

Data for policy action framework

Agriculture

July 2022



Author(s)

Hennie Bester

Albert van der Linden

Pieter Frederik Janse van Vuuren

Editorial support:

Christine Hougaard

Melanie Fairhurst

Cenfri

Tel. +27 21 913 9510

Email: info@cenfri.org

The Vineyards Office Estate

Farm 1, Block A

99 Jip de Jager Drive

Bellville, 7530

South Africa

PO Box 5966

Tyger Valley, 7535

South Africa

www.cenfri.org



Table of contents

1. Introduction	1
2. Policy priorities	3
Why does agriculture matter?.....	3
Policy objectives	4
3. Role of digital technology and digital payments	6
Role of payments digitalisation	6
How does payment digitalisation come about?.....	7
4. How can data help to drive the policy agenda?	10
5. Implications for policy implementation	13
6. Bibliography	15

List of tables

Table 1: Digitalisation drivers, available data sources and indicators.....	11
Table 2: Datasets for tracking agricultural KPIs	12

List of figures

Figure 1: Rwanda Economy Digitalisation Program (RED) policy domains and Government of Rwanda domain-owners.....	1
Figure 2: Segmentation of farmers within adult population.....	3

1. Introduction

Purpose and scope of the Rwanda Economy Digitalisation (RED) programme.

The [Rwanda Economy Digitalisation Programme](#) is a three-year initiative to support a sustained shift to an inclusive, digitalised economy in Rwanda. Hosted by MiniICT, the programme is implemented by [Cenfri](#) in partnership with the Government of Rwanda and supported by the Mastercard Foundation. The programme works with policymakers by leveraging insights from data analysis to inform policymaking, catalyse innovation and, ultimately, improve livelihoods towards the attainment of Rwanda’s Vision 2050.

Core policy domains. The RED programme engages in several policy domains, as indicated in Figure 1. The programme’s anchor domains are those below the line (i.e. in green), where it engages closely on the Cashless Rwanda agenda. From these anchor domains, it also informs important real economy policy domains above the line (i.e. in blue), in each instance identifying how data can inform policy action towards the achievement of the policy objectives and key performance indicators for the relevant sector authorities. While the entry angle or lens is payments data, the focus above the line expands beyond payments digitalisation to generating actionable policy insights through novel data analysis.

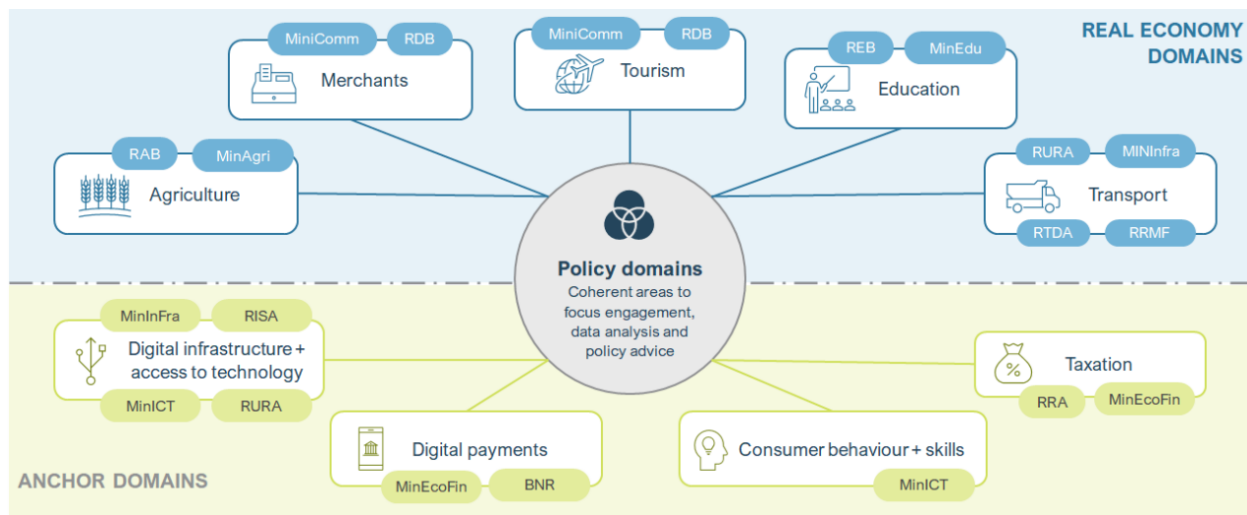


Figure 1: Rwanda Economy Digitalisation Program (RED) policy domains and Government of Rwanda domain-owners

Agriculture data for policy action framework. As the sector where most Rwandans earn their livelihood, agriculture is a fundamental real economy focus sector for the RED programme. Agricultural policy is the domain of the Ministry of Agriculture (MinAgri), in close collaboration with the Rwanda Agriculture and Animal Resources Development Board (RAB) and the National Agricultural Export Development Board (NAEB). The purpose of this document is to illustrate how data analysis can help to

steer interventions for achieving the key policy objectives to which these authorities are held accountable.

