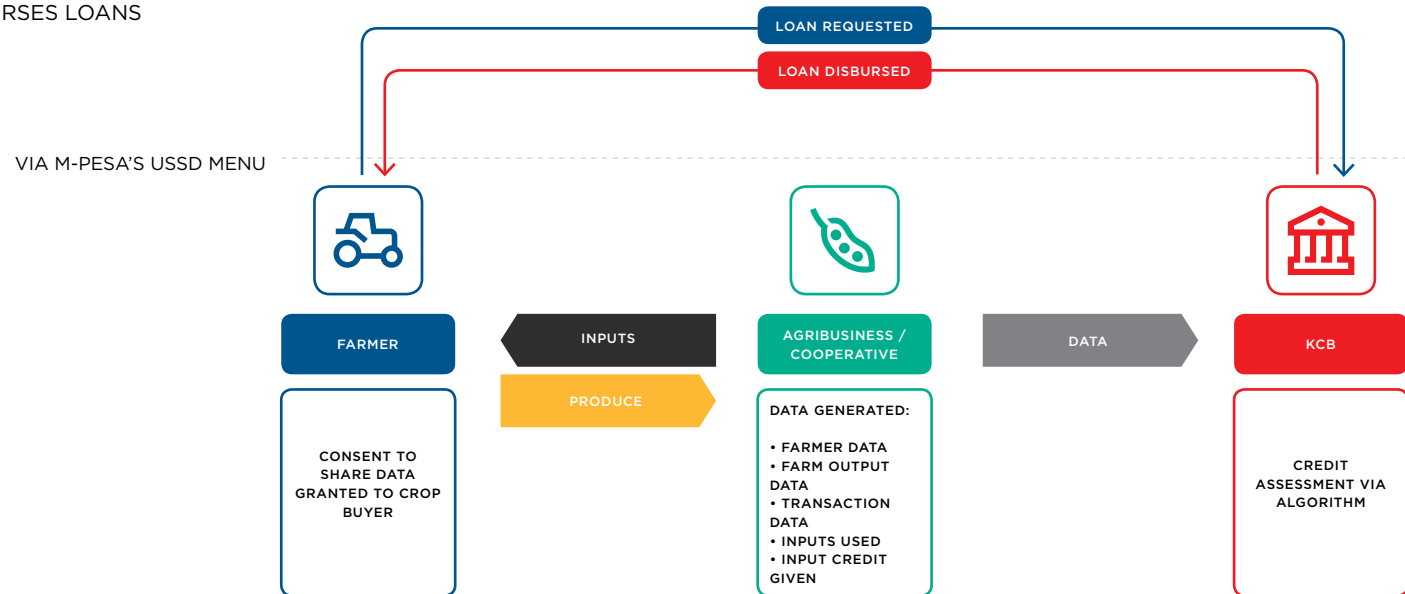
6.8 Case study: KCB's MobiGrow partners with value chain actors to access farmer data and disburse loans

EXPLORING KEY DATA CHALLENGES: DATA SHARING

In partnership with the Mastercard Foundation, Kenya Commercial Bank (KCB) launched the MobiGrow service, which aims to promote financial inclusion among smallholder farmers in Kenya and Rwanda. The service works by partnering with crop buyers (agribusinesses and cooperatives) to better understand their value chains. The service can access 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 (Figure 17). Crop buyers typically obtain farmers' consent to share data at an annual meeting prior to sharing with KCB.

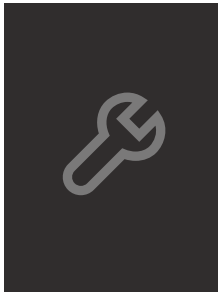
In Kenya, the service uses M-Pesa's wide reach and established infrastructure as a distribution channel to provide farmers with credit and savings accounts. Farmers can access the service via the M-Pesa USSD menu and are required to create a KCB MobiGrow account. They can then request a loan based on their needs and, if successful, this is deposited into their KCB MobiGrow account. Farmers can push these funds to their M-Pesa account (for a small fee) or withdraw the money via agents. Repayments are usually made over one, three or six months. The service also provides free training material to farmers via mobile.

FIGURE 17
HOW KCB MOBIGROW DISBURSES LOANS
TO SMALLHOLDER FARMERS



Sources: KCB MobiGrow website, GSMA-KCB meeting notes and Mastercard Foundation's Symposium on Financial Inclusion 2017, Day 2 presentation.