Structure. The document starts by outlining the **policy priorities** for the agriculture sector in [Section 2](#). These policy objectives and their corresponding key performance indicators (KPIs) are the point of departure for RED's agricultural engagement and will frame all RED activities in agriculture. Next, [Section 3](#) considers the linkage between agriculture and the digitalisation policy agenda, with particular emphasis on the **role of payments digitalisation** in supporting the relevant policy priorities. From there, [Section 4](#) considers how data held by government, including payments data, can help to measure progress towards the attainment of the policy objectives and identifies **key indicators** to track under this agenda. [Section 5](#) concludes on the implications for policy implementation and the corresponding **data access and partnership** needs.

2. Policy priorities

Why does agriculture matter?

Rwandans' primary livelihood. The agricultural sector is a mainstay of the Rwandan economy: agriculture contributed 26% of the value added in Rwanda's GDP in 2020 (NISR, 2022). According to FinScope (2020), close to 5.4 million Rwandans, or 75% of the adult population, generate their livelihoods through agriculture.

Box 1. Main agriculture activities in Rwanda

- In 2021, 59% of agriculture's GDP contribution was from food crops. The largest three food crops by share of land cultivated in the Seasonal Agriculture Survey (2021) were bush bean (18%), cassava (13%), maize (12%).
- The two main cash crops are tea and coffee, which were responsible for 12% and 7%, respectively, of Rwanda's export earnings in 2020.
- The livestock sector is also significant, particularly cattle and goats. Cattle farming supports a substantial dairy value chain (MINAGRI, 2022).
- Many farmers operate across several value chains. Estimates from FinScope suggest that, on average, commercial farmers operate in five value chains spanning different crops as well as livestock.

Mostly subsistence based. According to FinScope (2020), 4.5 million Rwandan farmers do not sell any produce, that is, they produce food crops only. In contrast, only 880,000 farmers sold or were aspiring to sell their produce. When expressed as a percentage of the full Rwandan adult population (see Figure 2 for the breakdown), these figures show that two out of every three Rwandan adults engage in subsistence farming activities.

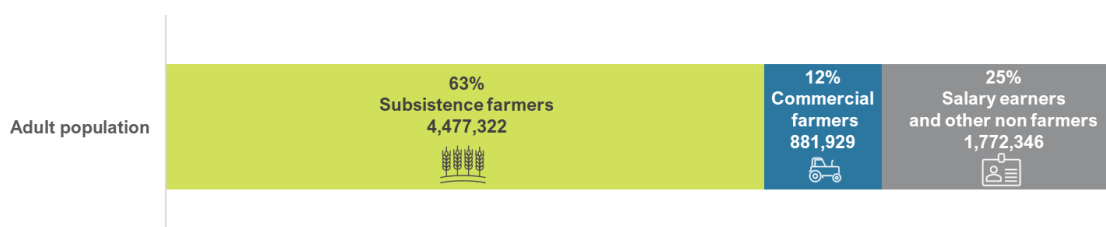


Figure 2: Segmentation of farmers within adult population

Source: FinScope 2020

This picture is confirmed by agricultural production statistics, which show that for Rwanda's main agricultural activities, the bulk of output is not sold. For example, only 41% of banana production, 31% of roots and tubers, 43% of cereals and 16% of legumes and pulses were estimated to have been sold in 2020¹.

Structural constraints. The low share of produce sold and high share of subsistence farming is a symptom of structural challenges to market access for rural farmers, given the topography. Furthermore, the high population density means that the average farm size is only 0.17 ha, making it difficult for subsistence farmers to produce surplus production (RLMA, 2022).

Policy objectives

Central to Vision 2050. The direct relevance of agriculture to most of Rwandan society, coupled with the structural barriers that have so far prevented agriculture from being a source of wealth rather than mere subsistence to most, means that agriculture, and the transformation of the agricultural sector, matter deeply for Rwanda's Vision 2050 aim of seeing Rwanda achieving high-income status by 2050.

Core policy objectives aim to boost productivity and inclusive markets, with defined measures of success. National Strategy for Transformation (NST 1) 2017-2024 is the main implementation plan for reaching Vision 2050. It highlights an **increase in agriculture and livestock quality, productivity and production** as a key priority under *Pillar 1: Economic transformation* and sets a list of KPIs in this regard. Box 2 outlines these main priorities, along with those of two further policy frameworks for agriculture in Rwanda: the Agriculture Sector Strategic Plan (SSP) developed under the NST1, and the MinAgri's Strategic Plan for Agriculture Transformation (PSTA 4) 2018-2024. Each framework sets defined priorities and corresponding measurable indicators focusing on information/extension, productivity enhancement, better access to markets, and enhanced credit access as core themes.