LEARNINGS



1. KENYA HAS BENEFITTED FROM DIGITAL TOOLS THAT HAVE BROUGHT EFFICIENCY TO THE AGRICULTURAL SECTOR, AND THESE CAN BE IMPLEMENTED IN OTHER COUNTRIES

While a number of countries have seen the introduction of digital tools in the agricultural last mile, high mobile penetration and mobile money use in Kenya has enabled AgriTech companies to develop more sophisticated solutions. As a thriving technology hub in Sub-Saharan Africa, Kenya has also benefitted from technical know-how and inward investment in digital agricultural solutions. However, these benefits can be extended to other parts of Sub-Saharan Africa, too. Virtual City also operates in Rwanda, while Digifarm for Enterprise is active in Uganda and has been adopted by the Zambia Dairy Association.



2. DIGITAL AGRICULTURAL TOOLS IN KENYA ARE GENERATING FARM AND FARMER DATA THAT CAN BE USED TO CREATE ECONOMIC IDENTITIES.

Digital tools can aggregate a range of rich data points, such as mobile money transactions, farm location and value-chain transactions. This data can be used to assess the creditworthiness of farmers. Most digital solution providers have acknowledged that the data they collect and generate has the potential to serve as financial histories for farmers and create economic identities in the process. While some AgriTech companies are developing internal credit scores for farmers, using the data to generate universally accepted credit scores remains a challenge.



3. BEST PRACTICES ARE NEEDED ON HOW TO SHARE DATA AND ENSURE THAT INCENTIVES TO SHARE DATA ARE NOT LIMITED TO AGRIBUSINESSES.

While many digital solution providers are keen for their data to be used to generate credit scores for farmers or to link farmers to additional financial services, data sharing remains patchy and limited. A few agribusinesses currently share their data on a bilateral or tripartite basis with third parties that offer loans. Although some solution providers are concerned about entrusting their data to third parties, a holistic, centralised sharing mechanism that connects data controllers and third-party providers could allow all data controllers to share data with providers that best meet farmers' needs - which would require many commercial, regulatory and legal challenges to be considered.

LEARNINGS



4. FARMERS NEED TO BE MORE AWARE OF WHO OWNS THEIR DATA, BUT DATA CONTROLLERS HAVE VARYING CLAIMS TO OWNERSHIP.

Of the digital solutions surveyed, claims on data ownership varied, from the data belonging to farmers versus solution providers. While some solutions providers ensured that farmers' consent was sought, others are doing this on an as-needed basis. Farmers should be informed of how their data might be shared and which data points could be shared, and explicit consent to share should be sought during registration. This may require additional educational efforts, but solutions providers should also implement systems that protect farmers' data. Data sharing is not simply limited to technology, but involves rules and incentives around data sharing and awareness and trust of data-sharing processes.



5. GROWTH IN DIGITAL AGRICULTURAL SOLUTIONS AND INITIATIVES WILL LEAD TO AN INCREASE IN THE TYPES OF DATA POINTS AVAILABLE FOR ANALYSIS.

Data currently generated by digital solutions includes personal information, communication details, farm data, crop characteristics, production data and financial and transactional data. Over time, more data will become available to complement existing information. This data will be generated by IoT agricultural sensors and satellites, such as SunCulture's AgOptimized soil sensors. Through these sensors, the company provides customers with weather forecasts and precision irrigation timing alerts via SMS. Another example is WorldCovr, which provides climate insurance to smallholder farmers. WorldCovr uses satellites to monitor rainfall and makes automatic payments to farmers based on this data.



6. DATA SHARING THROUGH A CENTRALISED EXCHANGE HUB COULD HELP TO SCALE FINANCIAL INCLUSION AND SERVICE PROVISION.

The number of last-mile digital solutions and e-commerce platforms is expected to grow, leading to more data-sharing opportunities. Although current one-to-one data sharing can improve financial inclusion for smallholder farmers, centralised data exchange hubs would enable more farmers, agribusinesses, cooperatives and NGOs to share their data with a variety of third-party service providers, such as financial services providers, input suppliers and agricultural advisory providers. Through the use of technologies such as blockchain, centralised exchange hubs could enable data to be stored and shared securely, and ultimately scale financial inclusion for smallholder farmers.



GSMA HEAD OFFICE

Floor 2
The Walbrook Building
25 Walbrook
London EC4N 8AF
United Kingdom
Tel: +44 (0)20 7356 0600
Fax: +44 (0)20 7356 0601