Box 2. Core policy objectives for agriculture

The **NST 1** sets twelve measurable indicators for the agriculture objective under its Pillar 1. These include specific targets regarding land consolidation, land under irrigation and terraced farming; yield increases; increases in storage capacity and reserves in storage; increases in production and productivity over certain crops; as well as a target to double the credit to the agricultural sector as a percentage of total credit extended.

The **Agriculture Sector Strategic Plan (SSP)** identifies four key policy objectives for the agricultural sector by 2024, each with measurable key performance indicators:

- **Innovation and extension:** Technological upgrading, capacitated farmers and rural value chain actors are able to make informed decisions and profitably engage in off-farm activities.
- **Productivity and resilience.** Increase productivity, nutritional value and resilience through sustainable, diversified, and integrated crop, livestock, and fish production systems.

1 Annual Agriculture Survey 2020

- ***Inclusive markets and value addition.*** Improve productivity and inclusiveness of agricultural market systems and increase value addition and competitiveness of diversified commodities for domestic, regional, and international markets.
- ***Enabling environment and responsive institutions.*** Effective and efficient public and private sector services in the agriculture sector. Here, the KPIs include capacity for evidence-based planning, implementation and M&E.

The MinAgri's **Strategic Plan for Agriculture Transformation (PSTA 4) 2018-2024** highlights increased wealth contribution, increased economic opportunity, improved food security and increased resilience as key impact areas for agriculture, each with associated KPIs, and defines several priorities and corresponding KPIs for achieving these impacts.

3. Role of digital technology and digital payments

Digitalisation supports the agricultural policy agenda. The policy agenda for agriculture is closely linked to the broader agenda for the digitalisation of the economy. This is apparent from the fact that agriculture features in the SMART Rwanda Masterplan, where the stated objective is to transform agricultural practices to enhance productivity and increase commercialisation and industrialisation. Moreover, the PSTA 4 pays particular attention to the role of agricultural digitalisation to help monitor sector performance and support decision making processes, provide services to farmers, provide information to facilitate private market actors, as well as to support emerging technologies. The objectives of the National ICT4R Ag strategy (2016-2020) included the development of a common user interface and repository for farm and farmer information, and emphasised the role of ICT in increasing access to agricultural information, knowledge and markets. A range of specific KPIs are set, including regarding farmers' adoption of technology for farming purposes, the number of farmers digitally accessing weather information, and the number of farmers making use of the e-Soko market information tools. The Smart Nkunganire system (SNS) and Smart Kungahara system (SKS) input subsidy schemes are notable examples of implementation activities that leverage digitalisation for productivity growth.

Role of payments digitalisation

Specific KPIs for financial service provision. The PSTA 4 KPIs also acknowledge the role of financial services in the digitalisation-for-productivity drive. This includes specific KPIs for the share of credit to agriculture as a percentage of total loans, in line with the NST1 KPI noted above, as well the number of agricultural financial services and insurance products provided through SACCOs and cooperatives. The ICT4R Ag strategy, likewise, targeted access to and uptake of agricultural finance via the use of ICT.

Digital payments as entry point. As noted in [Section 1](#), this document considers the payments digitalisation or Cashless Rwanda agenda² as the entry angle in exploring how data can be used to inform sector-specific policy objectives. Access to digital financial services plays a direct role in promoting value addition and building inclusive agricultural markets, and digital payments are critical to enable an efficient agriculture sector. Digital payments can inform the objectives and KPIs set out above on several fronts:

2 As the main strategy for the digitalisation of payments in Rwanda and one of the six policy priorities highlighted in the Financial Sector Development Strategic Plan 2018-2024

- **Payments digitalisation can help to increase the accessibility of agriculture markets.** There are already some promising initiatives by prominent aggregators in the agricultural sector to support this goal. The top two tea factories³, Rwandan Mountain Tea and Woods Foundation, have both undertaken payment digitalisation efforts, such as the distribution of smartphones to farmers and opening of bank accounts for farmers⁴. In addition, BK Techouse, a technology aggregator in the coffee value chain, is supporting payment digitalisation of input systems, and is integrated to a digital wallet which so far covers 1,767 agro-dealers and 263,691 farmers⁵.
- **Payment digitalisation can help to increase the share of credit that is extended to the agriculture sector**⁶. According to FinScope (2020) farmers are less likely to access formal credit (11%) than the general population (17%). The National Bank of Rwanda (NBR) annual report also shows that agriculture only received 1% of the reported outstanding loans (NBR, 2022). One of the possible reasons for this gap is that farmers do not tend to have the necessary credit record history to receive loans. Digital payments can help bridge the gap; by digitalising agricultural payments, the farmer creates a transaction history that can be utilised for credit scoring.
- **Digital payments are enablers for input subsidy schemes.** The SNS and SKS input subsidy schemes are strongly driven by digital technologies and payments. This includes the extension of inputs on credit.
- **The ability to make digital payments is a strong driver to increase overall connectivity for farmers.** RED Programme data analysis has shown that digital payments are a significant driver of mobile technology adoption by farmers in Rwanda. The adoption of mobiles, in turn, provides digital communication channels which are essential for agricultural extension services and the distribution of market information – most agricultural extension services, as well as the flagship e-Soko information sharing platform, rely on mobile phones.

How does payment digitalisation come about?

Digitalisation agenda circling out from household to farming level. The fact that most farmers in Rwanda are operating largely on a subsistence basis and do not sell their produce or purchase regular inputs means that the initial scope to digitise payments at scale among farmers lies not primarily in payments for agricultural produce sold, but rather in the broader transactions of farming households, including for farming inputs and credit, as well as for household purchases and payments. Over time, as the agenda to grow productivity and support a shift away from food crop farming progresses, so the scope for payments digitalisation to support that agenda (along with that the number of farmers to be reached) also grows.

3 Between them accounting for more than 75% of tea production in Rwanda.

4 Rwanda Tea distributed 566 smartphones to farmers in September 2021. The Woods Foundation facilitated the opening of bank accounts for all their farmers.

5 Their Smart Kungahara System (SKS) supports input purchases and is set to enable farmers accessing credit from the Bank of Kigali. SKS integrates with BK Techouse's digital wallet IKOFI.

6 The [NBR annual report of 2021](#) shows that agriculture received only 1% of loans. The target in the agriculture SSP is 10%.

Seven core drivers of payments digitalisation. On the premise that payments digitalisation can help to support the agricultural policy agenda, as established above, the rest of this section considers *how* payments digitalisation in agriculture can be brought about. Doing so requires institutional and infrastructure support functions and conducive policy frameworks. It also requires that consumers are ready and able to adopt, as well as appropriate and widely-spread supply of services. A review of the international literature and available Rwanda evidence identifies the following drivers of payments digitalisation as relevant for the agricultural sector in Rwanda:

- **Reliable connections and infrastructure access.** Digital payments are only feasible if supported by the necessary enabling infrastructure. Basic infrastructure such as access to phones, network connectivity and electricity remain a constraint, especially in the rural areas where most farmers live. Nineteen percent (19%) of mobile users indicated that they experienced network downtime while using mobile money and 25% of Rwandan adults do not own a phone (FinScope, 2020). Moreover, 32% of Rwandan households do not have electricity access (Rwanda Energy Group, 2022). The payments digitalisation drive requires both USSD and data connectivity. As most people are familiar with USSD and do not yet have smartphones, USSD continues to be a useful stepping-stone in the digitalisation journey⁷, even if there is a current need to move to a more secure and easy-to-use channel based on data connectivity.
- **Leveraging client aggregators.** SACCOs are an important ally in the digitalisation drive. Farmers are more likely to have an Umurenge SACCO account (37%) than a bank account (14%)⁸. Thus, SACCOs could be leveraged as group clients, or aggregators in the drive to digitalise farmers. Another example of an existing structure that holds promise as a hook for payments digitalisation is the eSoko initiative to supply farmers with up-to-date commodity pricing information. The eSoko initiative is currently operated through WhatsApp groups but has the scope to grow into an e-commerce platform that integrates digital payments.
- **Making it as frictionless as possible.** Given the prominence of cash as default payment instrument in most of sub-Saharan Africa, including Rwanda⁹, digital payments are accelerated by making the change from cash to digital (and vice-versa) convenient and affordable. Therefore, cash-in cash-out (CICO) points, processes and technology need to be affordable, accessible and efficient.
- **Adding value.** When users can access additional services – notably credit¹⁰ – by means of their digital payments transaction profile, it increases the value proposition of using digital payments. For example, the prominence of MoKash in

7 Global evidence shows that the digitalisation of payments achieves momentum through existing payment channels that are familiar to users and require minimum additional investment from providers. Deliberate intervention will be required to transition to more appropriate payment channels where necessary. This would appear to hold true for USSD payments in Rwanda.

8 Umurenge SACCO account ownership is even higher among commercial farmers: 46% have accounts.

9 The importance of CICO infrastructure to ease the shift to digital payments is evidenced in Nigeria's Shared Agent Network Expansion Facilities (SANEF). The programme explicitly includes CICO facilities as part of their offering to increase financial inclusion and payment digitalisation. SANEF was able to expand the agent network in Nigeria to over a million agents in February 2022 in all 774 local government areas. In doing so, SANEF agents facilitated over 1.6 billion transactions by the end of 2021 (Guardian Nigeria, 2022). In Rwanda, 98% of adults reported paying for groceries in cash (FinScope, 2020).

10 By making and receiving digital payments, a person makes their financial life visible to the providers who are then able to use this data to offer safe credit to the user

the provision of credit shows the ability of digital payments to facilitate greater credit access in Rwanda¹¹.

- ***Gradually building trust, growing the network.*** Trust develops over time. As users become more comfortable using digital payments, it is likely to trigger uptake of other use cases as well. This familiarity can also be gained by partnering with institutions that users trust¹². Furthermore, the value of digital payments to users increases as more users join the network and as payment use cases increase¹³. FinScope (2020) data confirms that the most frequent users of digital payments in Rwanda are also the longest-standing users.
- ***Appropriate and transparent pricing.*** The value and structure of fees for digital payments are key determinants in users' perceived value of digital payments. The Rwandan experience with the removal and subsequent reinstatement of fees during the initial COVID-19 lockdown has shown that consumers are highly price-sensitive. It is also important that users can easily understand the structure of the fees charged on digital payments, otherwise it will erode their trust¹⁴.
- ***Achieving scale through interoperability.*** Digital payments require scale to be profitable and sustainable. Interoperability – enabling users to make payments across different providers, channels and instruments – is an important driver of reaching the necessary scale.

11 Another Rwandan payment provider that has value-added services is MobiCash who offer access to insurance, bulk payments, tax payments and grant receipts (MobiCash, 2022). In addition, international payment provider Flutterwave also operates in Rwanda and provides the infrastructure for online stores, professional invoices and embedding financial services (Flutterwave, n.d.)

12 For example, in Kenya, DigiFarm utilised the prominence and familiarity of M-Pesa to reach farmers, reaching 167,000 smallholder farmers during the pilot phase from January to November 2017 (Strydom, 2017).

13 Notably, Kigali functions as a central node in the digital payments network with many payments occurring in the Kigali districts or flowing into or out of Kigali. In addition, Musanze and Huye seem to be the emerging digital payment acceptance nodes outside Kigali. We also see MTN dominating the mobile money market. As mobile wallets were not interoperable until the March 2022 pilot, this meant the network effect was accrued only to users within the same mobile network.

14 Qualitative interviews with merchants in Rwanda further indicate that ad valorem fees on mobile money merchant payments creates uncertainty on the cost of transactions. This uncertainty about ad valorem fees has seen merchants pass incorrect estimates of fees on to customers who wish to pay digitally. By contrast, these merchants consider cash free to transact with.

4. How can data help to drive the policy agenda?

Armed with an understanding of the agriculture policy priorities (Section 2), as well as the role of payments digitalisation in helping to support these policy objectives and the prerequisites or conditions for payments digitalisation (Section 3), we now turn to the question of how data held by government can inform the agricultural policy agenda.

Data insights are core to effective policy implementation. Effective, data-driven measurement can dramatically increase the efficiency of policy implementation, as it allows one to gauge progress on specific KPIs and identify pain points along the policy implementation journey. We see four core roles of data to support policy implementation in agriculture:

1. **Profiling the farmer population.** In the first instance, data allows us to create a digital profile of farmers in terms of their connectivity, device ownership and usage, by district and gender.
2. **Understanding the impact of the input subsidy schemes.** Digital payments data on input scheme and related credit engagements, mapped against farmer productivity data, can render valuable insights on the impact of the input subsidy schemes. The data can also yield essential insights like how many farmers actually receive benefits from the program, where they are located and which benefits are the most useful to farmers.
3. **Highlighting trends in and constraints to payments digitalisation.** As stated upfront, the entry angle for the RED programme is payments digitalisation. Thus, considering data related to the state and nature of digital payments among farmers, as well as the underlying infrastructure supporting payments digitalisation, is the first step in the data for policy agenda in agriculture. The government of Rwanda already holds a number of datasets that can be used to track relevant indicators on the **current state** of, and **drivers** for, payments digitalisation among farmers:
 - **Forming a farmer payment profile.** Combining data from the foundational farmer profile with data on mobile payments and bank account usage, it is possible to track actual uptake and usage of digital accounts (bank accounts and mobile wallets) by farmers. Three relevant indicators can be extracted from a combination of RURA mobile money data, NBR account ownership data and BK TechHouse SNS and SKS data:
 - Farmers with a digital payment account (#), by district and gender
 - Volume of digital payments made by farmers (#), by district and gender
 - Value of digital payments made by farmers (#), by district and gender

Apart from showing overall trends, the data also enables comparison across districts and gender, to help inform the targeting of policy interventions.

- **Understanding the drivers of payments digitalisation.**
Government-held data can help to form an understanding of the status of and trends in various of the payments digitalisation drivers set out in [Section 3](#). Table 1 shows how available data sources and indicators match to several of the identified digitalisation drivers.

Relevant payments digitalisation driver	Indicator	Data source	Rationale
Infrastructure access	Area of farms with mobile network access (%)	MINAGRI ALIS, RURA tower data and mapping of signal strength and ALIS	Connectivity is a basic requirement for digital payment access. Once this is 100%, it can be updated to 4G access.
	Mobile phone ownership by farmers	RURA telecoms data; BK Techouse SNS	Device access is a basic requirement to access digital payments and smartphone ownership is needed to shift the payment channel from USSD.
	Smartphone ownership by farmers		
Network reliability	Network down time (%)	RURA telecoms data	Network down time speaks directly to reliability of the network.
	Call failures as proportion of calls (per district) (%)	RURA telecoms data ¹⁵	Failed calls indicate the reliability of the communications network broadly.
Payment infrastructure and cash-in-cash-out (CICO) access	Number of POS devices, disaggregated by district	NBR card data	Measuring the supply of digital payment infrastructure gives an indication of whether there is sufficient scale and concentration of payment options to make it feasible to pay digitally.
	Number of ATMs, disaggregated by district	NBR ATM data	
	Number of mobile money agents, disaggregated by district	RURA mobile money data	

Table 1: Digitalisation drivers, available data sources and indicators

15 RURA data does not indicate failed calls, but by considering the number of calls between the same two numbers in a short space of time, call failures could be proxied. In other words, if there is more than one calls being placed between two numbers within a span of e.g. two minutes, it could indicate the initial failed call.

4. *Directly informing the agricultural policy agenda.* Beyond the payments digitalisation angle, several existing datasets render indicators that, if systematically tracked, can help to gauge progress against direct agricultural KPIs (see Table 2).

Relevant SSP objective	Indicator	Data source	Rationale
Objective 2: Productivity and resilience	Number of farmers registered to receive inputs (#) by district and gender versus number of farmers actually receiving inputs	NISR population estimates; MINAGRI ALIS; BK Techouse SNS & SKS	This indicator shows the spread of input support to promote productivity and resilience.
	Number of unique farmers accessing commodity prices on eSoko	MINAGRI's eSoko and BK Techouse SNS	This indicator speaks to the supporting role of information like digital prices to help make markets more efficient.
Objective 3: Inclusive markets and value addition	Total value of active credit extended to farmers (#) by district and gender	RURA mobile money data; NBR account ownership data; BK Techouse SNS One Acre Fund data	These indicators showcase how credit is helping to build an inclusive market that supports value addition.
	Farmers with an active credit product (#) by district and gender		
	Total value of active credit extended to farmers, per district and gender (#)		
	Farmers registered on credit bureau (#), per district and gender		
Objective 4: Enabling environment and responsive institutions	Farmers with land registered in their name (%) Average size of land registered, and how this differs by region and farmer types	BK Techouse SNS, MINAGRI Agriculture Land Information System (ALIS); Rwanda Land Management and Use Authority (RLMA) registration data	Land registration is an integral part of the enabling environment for agriculture.

Table 2: Datasets for tracking agricultural KPIs

5. Implications for policy implementation

Better measurement enables better management. This note has provided an overview of the agricultural policy agenda and the role of payments digitalisation in supporting that agenda. It has shown that government already holds several datasets that can render measurable indicators on the state and drivers of payments digitalisation among farmers. Tracking these indicators will help to inform policy decisions and interventions that will not only serve the payments digitalisation agenda but will contribute to the broader agricultural policy priorities. Beyond the payments digitalisation entry angle, data on credit, input programmes and information platform engagement speak directly to the NST1 objectives. **However, these datasets are not yet integrated to allow for a consolidated data4policy analysis.**

The role of RED. The purpose of the RED Programme is to equip government to more systematically track data indicators that inform the attainment of its KPIs. For agriculture, the most important value-add of the RED programme will be to compile a **consolidated database** across the various available data sources – spanning data held directly by the MinAgri¹⁶, several other agriculture sector data sets¹⁷, as well as mobile and financial transaction data held by RURA and the NBR¹⁸. The RED Programme will also with government agricultural ministries and institutions to develop skills and capacity to support data-driven policymaking.

By combining these various datasets into one consolidated data bank, we are able to map the profile and activities of 90-95% of all farmers in Rwanda. This dataset will then allow us to draw out policy-ready indicators on farmer profiles (e.g. locale, type of farming operation, ownership status, type of crop), engagement with input subsidy programmes, as well as digital payments and credit profile (i.e. account ownership and usage). Preliminary analysis already shows the value of overlaying agricultural credit and input subsidy data with mobile transaction data. It shows an interesting differences in the digital payment behaviour between farmers and the general mobile money subscriber base, suggesting that farmers use mobile money for different purposes, and are likely to be more price sensitive than the general population.

This is only the start. Over the next two years Cenfri will work closely with the MinAgri, the Rwanda Agriculture and Animal Resources Development Board (RAB) and National Agricultural Export Development Board (NAEB), alongside the MiniCT

16 Relevant datasets: eSoko; Ministry of Agriculture Management Information System; National Agriculture Insurance Scheme; Agriculture land information systems (ALIS).

17 Relevant datasets: Smart Nkunganire system provided by BK Techouse; Smart Kungahara system provided by BK Techouse; One Acre Fund customer information system; Rwanda Land Management and Use Authority systems; Land information query portal; Rwanda Geoportal; National Land Use Planning Portal; Rwanda Land Dashboard

18 Relevant datasets: Mobile money data provided by RURA; Financial sector account data provided by NBR.

as anchor policymaker for digitalisation, to unlock the power of data for public policy in agriculture. This will be achieved via analysis of the relevant datasets outlined in this note, as well as joint deliberation on further datasets to collate and relevant indicators to define to measure the Agriculture SSP KPIs.

6. Bibliography

- BCTA, 2015. *Colombia's Online E-Payments Platform: Private Sector Innovation Inspired by Government Vision*. [Online]
Available at : https://btca-production-site.s3.amazonaws.com/documents/29/english_attachments/Colombia-PSE-Case-Study-Long-ENG-Jan-2015.pdf?1438936030
[Accessed 29 April 2022].
- Better Than Cash Alliance, 2017. *How Digitizing Agricultural Input Payments in Rural Kenya Is Tackling Poverty: The Case of One Acre Fund*. [Online]
Available at: https://btca-production-site.s3.amazonaws.com/documents/287/english_attachments/RuralKenyaIsTacklingPovertyCaselet.pdf?1495717431
[Accessed 8 April 2022].
- BCTA, 2020. *How Digitizing Agricultural Input Payments in Rural Kenya Is Tackling Poverty: The Case of One Acre Fund*. [Online]
Available at: https://btca-production-site.s3.amazonaws.com/documents/287/english_attachments/RuralKenyaIsTacklingPovertyCaselet.pdf?1495717431
[Accessed March 2022].
- Byishimo, B., 2022. *MTN-Airtel MoMo services to be integrated on March 15*. [Online]
Available at: <https://www.newtimes.co.rw/news/mtn-airtel-momo-services-be-integrated-march-15#.Yh5-9-Ckm6Y.whatsapp>
- CGAP, 2019. *China: A Digital Payments Revolution*. [Online]
Available at: <https://www.cgap.org/research/publication/china-digital-payments-revolution>
[Accessed 29 April 2022].
- FAO, 2021a. *Digital agriculture report: Rural e-commerce development experience from China*. [Online]
Available at: <https://www.fao.org/documents/card/en/c/cb4960en/>
- FAO, 2021b. *Digital Agriculture Profile*. [Online]
Available at: <https://www.fao.org/publications/card/en/c/CB3955EN/>
[Accessed March 2022].
- FIGI, 2020. *Electronic Payments Acceptance Incentives: Literature Review and Country Examples*. [Online]
[Accessed 8 April 2022].
- Flutterwave, n.d. *Endless possibilities for every business*. [Online]
Available at: <https://flutterwave.com/rw>
[Accessed 19 May 2022].
- Fourtané, S., 2020. *Sweden: How to Live in the World's First Cashless Society*. [Online]
Available at: <https://interestingengineering.com/sweden-how-to-live-in-the-worlds-first-cashless-society>
[Accessed 11 May 2022].
- GhIPSS, 2022. *GhQR FAQ Customer*. [Online]
Available at: <https://ghipss.net/index.php/publications/ghqr-customer>
[Accessed 6 April 2022].

- GSMA, 2021. *GSMA Mobile Connectivity Index 2020*. [Online]
Available at: <https://www.mobileconnectivityindex.com/#year=2019&zonelsocode=RWA>
[Accessed 29 March 2022].
- Guardian Nigeria, 2022. *he Guardian's special focus and Nigeria's most impactful and award-winning CEOs in 2021: Part 2*. [Online]
Available at: <https://guardian.ng/features/the-guardians-special-focus-and-nigerias-most-impactful-and-award-winning-ceos-in-2021-part-2-2/>
[Accessed 11 May 2022].
- Karombo, T., 2022. *"It's a lazy tax": Why African governments' obsession with mobile money could backfire*. [Online]
Available at: <https://restofworld.org/2022/how-mobile-money-became-the-new-cash-cow-for-african-governments-but-at-a-cost/#:~:text=Angela%20Wamola%2C%20the%20acting%20head,after%20introducing%20it%20at%201%25.>
[Accessed 8 April 2022].
- Kodalo, C., 2021. *Ghana's Controversial E-Levy Reportedly Causes Mobile Money Flight*. [Online]
Available at: <https://bitcoinke.io/2021/12/ghana-controversial-e-levy-reportedly-causes-mobile-money-flight/>
[Accessed 8 April 2022].
- Mercy Corps, 2019. *DigiFarm: A Digital Platform Made for Farmers*. [Online]
Available at: <https://www.mercycorpsagrifin.org/project/digifarm-a-digital-platform-made-for-farmers/>
[Accessed March 2022].
- MINAGRI, 2018. *Strategic Plan for Agriculture Transformation 2018-2024*. [Online]
Available at: https://www.minagri.gov.rw/fileadmin/user_upload/Minagri/Publications/Policies_and_strategies/PSTA4_Rwanda_Strategic_Plan_for_Agriculture_Transformation_2018.pdf
[Accessed 13 June 2022].
- MINAGRI, 2022. *Annual Report 2020-2021*. [Online]
Available at: https://www.minagri.gov.rw/fileadmin/user_upload/Minagri/Publications/Annual_Reports/MINAGRI_ANNUAL_REPORT_2020-21_FY.pdf
[Accessed 13 June 2022].
- MobiCash, 2022. *Amazing Features: Value Added Services for everybody. Now you can pay all your bills using your mobile phone*. [Online]
Available at: <http://www.mcash.rw/>
[Accessed 19 May 2022].
- Mumbere, D., 2018. *Uganda removes taxes on 'depositing and sending' mobile money*. [Online]
Available at: <https://www.africanews.com/2018/07/17/uganda-removes-taxes-on-depositing-and-sending-mobile-money/>
[Accessed 19 May 2022].
- Munoz, L. A. et al., 2021. *Digital Agriculture Profile Argentina*. [Online]
Available at: <https://www.fao.org/publications/card/en/c/CB3955EN/>
[Accessed 6 April 2022].
- NBR, 2022. *National Bank of Rwanda Annual Report 2020-2021*. [Online]
Available at: https://www.bnr.rw/news-publications/publications/annual-reports/?tx_bnrdocumentmanager_frontend%5Bdocument%5D=2017&tx_bnrdocumentmanager_frontend%5Baction%5D=download&tx_bnrdocumentmanager_frontend%5Bcontroller%5D=Document&cHash=c37c5e48e2816ff1f9468e408

- NISR, 2021. *Seasonal Agricultural Survey (Annual Report, 2021)*. [Online]
Available at: <https://www.statistics.gov.rw/publication/1754>
[Accessed 13 June 2022].
- NISR, 2022. *Labour Force Survey Annual Report 2021*. [Online]
Available at: <https://www.statistics.gov.rw/publication/labour-force-survey-annual-report-2021>
[Accessed 13 June 2022].
- NISR, 2022. *Statistical Year Book 2021*. [Online]
Available at: <https://www.statistics.gov.rw/publication/1767>
[Accessed 13 June 2022].
- Primeiropay, 2020. *Selling online in Colombia? Here is what you need to know*. [Online]
Available at: <https://primeiropay.com/blog/markets/selling-online-in-colombia-primeiropay/>
[Accessed 29 April 2022].
- PYMNTS.com, 2021. *QR Code Payments Tracker*. [Online]
Available at: <https://securecdn.pymnts.com/wp-content/uploads/2021/03/PYMNTS-QR-Code-Payments-Tracker%E2%80%93March-2021.pdf>
[Accessed 6 April 2022].
- , 2022. *Rwanda Land Use Portal*. [Online]
Available at: <https://rwandalanddashboard.rlma.rw/>
[Accessed 13 June 2022].
- Rwanda Energy Group, 2022. *Electricity access*. [Online]
Available at: <https://www.reg.rw/what-we-do/access/#:~:text=To%20date%2C%2068.17%25%20of%20Rwandan,is%20100%25%20access%20by%202024.>
[Accessed 25 March 2022].
- SANEF, 2020. *About SANEF*. [Online]
Available at: <https://www.sanefng.com/about-sanef>
[Accessed 6 April 2022].
- Shu, C., 2016. *Traditional Red Envelopes Are Going Digital Thanks To China's Largest Internet Companies*. [Online]
Available at: https://techcrunch.com/2016/02/08/smartphone-hongbao/?guccounter=1&guce_referrer=aHR0cHM6Ly9lbi53aWtpcGVkaWEub3JnLw&guce_referrer_sig=AQAAAVSizUB0zGlz7dQY5CM6FEGgmIYT6LcKqmWa3dm91WBfAgpy-rJtrU1GfaNxxAMWni2bo2kv_i9R7yrRP_ytPcq8StHObv_f4eQTwhUcGn-nb2wW3TVZ
[Accessed 8 April 2022].
- Strydom, C., 2017. *DigiFarm: Technology that bolsters change in Kenya*. [Online]
Available at: <https://mezzanineware.com/digifarm-technology-that-bolsters-change-in-kenya/>
[Accessed 8 April 2022].
- The Wood Foundation, 2021. *Spill Over Effects of Nyaruguru Greenfield Development of Nyaruguru Phase II*. [Online]
Available at: <https://www.thewoodfoundation.org.uk/wp-content/uploads/2021/03/SILTTPR-Spillover-Effects-of-Phase-I-Nyaruguru-Phase-II-Final-17.03.2021.pdf>
[Accessed 19 May 2022].
- UNCDF, 2021. *The Impact of Mobile Money Taxation in Uganda*. [Online]
Available at: <https://www.uncdf.org/article/7313/the-impact-of-mobile-money-taxation-in-uganda>
[Accessed 19 May 2022].
- von Bismarck-Osten, M., 2021. *Understanding Strategic Decisions of Digital Agricultural Platform Companies: Six Case Studies of Sub-Saharan African Platforms*. [Online]
Available at: <https://ssrn.com/abstract=3849193>
[Accessed 9 April 2022].

Wills, A., 2014. *Case study: Kopo Kopo*. [Online]
Available at: https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2016/02/Case_Study_-_Kopo_Kopo_04_2014.pdf
[Accessed 8 April 2022].